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Getting the Most from the Index

THIS is essentially a subject index, not an index of titles, and articles treating a number of different subjects are listed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, city, state or nation. Entries about an electric railway are under the name of the city in which the main office of the company is located.

In the subject index, the alphabetical method is followed. If there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. The headings which appear in the index itself are in small type under the general classifications. The main headings in capitals below do not appear in the index.

As an example of how to use the index, if a reader wishes to locate an article on special trackwork he obviously would look in the list below at the general subject "Track." Under this caption, only "Special trackwork" could apply to the article in question.

The large number of articles brought out on the monthly maintenance data sheets, together with the increasing number of maintenance notes in other issues has resulted in the substitution of three keywords, for indexing items formerly appearing under "Repair shop practice": (1) Maintenance data, under which all articles appearing on the monthly maintenance data sheets are grouped; (2) Maintenance equipment, with classified subheads, under which all articles in the weekly department "New Equipment" are included, and (3) Maintenance practice, also with classified subheads, under which all articles in the weekly department "Maintenance Notes," as well as the articles on the data sheets, are inserted. The heading "Repair Shops and Equipment" has been reserved for general articles on the design of repair shops and their equipment. Otherwise the plan used for many years in the preparation of this index has been followed.

In addition to the groups of articles covered by these headings, papers and reports from railway associations are grouped under the names of the various organizations. Proceedings of other associations and societies are indexed in general only in accordance with the subject discussed.

Signed articles also are indexed by the name of the author. When the name of the author is known to the reader this provides the simplest method of locating any article.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND ACCIDENT PREVENTION
Accident claim department
Accident prevention
Accidents (including wrecks)
Insurance, Fire
Safety work
Storm and fire damage

ELECTRIC CARS AND SERVICE CARS
Cars (including car design)
Locomotives
Service and tower trucks
Trackless trolley

CAR EQUIPMENT
Bearings
Brakes and compressors
Doors, car
Electrical equipment for cars (except motors)
Gears and pinions
Heaters, electric
Lighting and lighting fixtures
Motors, Electric
Seats
Trucks
Wheels and axles

EMPLOYEES
Education
Employees
Insurance and pensions
Labor
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Fare decreases
Fare increases
Fares
Traffic investigations
Traffic stimulation

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Appraisal of railway property
Blanks and forms
Discontinuance of lines
Financial (methods of financing)
Financial reports
Franchises
Insurance, Fire
Insurance and pensions
Legal
Legislation for railways
Market conditions
Operating records and costs
Public service and regulative commissions
Statistics
Taxes

HEAVY ELECTRIC TRACTION
Heavy electric traction (general)
Locomotives

MAINTENANCE OF EQUIPMENT
Car cleaning
Lubrication
Maintenance data
Maintenance equipment
Maintenance practice
Maintenance tools, Suggestions for
Motor buses, Operating practice
Painting
Repair shops and equipment
Stores
Tests of materials and equipment
Welding

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Motor buses, design
Motor buses, gas-electric
Motor buses, installations
Motor buses, jitney competition
Motor buses, Operating practice
Motor buses, regulation

POWER
Energy checking devices
Energy consumption
Fuels

POWER—Continued
Overhead contact system
Power distribution
Power generation
Power stations and equipment
Power transmission
Substations and equipment

STRUCTURES
Bridges
Carhouses and storage yards
Loading platforms
Power stations and equipment
Repair shops and equipment
Substations and equipment
Terminals and waiting stations

TRACK
Pavements
Rail joints and bonds
Rails
Special trackwork
Ties
Track construction
Track maintenance

TRAFFIC AND TRANSPORTATION
Advertising
Dispatching
Freight and express
Interurban railways
Merchandising transportation
Parking of cars
Publicity
Public, Relations with
Rapid transit (elevated and subway)
Schedules and timetables
Signals
Street traffic congestion
Traffic investigations
Traffic regulation
Traffic stimulation
Transportation, Metropolitan (general studies)

MISCELLANEOUS
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[Vol. 73

Electric Railway Journal

Consolidation of
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Engineering Library

Electric Railway Journal is a consolidation of *Street Railway Journal* and *Electric Railway Review*, effected in 1908.

In November, 1884, *Street Railway Journal* began publication, having been started a few months earlier as the street railway department of the *Journal of Railway Appliances*. The new paper was edited during various periods by Robert Grimshaw, George L. Fowler, Emerson P. Harris, C. B. Fairchild and Edward E. Higgins.

In May, 1908, *Electric Railway Review* was purchased and consolidated with *Street Railway Journal* to form Electric Railway Journal. Henry W. Blake, who joined the staff of *Street Railway Journal* in 1891 and in 1894 became its editor, continued as the editor of Electric Railway Journal until 1925, when he was made senior editor. Harold V. Bozell was co-editor from 1920 to 1922 and Harry L. Brown was co-editor from 1923 to January, 1925. Charles Gordon became editor in February, 1926.

The present staff is as follows: editor, Charles Gordon; acting managing editor, John A. Miller, Jr.; senior editor, Henry W. Blake; engineering editor, Morris Buck; editorial staff, Clarence W. Squier, George J. MacMurray, Clifford A. Faust, J. W. McCloy, V. A. Hanson and L. H. Church (Chicago). Paul Wooton is Washington correspondent and Alexander McCallum is London editorial representative.

Seeking the Causes of Changes in Riding

THE OLD rule for approximating the volume of future traffic on a city electric railway was that passengers would increase with the square of the population. Enunciated in the early 90's, this rule generally held true both in this country and abroad until from ten to fifteen years ago. Then it began to show signs of failing, largely because of competition from other means of transport, principally the private automobile. Now, some railways find that their annual returns show fewer passengers carried than the year before, in spite of accessions in population. Even where all the bus service in a city is operated by the railway, there are numerous instances where the passengers on both types of public transportation vehicles are fewer each year, despite increases in the population of the district served. It may be that the old law holds true if applied to all riding, but that does not greatly help the harassed railway manager. The matter in which he is interested is what can be done to retain his business. He wants to know what law has come to take the place of the one which seems to have been superseded? What cities, if any, are showing increased patronage of local public transportation facilities?

Some of these questions are answered, at least for large cities, in a report prepared by the Beeler Organization and recently submitted to the New York Transit Commission. Abstracts appear in this issue and that of December 22. Briefly, the traffic returns for ten years in four rapid transit cities and five cities without rapid transit were examined and showed a fundamental difference. In the four rapid transit cities, the surface traffic by trolley car and bus has generally maintained its former proportions and in some cases has increased, despite increases in travel on the rapid transit lines. In all the cities without rapid transit, there has been a decrease in the combined bus and surface car travel. The reason given for this noteworthy situation is the demand for speed in transit. Where only buses and surface cars provide mass transportation, many persons will use private automobiles and taxicabs for their longer trips. Where rapid transit has been installed, the surface lines gain in short haul business more than they lose in long hauls, because many rapid transit passengers use them to complete their journeys. Supplementary evidence on this explanation of the effect of rapid transit on surface vehicle riding is found in the fact that the cities with the largest proportion of rapid transit have the highest riding habit on cars and buses and the lowest registration of automobiles per thousand population.

Granting this diagnosis, what is the remedy? What factors may be expected to increase riding in cities without rapid transit? The report does not discuss this question because it was prepared for another purpose, but perhaps the answer can be reached by the process of elimination. Is a solution to be found in more general use of private automobiles and taxicabs? Obviously not. The congestion on city streets is now bad enough. Is the remedy buses? No, again. The report indicates that extended bus service in all the cities studied has not altered the situation. Where buses make frequent stops, they are no faster than trolley cars of the same size. Is the answer to be found in the construction of rapid transit systems in cities now without them? This is evidently one remedy, but it should be remembered that a rapid transit system is very expensive to build and can be made to pay only under conditions of continued dense traffic. Few cities can afford subways.

The only other possibility is improvement and greater use of existing railway and bus systems. This will have to be the answer in most cases. With greater restrictions on the use of individual transportation vehicles, which are notoriously wasteful of street space, with greater organization and co-ordination of the several agencies using city streets, and with higher speeds for the trolleys and buses, many cities will be able to postpone for many years a complete sub-surface or elevated system. After all, the point most emphasized by the report is the demand by the public for speed in transit. More attractive rolling stock and better schedules, coupled with the judicious addition on certain routes of express higher-fare buses, should bring back much of the business which

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has been lost. The report is indeed thought provoking and is worthy of serious attention by every transportation executive.

Traffic Pipe Dreams

LIKE a hardy perennial, the idea of double-deck streets as a panacea for all our traffic ills springs up at regular intervals. It is hardly surprising that this suggestion attracts the attention of a public harassed by the constantly increasing inconvenience, delay and danger from the flood of vehicles in our streets. The industry which has produced the greatest part of this traffic flood and which is dependent for its continued prosperity upon finding additional space where automobiles can operate, naturally seeks to induce the community to provide this space. That is to be expected. But when the automobile manufacturer is carried so far by his enthusiasm that he makes misleading statements regarding the relative economic importance of other forms of community transportation, it is time to challenge his competence or his motives. A striking example is furnished by the statement printed a short time ago in the Detroit *Free Press* and attributed to R. E. Olds, veteran automobile manufacturer:

"Light steel elevated speedways could be built on Detroit's main arteries at a fraction of the enormous cost of subways. Through traffic could travel at top speed on the raised roadway and local traffic could use the surface streets. This system would last many decades after subways have become obsolete and would establish Detroit as a world leader in handling the transportation problem. After building the elevated, the city should purchase two or three undesirable business blocks in the downtown district and erect municipal garages of the ramp style, ten or twelve stories high."

A proposal of this kind would be too ridiculous to merit serious consideration, if similar ideas did not have a persistent habit of bobbing up in the public press. The impracticability of the scheme is easily seen. First of all, we are urged to use individual vehicles for transportation instead of public carriers. Then, because the vehicles must be stored somewhere during the day, the community is asked to condemn property in the crowded business district to provide great free public garages. Imagine the hours between 5 and 6 o'clock in the evening or 8 and 9 in the morning at these garages! Since Mr. Olds considers subways obsolete and presumably street cars too, there would be added to the 25 or 30 per cent who now use individual transportation, the 70 or 75 per cent who are dependent upon public vehicles. Neglecting for the moment the matter of cost, consider only the physical situation at these garages. The congestion and confusion would be appalling.

But inevitably the matter of cost does come up for consideration. The city is asked to provide these great free garages, and then the double-deck streets, at a fraction of the cost of subways, according to Mr. Olds, but it seems hardly likely that the automobile industry will come forward to provide the funds. In addition, those who now ride public transportation vehicles and who are to be denied the privilege of continuing that economical method of travel, must provide their own automobiles, which on the most conservative basis will cost them from 8 to 10 cents a mile to operate.

Experience fails to furnish any justification for the assumption that double-deck highways can be built for a fraction of the cost of subways. Furthermore, there is the possibility of elevated rapid transit to be compared with the cost of elevated highways. Mr. Olds seems to have overlooked the fact that competent engineers have estimated that one four-track rapid transit system, either subway or elevated, serves more people in the rush hour than can be carried by 25 express boulevards for private automobiles at the average conditions of loading found in city service! Actually it would probably be cheaper to provide each traveler with an individual upholstered arm chair in a rapid transit train than to provide transportation under Mr. Old's plan. Why not try that? If we are to solve the traffic problem by indulging in a pipe dream, let's make it a good one.

Determining the Proper Standard of Bus Maintenance

SUPERINTENDENTS of equipment and garage foremen are trying constantly to reduce the cost of maintaining buses. New methods, new materials and modern equipment often permit substantial savings to be made. However, it is important to remember that many of the ways of lowering maintenance cost also lower the standard of maintenance. For example, if fewer inspections are made, the cost will be less but the buses may not be kept in a proper state of repair. Or, if buses are cleaned only every week instead of being cleaned after every run, a large saving will be made in labor, but the buses will not appear as they should. The big problem, therefore, is to determine the proper relation between the standard of maintenance and the cost of doing the work. This is a problem which cannot be solved satisfactorily by any known formula. The foreman of the garage might, offhand, be considered the logical one to determine the proper balance between the standard and the cost, but his duty is primarily to take care of the shop work, supervising the technical details and the personnel. He is responsible in a great measure for the effectiveness of the methods and equipment used in the garage and can influence to a large extent the cost of the various phases of the work, but his experience may not be sufficiently broad to permit him to determine correctly the proper standard of maintenance.

Again, the superintendent of equipment might be thought to be the one to decide this question. His opinion is valuable, but can hardly be considered final until the entire organization has been consulted. The fact is that personal opinion alone cannot be relied upon to determine the proper balance between the standard of bus maintenance and the cost. As pointed out by Adrian Hughes, Jr., superintendent of bus transportation of the United Railways & Electric Company of Baltimore, in an article published elsewhere in this issue, there is a need for some practical and direct method of answering this question. Mr. Hughes mentions that in Baltimore the number of road failures or service calls per 10,000 miles of bus operation is used as a measure of the condition of the equipment and that the allowance for each vehicle is determined from its condition. The trend in the number of service calls from month to month or from year to year, should be a positive indication of the condition of the equipment and should reflect the effect of the expenditures for maintenance. The method used in Baltimore may not be the best means of indicating the minimum figure, but at least it is a good one. Certainly, it is reasonable not only to obtain the personal opinions of the manager, the superintendent of equipment and other supervisory officials, but also to refer to figures which indicate the condition of the vehicles.

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By-Products of Safety

AMONG the results of any organized safety effort, such as that which inspired the contestants in the recent Anthony N. Brady contest, are a reduction in the number of accidents and a decrease in the injury and damage payments. These are the items that affect the balance sheet. That they are important factors goes without saying. By no means all of the benefits that accrue, however, can be measured in dollars and cents. One of the points brought out in each of the briefs submitted is the psychological effect upon public opinion of the measures taken by the companies in the interest of public safety and accident prevention.

In Youngstown, Ohio, the center of the activities of the Penn-Ohio System, winners of the Class A Award this year, the practice of instituting law suits based upon real or alleged injuries, had developed into an organized industry. Not only was the trolley company being systematically victimized but casualty insurance companies, local corporations and even individuals were being mulcted in suits which had little basis in fact or justice. As the result of resolute steps taken by the Penn-Ohio System, in which it had the active support of a citizens' committee, organized for that very purpose, this practice was to a large extent broken up. The energetic measures taken are expected to have a lasting effect upon the shysters who have plagued the community by their ambulance-chasing activities. That it will also have a favorable reaction among the more substantial interests in the district is assured. And now that the company is in position to announce that it has been accorded national recognition through the granting of the Brady Award, it is safe to say that the general public will not be backward in giving credit where credit is due.

In discussing the effect upon public opinion of the winning of last year's award, the El Paso Electric Company, in its brief this year, says: "This achievement has thoroughly convinced all citizens of the community that we are operating our cars in a safe and efficient manner. . . . The natural civic pride that has resulted has had a beneficial effect in creating a general safety consciousness which has helped to reduce all types of public accidents." It is within reason to expect that on the properties of the Penn-Ohio System, the Tampa Electric Company, and the Tide Water Power Company, winners of the latest awards, the results during the months to come will be none the less substantial, even though they may not be measured directly by a monetary yardstick.

An Unusual Recipe for Success

AT A DINNER a few weeks ago, citizens of Richmond extended an unusual tribute to the winner of the 1928 Coffin award. Each speaker praised the company's achievements in his own way. It remained, however, for the witty toastmaster, who, by the way, had led the fight against this very property three years before, to give the real reason for the Virginia success. "Hold your breath under water longer than the other fellow," he said, was a recipe for success given him by his father, and evidently the owners and management of the Virginia Railway & Power Company were adept in this art.

Although unbeknown to the public, a lot of this "breath holding" is being practiced throughout the local transportation industry. Some managements have come up for air, but few have been rewarded with such praise as was meted out in Richmond. It is a heartening thought, however, that the painful experiment has in some cases received its just recognition. It holds out increased hope to those who are inclined to question whether or not persistent effort toward improvement of transportation service in the face of present inadequate return, is really worth while.

An Open Mind on Coach Design

IT REMAINED for a leader in the bus field to marshal a really comprehensive analysis of the difficulties that face the automotive engineer in building vehicles for public transportation. This was done in the article by G. A. Green, vice-president in charge of engineering of the General Motors Truck Company, printed in last week's issue of the JOURNAL. And in thus frankly presenting the facts, particularly with respect to the wide gap that separates bus and automobile performance, the author has unquestionably rendered a distinct service to the entire local transportation industry. Furthermore, in throwing aside the inhibitions of commercial considerations to the extent of talking out to customers and competitors alike on the engineering and common-sense questions involved in bus development, he leads the way toward that frank discussion and interchange of ideas which has for so many years accompanied and been largely responsible for the spectacular strides made by the automotive industry.

One word suffices to define the primary problem of the bus—power! Higher acceleration and higher schedule speed are required to meet the public demand for automobile performance. But as Mr. Green also points out, this standard of comparison is not fixed; it is itself moving forward constantly. Each year the new models of passenger cars are subjected to an annual reaming process to give constantly increasing power output. To meet present automobile standards of performance with buses of the conventional 29-passenger type (Mr. Green bases his figures on a total loaded weight of 19,250 lb.) would require engines of from 1,400 to 1,600 cu.in. displacement! And that is on the assumption of no increased weight for the larger engine.

Here are considerations that demand careful study by the purchasers and manufacturers of buses. The demand for large vehicles exists because the buyer of coaches presses constantly for increased carrying capacity. He visualizes the possibilities of hauling an increased number of passengers for a given labor cost. This applies not only to buses for city service, but to long-distance intercity operators as well. But larger capacity is only one phase of the demand.

Undoubtedly it is high time to face the economic as well as the engineering facts. There is danger that the bus industry may enter upon the same vicious cycle of increased vehicle size and cost that is responsible for many of the difficulties of the railway industry, though there are many railway men who do not, even at this late date, fully understand this fact. If engines of the size indicated by Mr. Green should be built, they would mean heavier chassis, greater fuel consumption and increased first cost. These are to be balanced against the driver's time. Only by the most careful study of these several factors can costly mistakes be avoided if the demand for large size and increased power persists. Perhaps this study would lead to smaller, not larger buses. All of which emphasizes the need for preserving an open mind, and for the kind of frank discussion in which Mr. Green has so courageously led the way.

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PENN-OHIO Wins Class A Safety Medal

Brady Award in Class B goes to Tampa Electric Company and in Class C to Tide Water Power Company of Wilmington, N. C. Many ingenious methods of increasing safety outlined in Penn-Ohio brief

Crossing a street in Youngstown under signal

PRESENTATION of the awards in the 1927 Brady Safety Contest was made at the meeting of the Metropolitan Section, A.E.R.A., on Jan. 4. The winner of the medal for the best safety record among the Class A roads, or those operating 5,000,000 or more car or bus-miles during the year, was the Penn-Ohio System. Honorable mention in Class A was given to the Louisville Railway Company, winner of the award last year. The medal among the Class B roads, or those operating between 1,000,000 and 5,000,000 car and bus-miles annually, was awarded to the Tampa Electric Company, with honorable mention to the El Paso Electric Company.

The medal for the Class C roads, or those operating less than 1,000,000 car and bus-miles last year, was awarded to the Tide Water Power Company of Wilmington, N. C. This company was also the winner of the same medal last year for its excellent safety record and methods. Particulars of the ceremonies accompanying the award of these prizes will be published in next week's issue. An outline is given here of some of the safety practices of the Penn-Ohio system, winner in the Class A group of companies. Data in regard to safety methods of the other competing companies will follow in later issues of ELECTRIC RAILWAY JOURNAL.

Altogether the Penn-Ohio system comprises 60 miles of interurban railway, 380 miles of motor bus routes, 73 miles of city railways and 42 miles of city bus routes. Within Youngstown the operation is conducted on a service-at-cost franchise by the Youngstown Municipal Railway. Outside of Youngstown the operation is conducted by the Pennsylvania-Ohio Public Service Corporation through a number of subsidiary operating organizations.

In some respects the industrial nature of the community served has made an intensified accident prevention policy a necessity. The steel industry, which is very prominent in this district, depends for its labor upon a population which includes a very large foreign element. Moreover, for some years past a commercial business has developed of propagating law suits based on injuries. While the victims of this malicious practice have been accident insurance companies, steel companies and steam railroads as well as the local transportation companies, this condition has added another incentive to the utilities in the district to organize for safety work. Fortunately, the situation has now been taken in hand by a citizens' committee and the local bar association, and ambulance chasing will be soon a matter of the past.

The safety program of the Penn-Ohio and associated companies has been developed consistently during a

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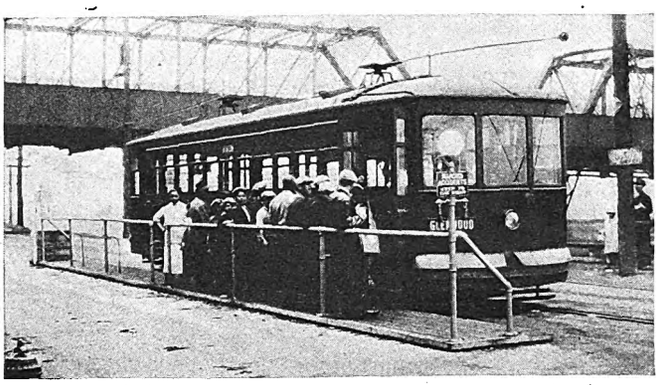
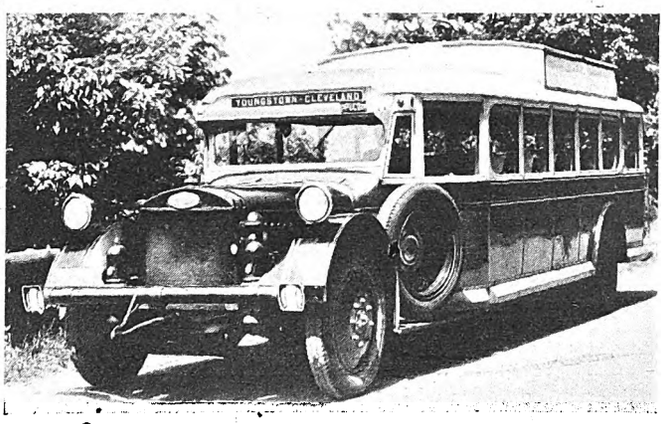
White safety belts protect track men



This safety zone with pipe railing enables passengers to board the cars safely at an industrial plant



Lights on the bumper of coaches give the operator a wider range of vision during night driving

Heaters prevent window frosting

period of nine years. The program embraces the following factors:

(A) The prevention of accidents wherever possible through mechanical means:

1. Every street car in regular service is equipped with complete safety features, such as ordinarily are found only on Birney cars. The same is true of the interurban and suburban cars.
2. Every railway crossing is provided with trolley guards.
3. Every siding or switch where cars pass is provided with automatic signal lights. There is only one hand-throw signal on the property.
4. Hand-throw switches are used only where circumstances render it impossible to install electric switches.
5. There is no old or obsolete piece of special trackwork on the system.

(B) A complete program of educational work in accident prevention is carried on through the following agencies:

1. Bureau of Safety of Chicago, consultant and advisor.
2. A system safety supervisor.
3. Safety committees embracing: (a) Central executive committee, (b) central transportation committee, (c) intermediate committees, (d) local groups.
4. A complete looseleaf record of the accidents of each car or bus operator.
5. Safety contests which have been carried on continuously for several years.
6. A bonus system on the lines of the Youngstown Municipal Railway.
7. A company magazine for employees, devoted largely to safety work.
8. Dinner meetings at which officials meet with employees to increase interest in accident prevention.

(C) Active co-operation of managers and superintendents in safety work, and active participation in all public safety efforts in the communities served.

These efforts have been effective, as shown by the reduction in accidents during the first seven months of 1928 as compared with the first seven months of 1927. The figures are shown in the table below.

SEVEN MONTHS ACCIDENT RECORD, PENN-OHIO AND YOUNGSTOWN MUNICIPAL RAILWAY

	Jan. 1 to Aug. 1, 1928	Jan. 1 to Aug. 1, 1927
Street cars	1,226	1,470
Buses	712	828
Total	1,938	2,298

Means By Which Safety Has Been Effected

Means by which greater safety has been effected are given in the brief submitted by the company for the 1928 Brady Safety Award. A few of them will be mentioned.

One of the contributions to the cause of safety was the "white safety car." A standard safety car, equipped with full safety devices, was decorated inside and out with white Duco. Then different slogans were painted on the exterior. Each slogan was followed with the name of its sponsor, such as the Boy Scouts, Playground Association, Youngstown Automobile Club, and others. A few of the slogans follow:

"Make motoring a pleasure, not a peril."
"Help prevent accidents. It is your duty."
"The best safety slogan is to be careful."
"Say it with brakes and save the flowers."
"Motorists, look back before you leave the curb."
"A bed at home is worth two in the hospital."

A unique feature of the car is that it is illuminated at night, which makes it even more effective then than in the daytime. In the inside of the car, in place of the usual advertisements, the card racks carry safety posters furnished by the National Safety Council. This car was operated during 1926 in regular passenger service on

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each car line in all of the communities served, and has acquainted the people of these sections with the company's endless efforts to prevent accidents.

The city of Youngstown and the company shared in the purchase of a machine which is used to paint "car swing," "safety zone" and other markings on the street pavement. The painting is done by city workers, with a railway representative on hand, when necessary, while the work is being done.

Where railway tracks turn from the center of the street to private right-of-way or from the side of the highway on to the highway, illuminated warning signs like that illustrated are erected. They have a background of burnt orange with black lettering and are illuminated by four 40-watt lamps. Four red lenses are arranged to attract the attention of the approaching motorist. The lamps are set in such a manner as to floodlight the lettering to warn the motorist of danger.

An automatic car stop, developed by the Nachod Signal Company, has been installed on interurban cars. The car stopping device consists of an arm in the shape of a loop supported on a pipe extending from a pole across the track. This arm has two positions: When raised it clears a car running under it; when dropped it is low enough to break a glass tube fixed on the top of the car. This tube is connected to the automatic air brake system in such a manner that when broken the brakes will be automatically set. The position of the stop arm is controlled by the signal indication, and is raised only when the signal shows "permissive." It is dropped in the other two indications, namely, "neutral" and "stop."

This automatic car stop has been found to stop a car within 168 ft. on very slippery rails when the car was running 40 m.p.h. When the car was running 20 m.p.h. the distance was 80 ft.

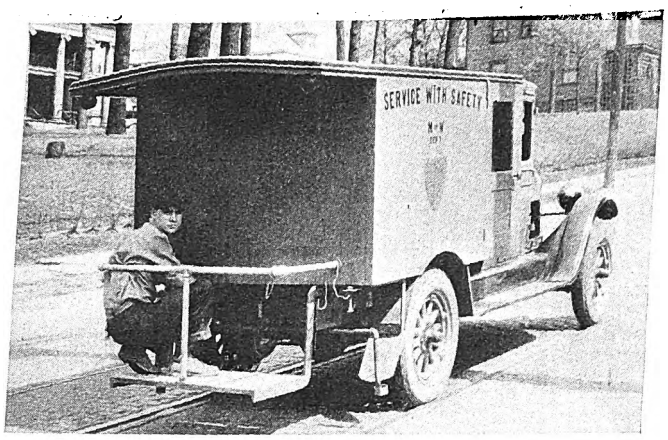
Wooden steps on all city buses have been replaced with perforated steel non-slip safety treads. The step wells have been painted white and are illuminated at night by an electric light. Electrically operated track switches have been installed in city streets over the entire system.

The territory served is one in which dense morning fogs are a frequent occurrence: To guard against accidents in operation in such circumstances, all car and bus operators reporting for duty when foggy conditions prevail are required to sign their names to an "order." In this the operator acknowledges that he is aware that there is a fog, that rule 113 requires operators to regulate the speed of their car (or bus) so that it can come to a full stop in less than the distance the operator can see, and that he agrees to operate his vehicle and car with a view to safety, disregarding schedule, if necessary.

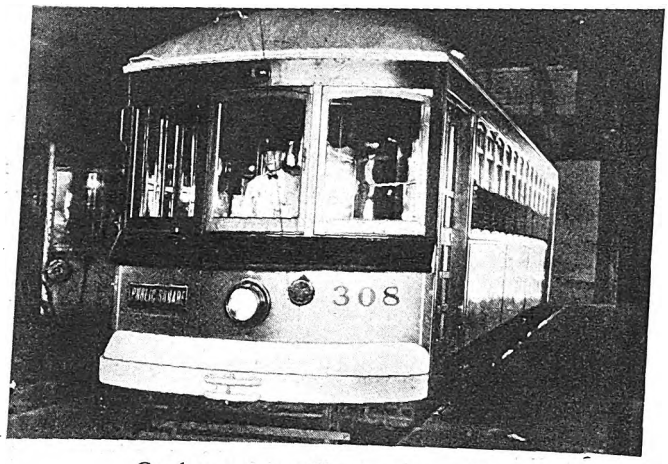
Track men, who are required to be on the street or right-of-way without protection of red or yellow flags, wear a white rubber belt and shoulder straps. These permit them to be seen readily at a greater distance than would otherwise be the case. No track man has been injured by an automobile since the belts have been worn.

A danger banner is displayed on the controller handles of electric cars and the steering wheels of motor buses when repairs are being made. This protects the mechanic or repair man when working on the vehicle. No person is permitted to move a car or bus while the danger banner is displayed.

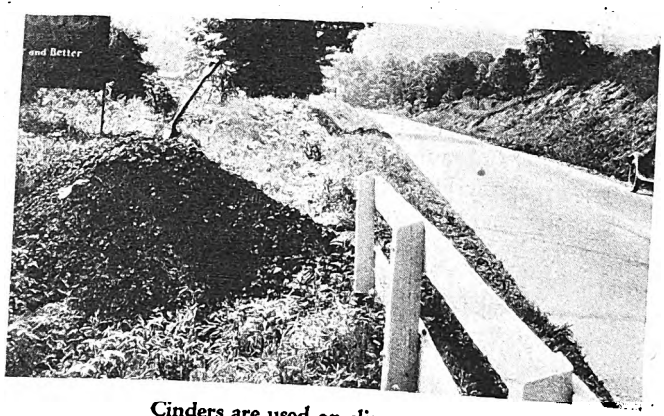
In the shop, foremen are required to inspect all tools used by their men and remove any which are not safe or show signs of stalling. This inspection of tools is re-



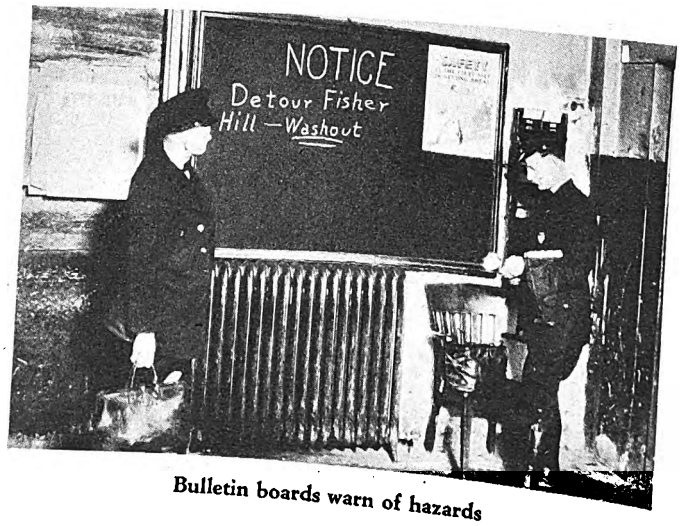
This truck sands dangerous grades



Car bumpers are illuminated at night



Cinders are used on slippery roads



Bulletin boards warn of hazards

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quired daily. The foremen and the men in the track gang are furnished with goggles and are required to wear them when working on concrete, stone, or any other work where eye injuries would be apt to occur.

At the entrance to the main works of the Youngstown Sheet & Tube Company, which is a heavy passenger boarding and leaving point, a raised safety zone with railing has been erected. It is lighted at night.

Illuminated bumpers have been installed on interurban coaches to give the operator a wider range of vision during night driving.

Two special automotive sand trucks have been built to sand dangerous grades. The trucks are equipped with a step at the rear so that a man may shift a sand pipe, along the rail and thus rapidly and safely do the work. Sufficient sand is carried to last an entire day unless the rail conditions are unusually dangerous. In addition to being used for sanding the track, the bus is equipped for switch repairing and curve greasing.

A brake-testing machine has been installed for making all brake adjustments on coaches and buses. It has reduced coach and bus pull-ins on account of brake trouble by 85 per cent.

Experience indicated that collisions, in which certain large cars were involved at night, were caused because certain automobile drivers mistook the single headlight for that of a motorcycle or an automobile with but one headlight burning. To prevent this the front bumper was painted white, as shown in one of the illustrations. It is illuminated at night.

As a safety precaution against operators misjudging the distance at railroad crossings, yellow lights were installed 100 ft. on each side of these crossings. They burn day and night. A reserve lamp relay has recently been added, in which a half yellow and half color cap is used. When this lamp is burning it warns the operator that one lamp is burned out and he reports this back to the dispatcher.

One-piece windshields have been substituted for two-piece windshields on the local Youngstown buses. They are found to obscure the driver's view less.

The company hauls a supply of cinders to points near dangerous curves or grades, where the cinders are stored by the highway department of the state. Then when the highways become slippery, the cinders are spread over the road by the state highway department, or in case of emergency, by company employees.

Bulletin boards are placed in each reporting room for the operator to report any unsafe condition or hazard that may come to his attention during his period of duty. All operators are required to examine the bulletin boards before going to work.

Thorough Organization

Mechanical aids for safety would be of little value without organization, just as organization would be of little help without mechanical aid.

All employees, foremen, superintendents and officials of the company are divided into proper groups, so that their personal effort and interest may be secured. These groups hold periodic meetings for the purpose of considering accident and fire hazards and unsafe practices and means for their elimination. This home study is supplemented by frequent inspection of the property by experts of the Bureau of Safety of Chicago.

Another means of securing suggestions is through the *Safety Bulletin*, a monthly publication of the Bureau of Safety, which is distributed to members of the safety committee. Appropriate original and contributed articles, illustrations and charts are published in this bulletin, with practical suggestions for the elimination of accidents. Suggestions are solicited particularly from those who are in closest contact with the work, i.e., the operators on the cars and buses, and the shop and garage men. To stimulate the contribution of suggestions, a special form has been printed on which they may be written. The suggestions are deposited in boxes in the garages, terminals and reporting rooms, or they may be handed directly to their supervisory officials or to any member of one of the safety committees. All suggestions are acted upon by the committee, and the maker of the suggestion is notified of the action taken. If in the opinion of the committee a suggestion is not practical in the form in which it was made but has possibilities, the maker of it is requested to supply more information in order that the suggestion may receive further consideration. This is done in such a manner that the person making the suggestion realizes that it has received full consideration.

The prone-pressure method of resuscitation is taught to all employees, and the value of such training is emphasized at every opportunity. In addition, training in application of first aid to injured persons is encouraged.

The safety work of the organization is intrusted to twelve committees. Ten of these are divisional committees and are made up largely of railway operators, coach operators, or shop men. These committees report through a central transportation safety committee to the executive central safety committee. This committee consists of the general manager of the company, manager of railways, chief electrical engineer, superintendent of power, transportation safety supervisor, electrical safety supervisor, general claim agent and director of public relations.

Bonus System Is in Effect

A bonus system to reduce accidents was placed in effect on the Youngstown Municipal Railways on Jan. 1, 1924. Briefly, the plan is as follows:

Each railway or bus operator who operates for one month without an accident is paid a bonus of $1; for the second successive month without accident he receives a bonus of $2, and for the third successive month and for each successive month thereafter, $3.

An operator having an accident in any month must start on the first day of the following month with a clean slate, and again operate for three consecutive months without an accident before he is entitled to the maximum bonus of $3 a month. An "unreported" accident, charged against a railway or bus operator, loses for him the right to a bonus for three months.

A regular man must work at least 25 days in a month, and an extra man at least 175 hours in a month to be eligible to receive a bonus.

During 1927, the largest number of railway operators at any one time was 181, and the total number of railway operators during the year was 205. Of this number 191 operators received a bonus. The largest number of bus operators at any one time was 87 and the total number during the year was 101. Of this number 95 received a bonus.

The fact that these precautions pay in lessened accidents is shown in the fact that the chargeable accidents on the Penn-Ohio System were reduced from 902 in 1926 to 705 in 1927, or a reduction of 22 per cent.

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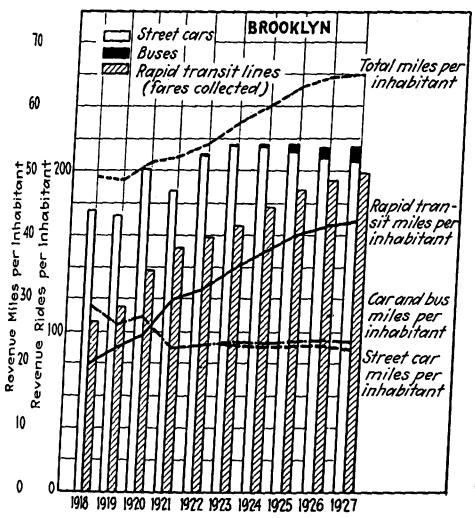
Analysis Is Made of Factors Affecting the

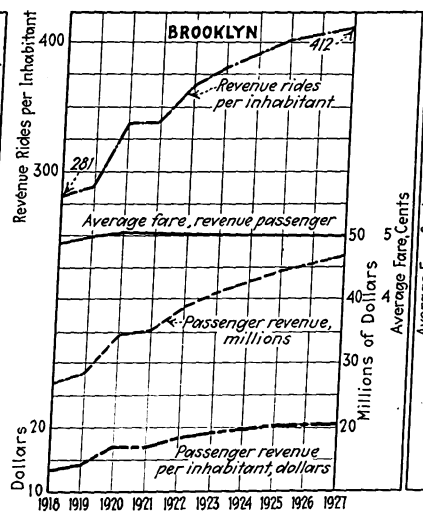
Riding Habit in Large Cities

Detailed statistics extending over ten years for nine cities presented by Beeler Organization. Effect on surface car traffic of rapid transit and bus developments

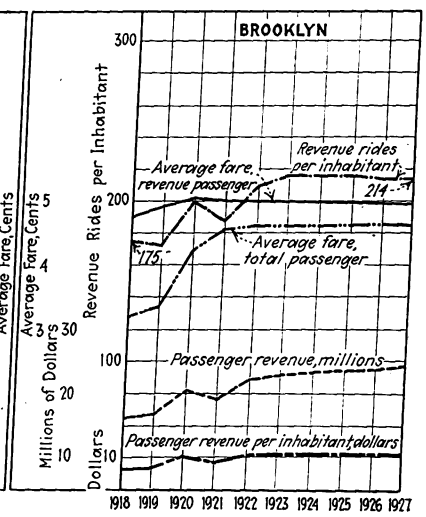
A REVIEW of traffic statistics from nine typical cities, made by the Beeler Organization to determine the relations between rapid transit, surface car and bus riding and the use of private automobiles, was published in ELECTRIC RAILWAY JOURNAL for Dec. 22. Briefly the study showed that the tendency of rapid transit development in any city is to increase surface car riding but that the extension of bus service has had the contrary effect. The review was part of a study conducted by the Beeler Organization for the Brooklyn City Railroad and Brooklyn-Manhattan Transit Corporation in connection with the proposed award of additional bus franchises in Brooklyn. In addition to the data abstracted in the issue of Dec. 22 the report contained a series of graphs covering traffic data for ten years in each of the cities mentioned. A number of these graphs are published in this issue with an abstract of the contents of the report.



Borough of Brooklyn—Annual revenue rides and vehicle-miles per inhabitant



Borough of Brooklyn—Transportation data for ten-year period. Surface cars, buses and rapid transit lines



Borough of Brooklyn—Transportation data for ten-year period. Surface cars and buses only

Borough of Brooklyn—With the great rapid transit development which has occurred in Brooklyn during the past ten years and the consequent revolutionary changes in the location of population in that borough, the function of the street railway lines has changed radically. Long-haul riding has been diverted to the rapid transit lines, and the surface lines now act largely as local distributors to the many new community centers.

Based on fares collected at the rapid transit stations located in Brooklyn, these lines in 1918 carried each resident an average of 106 times. This increased almost steadily year by year until it reached 198 in 1927. During the same period the street car revenue rides per inhabitant increased from 175 in 1918 to 215 in 1923. Since then the number has slowly declined to 205 in 1927. Independent bus operation was inaugurated in Brooklyn in 1922. When the revenue passengers carried by the buses are added to those carried by the street cars, the total surface revenue riding is found to have remained practically stationary and the street cars to have suffered an actual loss in total rides from 507,658,855 in 1918 to 501,069,397 in 1927.

A comparison of several facts relating to car and bus operation for the year 1927, which shows the relative extent of their use in Brooklyn, follows:

	Brooklyn, 1927		
	Bus	Street Car	Total
Miles of routes operated	21.2	316.7	337.9
Cars or buses operated	67	1,576	1,643
Number of routes	9	69	78
Car or bus-miles	2,142,795	50,216,273	52,359,068

A study of the distribution of population in 1925, which totaled 2,203,235, shows that some 2,045,835 people, or 92.9 per cent, live within a quarter of a mile of an existing surface car line and some 2,125,235 people, or 96.5 per cent, live within a quarter of a mile of an existing surface car or existing bus line.

New York City—Including the five boroughs this city has increased 14.3 per cent in population in the ten-year period from 1918 to 1927, inclusive.

During this decade there has been a tremendous in-

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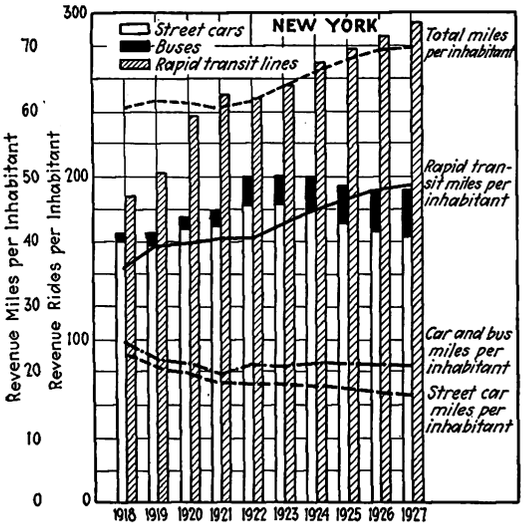
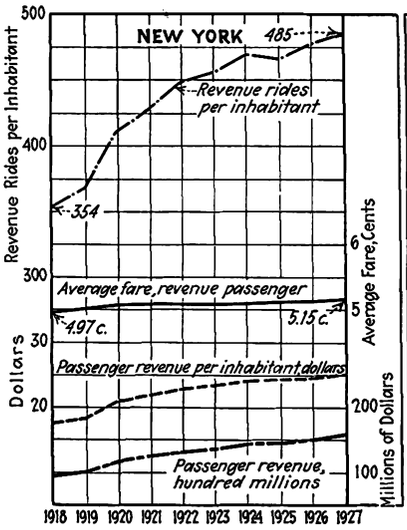
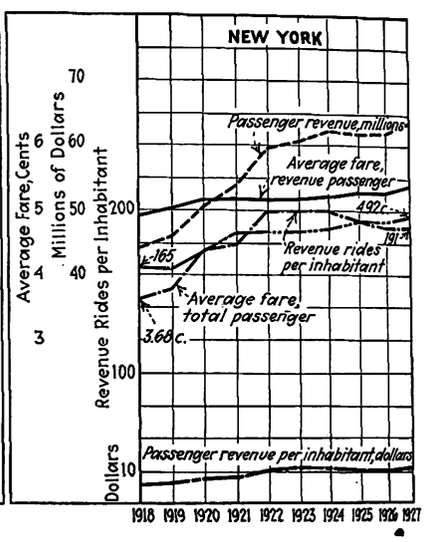


New York—Annual revenue rides and vehicle-miles per inhabitant



New York—Transportation data for ten-year period. Surface cars, buses and rapid transit lines



New York—Transportation data for ten-year period. Surface cars and buses only

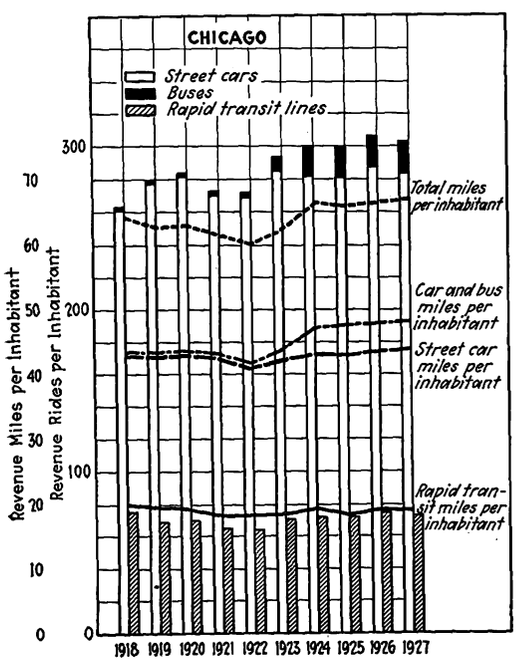
crease in rapid transit service, the rapid transit miles operated annually having gone up from 194,677,252 to 301,962,385, or an increase of 55.1 per cent. The rapid transit rides have increased from 1,029,165,648 in 1918 to 1,830,189,949 in 1927, or 77.9 per cent. The rapid transit car-miles have increased from 35.8 to 48.6; thus the service rendered has gone up faster than the increase in population by 35.8 per cent.

The surface riding on street cars and buses went up from 896,357,944 revenue passengers to 1,029,464,822 in the years 1918 to 1921, or about 44,000,000 each year. In the six years since 1921, a period of rapid expansion in bus service, the total revenue rides on surface facilities increased only about 26,000,000 yearly. Only in the first two years of this six-year period was there any increase in street car passengers. Since 1923 they have decreased 57,397,487, or at an average rate of more than 14,000,000 annually. Total revenue and transfer passengers on all surface facilities increased 85,558,268 between 1918 and 1927. During the same period the total passengers carried by street cars decreased 60,111,885 while total bus passengers increased 145,670,153.

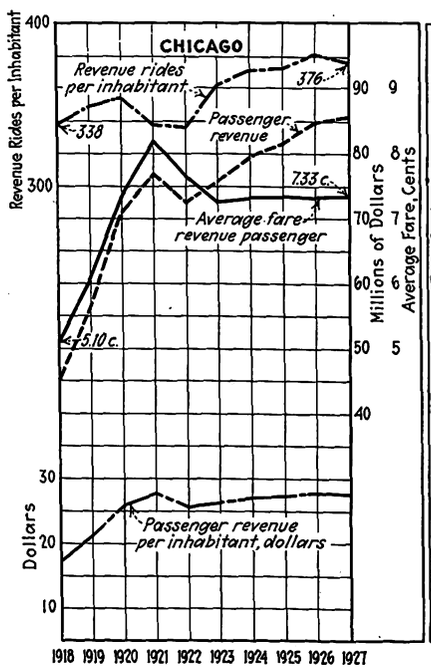
Chicago—Like New York, Chicago is served by rapid transit, street cars and buses. The population has increased 18.3 per cent since 1918. The total revenue passengers carried have increased 31.5 per cent.

There were 548 miles of street traversed by street cars and 111 miles of street traversed by buses in 1927. The street railway company, known as the Chicago Surface Lines, operates one feeder bus line 1.5 miles long and the Chicago Motor Coach Company operates 23 routes. Ten of the latter routes provide crosstown or feeder service. The other thirteen reach the Loop District.

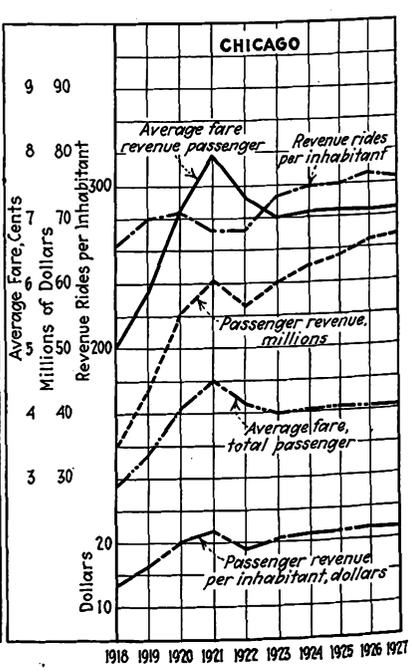
There are 1,092 miles of street car track operated in local service. Nearly all of this is double track, so the 548 miles of street are equivalent to 547 miles of two-way service. The 111 miles of street traversed by buses are equivalent to 109 miles of two-way service.



Chicago—Annual revenue rides and vehicle-miles per inhabitant



Chicago — Transportation data for ten-year period. Surface cars, buses and rapid transit lines



Chicago — Transportation data for ten-year period. Surface cars and buses only

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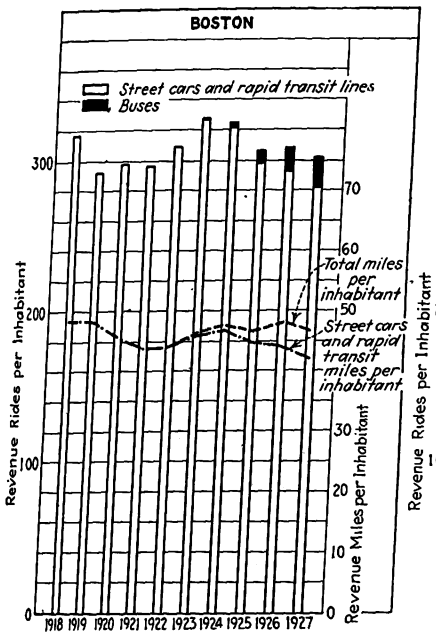
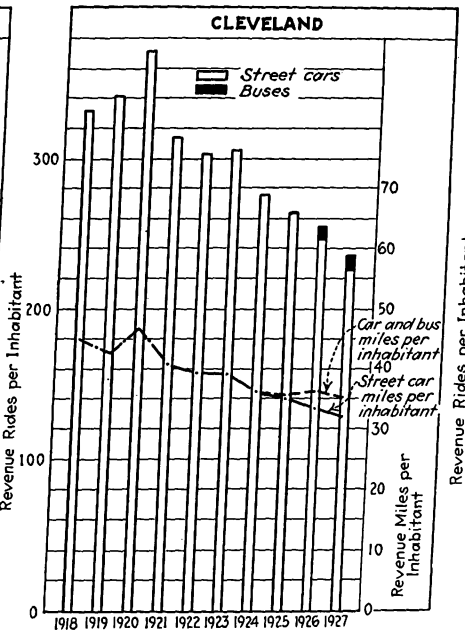
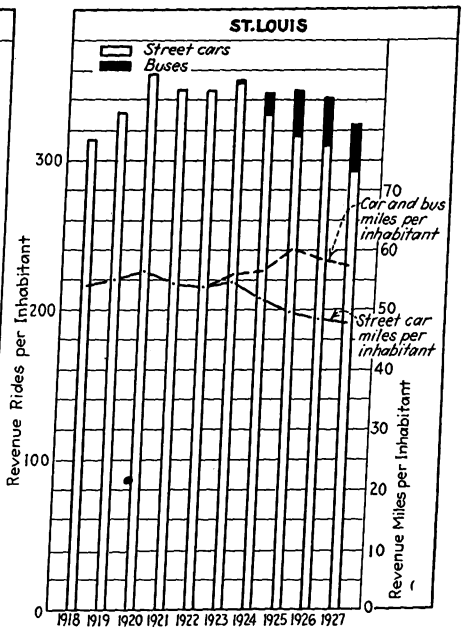


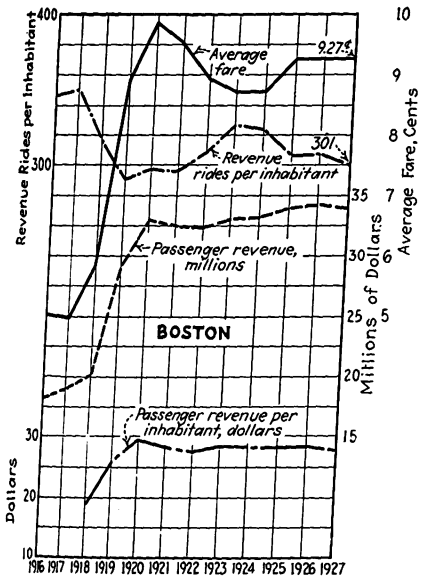
Boston—Annual revenue rides and vehicle-miles per inhabitant



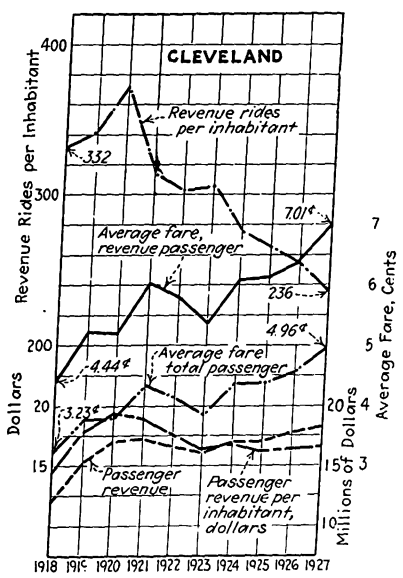
Cleveland—Annual revenue rides and vehicle-miles per inhabitant



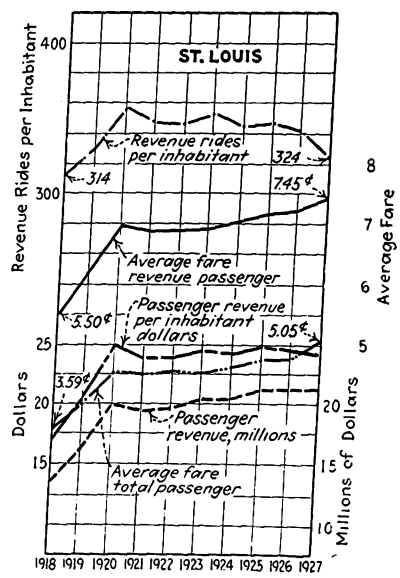
St. Louis—Annual revenue rides and vehicle-miles per inhabitant



Boston—Transportation data for ten-year period. Surface cars, buses and rapid transit lines



Cleveland—Transportation data for ten-year period. Surface cars and buses only



St. Louis—Transportation data for ten-year period. Surface cars and buses only

Unlike New York, the rapid transit service has not kept pace with the increase in population, the rapid transit car-miles per inhabitant having dropped from 20.21 to 18.73, while the rapid transit revenue rides per inhabitant have practically remained stationary, being 75 in 1918 and 73 in 1927.

The street car service, measured in car-miles per inhabitant, has kept pace with the increase in population, remaining at a figure close to 43 miles during the entire period. The revenue rides per inhabitant on the street cars have increased from 261 to 284. From 1923 to 1927 the riding habit on the street cars has remained practically constant at 284. The bus has increased from eight to nineteen.

In 1918 the street cars carried 685,300,718 revenue passengers; in 1923 they carried 824,850,103; and in 1927 some 881,958,647. The buses carried 21,919,399 revenue passengers in 1923 and 58,583,572 in 1927.

The street car fare is 7 cents with three tickets for 20 cents. There is a universal free transfer between car lines. The railway bus line has the same fare as the car line and interchanges transfers.

The fare on the Chicago Motor Coach lines is 10 cents, the lines being divided into three separate groups—north, west, and south side divisions. An additional 10-cent fare is required when transferring from one group to another. Free transfers, however, may be made between each group and the downtown shopping lines. The average revenue fare of street car and bus passengers was 7.10 cents in 1927.

The average rate of increase for street car riders was approximately 4 per cent per annum prior to 1923. After this, with increased bus activity, this rate dropped to about 1½ per cent per annum.

Boston—This city also has rapid transit lines in addition to street cars and buses, but unlike New York and

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Chicago all facilities are operated as one comprehensive system with a universal transfer privilege between the different classes of service.

The increase in the number of revenue passengers carried from 1918 to 1927 inclusive has been but 5.2 per cent, with a population increase of 11.1 per cent. There is no segregation between street car and rapid transit passengers, so the relative number of the two types cannot be determined. There are 26 bus lines operated, of which only one might be considered as not being a feeder line. The local character of these bus routes may be inferred from the fact that their average one-way length is just a little over 2 miles.

There have been practically but five years of bus service. In 1923 but 465,391 bus-miles were operated, while in 1927 some 5,562,766 were run. In spite of the increased facilities that the bus has offered, the total annual revenue passengers for the system have dropped from 382,149,697 in 1923 to 366,938,908 in 1927. The combined street railway and rapid transit revenue passengers reached their peak in 1923 with some 380,002,806. This dropped to 343,490,089 in 1927.

The fare is 10 cents, with free transfers between street cars, rapid transit and buses. In some of the outlying districts local rides may be had at the rate of five tickets for 30 cents with no transfers. There are also some 5-cent bus zones with no transfers. The average of all fares in 1927 was 9.27 cents.

The riding habit, as indicated by the total revenue rides per inhabitant, was 328 in 1923 and 301 in 1927, a decrease of 8 per cent. A portion of the indicated decrease for 1927, compared with 1923, is due to the average rate of fare increasing from 8.71 to 9.27 cents, or 6.4 per cent since 1923. Another factor for the decrease is a change in method of accounting for revenue passengers, subsequent to November, 1924. Nevertheless, the enormous increase in bus-miles reflects no corresponding increase in the total passengers or the riding habit.

Cities Not Served by Rapid Transit

The element of rapid transit, in cities so served, is likely to cause the results in the surface riding to vary considerably. The extension of rapid transit lines may reduce the riding on surface lines because former car patrons use the new facility. On the other hand, rapid transit lines may develop outlying territory so rapidly that considerable local riding will develop on the surface lines with it.

Various disturbances, such as strikes and fare changes, may cause a temporary shift from rapid transit to surface lines and vice versa, as for example during the subway strike in 1926 in New York City. Although service was maintained on these rapid transit lines, it was used but little and the street cars and buses enjoyed a temporary influx of riding. It is things like this that make it desirable to study changes in the trend where buses have been added in cities that are dependent entirely upon surface lines for their mass transportation.

Accordingly, in considering the effect of bus operation on the street car riding in cities where no rapid transit lines operate, such well-developed communities as Cleveland, St. Louis, Baltimore, Cincinnati and Richmond, where complete statistics were available, have been selected for analysis.

Cleveland—This city of more than 1,000,000 increased its population 35.1 per cent from 1918 to 1927. In the latter year 196 miles of street were traversed by street cars in Cleveland and 63 miles by buses. Buses were introduced three years ago, and now give 9.0 per cent of the service and carry 4.3 per cent of the passengers, and are beginning to be a factor in the city's transportation service. All of the bus lines are operated by the Cleveland Railway. The railway owns 1,456 street cars and 157 buses.

Of the 63 miles of street covered by bus lines, some 15 miles are operated on a car line street or parallel to a car line within ¼ mile, and for distances a mile or more in length. The major route, operated with double-deck buses, competes with car lines for its entire length.

The riding on the cars and buses has not kept pace with the population; in fact, the total rides are 4 per cent less than they were in 1918. In 1924, the year before bus operation was introduced, the street cars carried 279,917,221 revenue passengers. In 1927, after three years of bus operation, the revenue rides, including both street car and bus, dropped to 262,314,932, of which the bus carried 11,296,027 and the street car 251,018,905, a loss of 28,898,316 to the street car. In 1927, fewer passengers were carried per vehicle-mile operated than at any time in the past ten years, the street cars averaging but 7.08 and the buses 3.21 passengers per vehicle-mile.

The street car fare is 7 cents with eight tickets for 50 cents and a 1-cent charge for transfers. The bus fare is 10 cents with free transfers to street cars. Transfer may be made from car to bus for an initial 10-cent fare. The average of all revenue fares collected in 1927 was 7.01 cents, which was the lowest of any of the five cities discussed herein that have surface transportation only.

The surface system in Cleveland has undoubtedly reached the stage where rapid transit is a necessity in the city plan, if the best results are to be obtained in the future. At any rate, the combined service of the street car and bus have failed to render the enlarged population the same degree of service measured by the riding habit as the street car alone gave formerly, the revenue rides per inhabitant having fallen from 332 in 1918 to 236 in 1927, or 28.9 per cent.

St. Louis—A 12.5 per cent increase in population is shown by St. Louis since 1918. Its industries are well diversified so its business fluctuations are not marked. Its downtown streets are less favorable for parking of private automobiles than Cleveland's. In the period from 1918 to 1927 the revenue riders have increased 16.4 per cent.

In 1927, street cars operated upon 240 miles and buses on 101 miles of street. In all there are 24 bus lines, of which seven are operated by the St. Louis Bus Company, a subsidiary of the St. Louis Public Service Company, which operates the railway lines. The other seventeen routes are operated by the People's Motor Bus Company, an independent company. The latter carries about 80 per cent of all the bus passengers.

Of the 101 miles of street traversed by buses there are 63 miles which operate on car line streets or within ¼ mile of a car line, transporting passengers in the same general direction. The other 38 miles of bus line streets are, with few exceptions, in the outlying districts.

The car fare is 8 cents with two tickets for 15 cents. The fare on all bus lines is 10 cents. The street railway buses transfer to the street cars and the street cars transfer to these buses on payment of a 10-cent fare. The average fare collected in 1927, including all bus fares, was 7.45 cents. In 1923, the year the buses commenced operations, it was 6.92 cents.

The peak of riding habit was reached in the abnormally high year of 1920 with 358, and was closely

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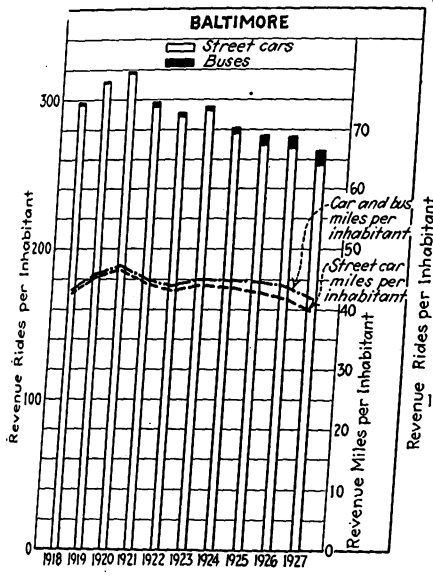
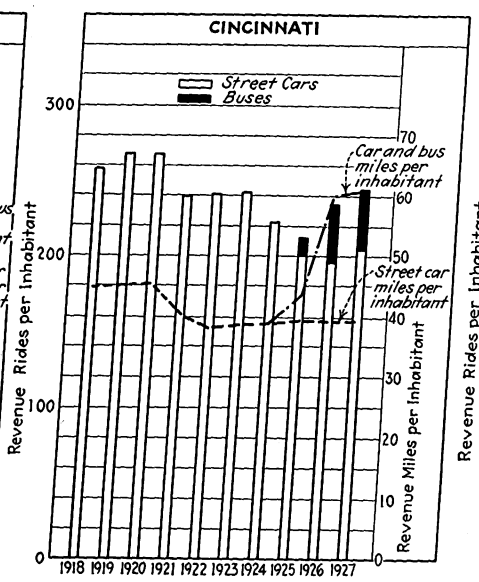
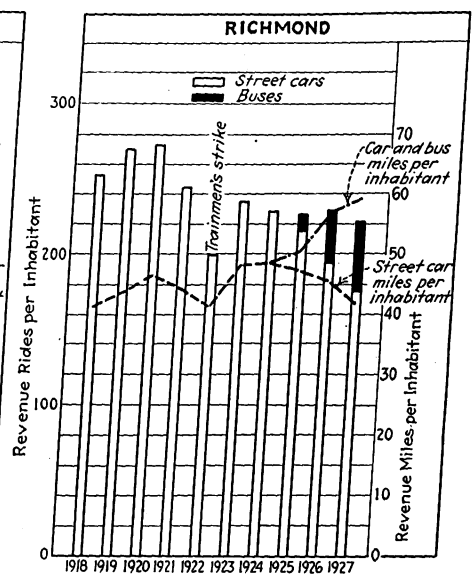


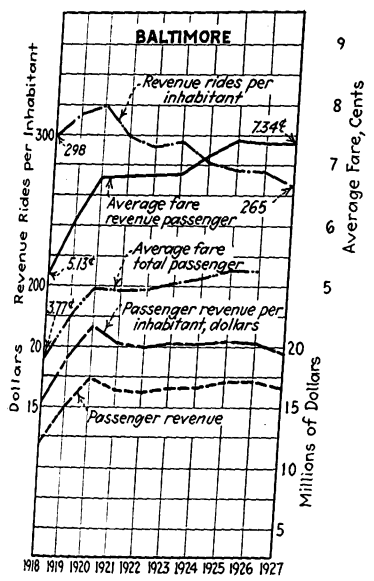
Baltimore—Annual revenue rides and vehicle-miles per inhabitant



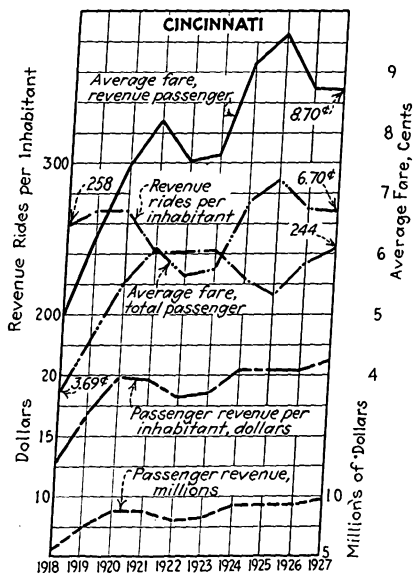
Cincinnati—Annual revenue rides and vehicle-miles per inhabitant



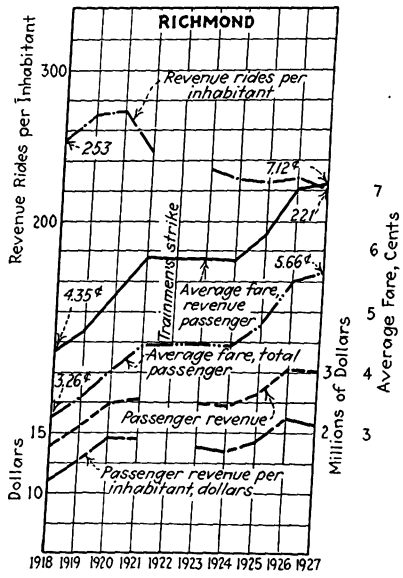
Richmond—Annual revenue rides and vehicle-miles per inhabitant



Baltimore—Transportation data for ten-year period. Surface cars and buses only



Cincinnati—Transportation data for ten-year period. Surface cars and buses only



Richmond—Transportation data for ten-year period. Surface cars and buses only

approached in 1923 with 354 rides per inhabitant. The latter year marked the beginning in a small way of bus operation. The scope of bus operation increased in five years from nothing to 16.8 per cent of the total mileage, carrying 9.5 per cent of the total revenue passengers in 1927. In 1927 the street cars carried 6.15 and the buses 3.21 revenue passengers per mile operated. In 1923 the buses carried 2,732,714 passengers out of a total of 295,404,495. Four years later, in 1927, when buses were carrying 27,296,000 passengers, the total dropped to 286,106,976, leaving a net loss to the street cars of 33,860,805 passengers, or more by 6,564,805 than the buses carried. It appears that rapid transit is necessary to St. Louis before an upturn in the riding habit to what it was in 1923 can be established.

Baltimore—With an increase in population of 11.5 per cent, Baltimore is one of the few cities that has had bus operation throughout the period under study. In 1918 buses carried about 1 per cent of the passengers. They now carry 3 per cent and render 5 per cent of the total mileage.

Some 219 miles of street are traversed by the car lines and some 30 miles by buses. All buses, with the exception of one line, are operated by the Baltimore Coach Company, a subsidiary of the local railway company. The statistics are for this company only.

Considering bus lines that operate within ¼ mile of the street car lines and carry passengers in the same general direction as competitive, some 10.5 miles of the street traversed by buses, of the total of 30 miles, are competitive. This competition is in the more thickly populated areas. These bus lines as a rule do not operate on the same streets as the car lines but are one block or more distant.

With an increase from 32,920,722 car and bus-miles operated in 1918 to 35,790,497 in 1927, the total annual revenue rides have dropped from 228,785,323 to 226,534,188; or to put it another way, with the amount of service per inhabitant measured in car and bus-miles remaining about the same (i.e., 42.92 in 1918 and 41.86 in 1927), the revenue rides per inhabitant have dropped from 298 to 265, or 11.1 per cent.

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In 1927 the street cars carried 6.44 and the buses 4.32 revenue passengers per mile operated.

The street car fare was 8 cents in 1927, with two tickets for 15 cents. The fare on feeder bus lines transferring to street cars is the same as the street car fare. Two lines operating with double-deck buses into the downtown section charge a 10-cent fare. One bus line which duplicates car service has a 7-cent fare. Several of the feeder lines are zoned and charge various rates for each zone. The average rate of all fares was 7.34 cents in 1927.

Cincinnati—Cleveland, St. Louis and Baltimore are representative cities of about 1,000,000 population with surface transit only. Cincinnati gives us an opportunity to study a slightly smaller city, but one with many major traffic problems because its avenues of ingress and egress are limited by the closely surrounding hills. It is of particular interest here because in three years bus operation has increased from nothing to 29.7 per cent of the total mileage operated, carrying 16 per cent of the revenue riding. There are now 149 miles of street traversed by street cars and a total of 123 miles of street traversed by buses.

In all there are 24 bus lines, of which nine are operated by the Cincinnati Street Railway and fifteen by various independent bus companies. Of the nine lines operated by the railway company, five are either cross-town or feeder lines while the other four operate an express service with limited stops for a distance of 2 or 3 miles from the business center. All of the fifteen independent bus lines reach the downtown terminal at Fountain Square. All but four compete with the street car for more than half the length of their route.

There are 200 street cars operated daily during the base hours and 590 during the maximum rush hour. There are 118 buses operated during the middle of the day and 144 during the maximum rush hour. Practically all of the rush-hour extras are on the Cincinnati Street Railway bus lines.

The street cars in 1918 carried 112,400,000 passengers; in 1927 they carried but 94,006,310, the other 18,393,690 being carried by the buses. In order to maintain the volume of traffic, 7,630,000 bus-miles were run in 1927, bringing the total surface mileage up from 38.97 miles per inhabitant in 1924, before bus operation, to 55.77 miles in 1927. The revenue passengers per mile operated in 1927 show an average of 5.22 for the street cars and 2.36 for the buses.

The car fare is 10 cents with three tickets for 25 cents. The bus fare is 10 cents, but some of the longer lines have additional zone rates. The street railway buses transfer to the street cars and the street cars transfer to these buses on payment of a 10-cent fare. The average of all fares was 8.7 cents in 1927, which is the highest rate of any of the five cities with surface transportation only. In spite of this, the riding per inhabitant is now within 95 per cent of what it was in 1918.

During the period from 1918 to 1927 Cincinnati has increased in population 5.6 per cent, while the service rendered, measured in car and bus-miles, has increased 31.4 per cent. In other words, the service has increased more than five times as fast as the population while the total number of revenue riders has actually dropped from 112,400,000 to 112,006,310. It is evident that rapid transit must ultimately be resorted to if the local transportation system is to function to the best advantage to the community. A project of this nature is already partially constructed.

GROWTH OF TRANSPORTATION BY STREET CARS AND BUSES IN THE CITIES OF CLEVELAND, ST. LOUIS, BALTIMORE, CINCINNATI AND RICHMOND FOR THE TEN-YEAR PERIOD OF 1918 TO 1927, INCLUSIVE

	1918	1927	Per Cent Increase
Population	2,971,534	3,499,707	17.77
Revenue Passengers:			
Street cars	899,555,560	856,200,052	4.82*
Street cars and buses	901,506,355	929,329,326	3.09
Revenue-Miles Operated:			
Street cars	138,044,545	137,487,168	0.40*
Street cars and buses	138,395,361	162,325,183	17.30
Revenue Rides per Inhabitant:			
Street cars	302	245	18.87*
Street cars and buses	303	266	12.21*
Revenue-Miles per Inhabitant:			
Street cars	46.46	39.28	15.45*
Street cars and buses	46.57	46.38	0.41*
Revenue Rides per Mile:			
Street cars	6.52	6.23	4.45*
Street cars and buses	6.51	5.73	11.98*
Per Cent of Revenue Passengers:			
Street cars	99.00	92.00	.....
Buses	1.00	8.00	.....
Per Cent of Revenue-Miles:			
Street cars	99.00	85.00	.....
Buses	1.00	15.00	.....

*Decrease.

Richmond—In the period from 1918 to 1927 inclusive Richmond's population has increased 17.8 per cent. A large amount of bus service has been introduced within the past three years. In 1927 buses operated 29.6 per cent of the mileage and carried 20.6 per cent of the total revenue passengers.

All street cars and buses are operated by the Virginia Railway & Electric Company, which has seven bus routes. Only one competes directly with a car line. Aside from the three feeder lines in outlying territory, all of the buses operate on or parallel to car lines for some portion of their route.

The car fare is 7 cents, with transfers to buses 1 cent. Bus fare is 8 cents with transfers to car free. The average rate of fare was 7.12 cents in 1927.

During the three years of bus operation, the total revenue bus-miles have increased from 619,700 to 3,359,409, bringing the total of all transit up to 11,344,286 in 1927, or some 68.8 per cent more than rendered in 1918. In the face of this, however, the revenue rides per inhabitant have declined from 253 in 1918 to 221 in 1927, or 12.6 per cent. In 1927 the street cars carried 4.21 while the buses carried 2.59 revenue passengers per vehicle-mile.

The Five Surface Transit Cities Combined

To determine average conditions for the cities in which street cars and buses give all of the transportation service, the accompanying table has been prepared to show the combined population, revenue passengers, miles operated, and other similar factors for Baltimore, Cincinnati, Cleveland, Richmond and St. Louis, for 1918 and 1927.

The total miles operated, street car and bus, have increased from 138,395,361 to 162,325,183 in this period, a jump of 17.3 per cent in service which has practically kept pace with the 17.8 per cent increase in population. The total riding has increased but 3.09 per cent, or less than one-fifth of the per cent of population increase. This is in the face of the fact that bus mileage operated is responsible for an increase of 17.3 per cent in the service.

While the total service per inhabitant operated in 1927, viz., 46.4 vehicle-miles, is practically the same as in 1918, the total riding habit or revenue rides per inhabitant has dropped from 303 in 1918 to 266 in 1927. The buses are now carrying 8 per cent of the revenue riders and furnishing 15 per cent of the miles operated; or putting it in another way, the buses are carrying on an average 2.94 and the street cars 6.23 revenue passengers per vehicle-mile operated.

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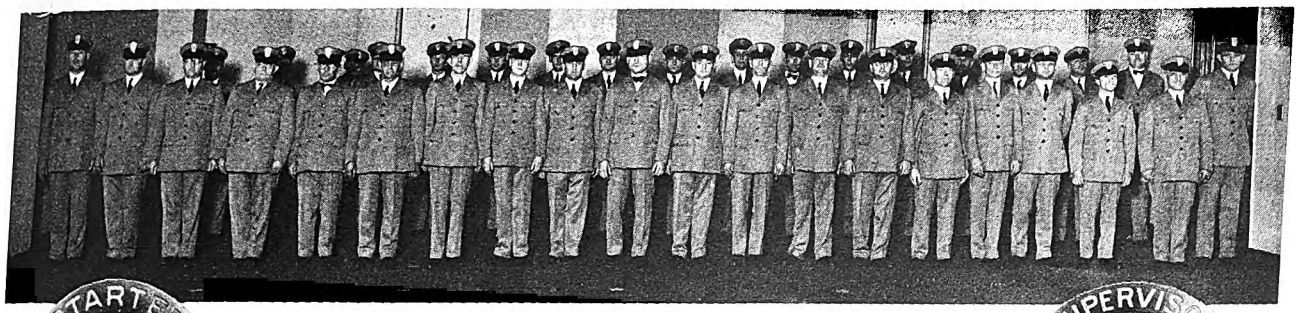
New Corps of Co-ordinated Transportation Supervisors Created By P.R.T.



New group of co-ordinated P.R.T. supervisors and starters, and their badges

Special group of men in the downtown district to direct movement of all forms of public transportation operated under Mitten Management

ANOTHER step in the direction of a more closely co-ordinated system of transportation was taken by the Philadelphia Rapid Transit Company when, on Dec. 1, 31 picked men donned well-tailored, special French-blue uniforms and took up their posts in the central business district of Philadelphia as supervisors of all the forms of surface transportation under Mitten Management. With them went six starters, making a group of 37 men upon whom will rest the responsibility of expediting the progress of trolleys, buses and taxicabs through the narrow, crowded streets of Philadelphia's downtown area.

These men have been taken from the supervisory forces for all three groups—street cars, buses and cabs—and have been selected because of their proved ability, experience and physical fitness. Each is a qualified operator of every type of P.R.T. vehicle; all are young men, capable and earnest.

With the creation of this corps of co-ordinated supervisors, these advantages will be realized more fully than ever before. Special events, such as athletic contests or other large gatherings necessitating the co-ordination of special transportation facilities of all forms, will find representatives of the new group on the job, directing street cars, buses, taxicabs and private automobiles—speeding up traffic for everyone.

They will prove especially valuable in emergencies—tie-ups, fires, parades, street accidents, snowstorms and all of the other causes contributing to traffic delay. At such times they will co-operate with the police in every way possible to accomplish the objective common to both—the acceleration of traffic through overburdened streets. To further this co-operation between the new co-ordinated supervisory group and the police traffic squad, the men have all been sworn in as special police officers.

The territory for which these men are responsible extends from Spring Garden Street to South Street and from 34th Street to the Delaware River. Outside of this central area, the regular supervisors of each division of the system will continue to direct their own transportation facilities, for here there is not the overlapping of all transit mediums that there is downtown. These supervisors will report to their division managers, as formerly, while the new group will report to an official directly responsible to the vice-president in charge of operation.

The creation of this organization comes at a time when public attention is focused on the problem of traffic congestion, for P.R.T. is now conducting its annual "80 per cent Campaign." This campaign, which takes its name from the fact that 80 per cent of the riding public in Philadelphia uses P.R.T. lines and has at its slogan "Give the 80 per cent a square deal," is an effort to bring the traffic situation to public attention and to acquaint the car rider with the actual causes of traffic delays.

Boston Bids Farewell to Old Dobbin

NO LONGER will the familiar sight of a tip cart, express wagon or other vehicle bearing the name "Boston Elevated Railway" and drawn by sleek-looking horses be seen on the streets of Boston, for on Oct. 13, 1928, the last of the horses owned by the railway, 23 in number, were replaced by motor vehicles. This, of course, is no surprise to anyone, because, just as electric cars replaced the old horse cars in providing quicker and more economical transportation for passengers, the motor vehicle has made it possible to transport material more rapidly and economically.

In connection with the passing of the old faithful horses, some of which have been serving the road for more than fifteen years, it is interesting to note that at one time 7,728 horses were required to haul the cars and other railway equipment. That was back in 1887, when the West End Railway was organized to take over the many independent horse car lines in and about Boston. These horses had a value of $1,035,552 and were housed in 37 separate stables. As the lines were gradually electrified, the number of horses was correspondingly reduced, so that when the last horse car line was abandoned in 1900 the railway owned only 487 horses.

Electric cars for the transportation of rails, sand, coal and other material came into use, with the result that in 1915 the railway owned but 230 horses. It could readily be seen that it was only a question of time when the

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horses would be entirely displaced, and for that reason no horses have been bought by the railway since 1918, when two were purchased.

The first large scale adoption of motor vehicles went into effect in 1920 in the miscellaneous departments, when 40 trucks and passenger cars were purchased for the use of the emergency crews, for switch repair trucks and for the convenience of track masters and other subordinate officials. Each vehicle replaced two or more horses. This practice continued until in 1927 only 23 horses remained and all the stables were closed, except the one at Lenox Street where these horses were quartered.

Modern Equipment Essential to Success

By Ross Schram

Vice-President in Charge of Sales Twin Coach Corporation, Kent, Ohio

The author, speaking at the December meeting of the New England Street Railway Club, points out that the electric railway industry has not gone nearly far enough in the adoption of modern light-weight rolling stock.

PEOPLE are going to continue to buy automobiles. No one can stop them. Two and one-half million born every year want them almost as soon as they are conscious of the thrill of riding. But with all the sales of motor cars, railway people are getting 75 per cent of the public riders in the large cities and more than 50 per cent in the smaller cities. The average fare is slightly more than 8 cents today and is slowly climbing. Now, if you have a monopoly to all intents and purposes on 75 per cent of the public traffic (50 per cent in the smaller communities) and there are available 2,000,000,000 miles of service annually, what result is obtained by multiplying this figure by the accredited 8 cents a mile saving with 50 per cent modern equipment, or 16 cents a mile with 100 per cent modern equipment? Finishing this theoretical example only halfway with 50 per cent new equipment, the answer is $0.08 multiplied by 1,000,000,000 or $80,000,000, the price of 6,000 new street cars. The industry's entire budget for 1928 has been estimated at $246,000,000, a third of which could be secured from new equipment savings.

Carrying this hypothetical earning a bit further, what about modern tools and shop practices? The cost of labor is fairly fixed, but why should one company have a pull-in record so much better than those of other companies? Why, when I read the minutes of a maintenance superintendent's association, should I find a discrepancy of 100 per cent in trolley wheel wear; or discrepancies in the cost of handling armatures; or that some do not believe in power meters; or astonishing differences on the theory and time of inspection and overhaul?

The keynote of the 1928 American Electric Railway Association convention was "No more delay on modernization"—the post-convention issues of the trade journals editorialized on this theme. It will be seen soon in 1929 whether the attempt for full speed ahead is a sincere one. If there ever was a time when the saying "Waiting is wasting" was true it is right now in the great American urban railway industry. It is not possible to point out a single field where there is greater opportunity to stand out above the rank and file than in this industry.

In days gone by they hung bells on car horses to warn folks to get out of the way. The operation was so relatively quiet in those days that one might be run down by a horse car. In the early electric days the trolley was the fastest urban transportation. Consider the change to the period when they became the noisest and slowest vehicles on the street. The speed factors are being attained today, but how late? Again, where can a man on his toes find a greater field of opportunity? Is it rust, lack of perspective, under-pay, or lack of capital that has caused this situation to accrue? Is it the drag of system versus city political conflict that has been the anchor? What has caused this industry to lag so far behind the other industries in modern practices? Has there not been just a little too much self-pity? Don't think for one minute the other fields which have shown great advances have lounged in beds of roses.

Concede that you still have 75 per cent of the public riders. In almost any field that would be considered a good percentage, and most folks would be happy with that ratio. Perhaps if the profits are forced by cutting the costs, it will still seem a good healthy percentage of business. Leather seats and rainbow paint will never be enough. The industry must force its profits through reduced costs based upon the use of modern tools. This is true merchandising.

This forcing of cost brings us back to street car manufacturers. You desire lower-priced units. Consider the varying specifications for street cars. Is it any wonder that costs do not come down? In passing, what has been done by the field as an industry in conforming with the recommendations of the committee on unification of car design, born in 1921—seven long years ago?

Is the bus industry subject to some of the criticism which has been aimed at the track industry? If so, it does not deserve criticism from the same standpoint. In 1924, bus transportation was well under way and operators had more traffic in many cases than they could handle. The bus manufacturers were kept busy, but not too busy to develop many new ideas in bus construction. Every one of these advancements was given to the traveling public before the public realized that it required the same. The traction industry has fallen down by not anticipating the public demands in the way that the great automobile industry determines by very exhaustive research what is best for the public.

For 20 to 25 years that part of the electric street car with which the lay public was familiar in most cities changed only in the way of additional structural strength and capacity. A very striking contrast exists in the design of street cars and some of the modern motor coaches, which have been increased in capacity to hold practically the same number as the average street car, at the same time reducing the weight 30 per cent. On the other hand, during the past decade or two, as the street car body increased its capacity it also grew in weight. Here is a good illustration of industrial science versus industrial—what should it be called?—stagnation.

The time is here now for the railway industry to follow the light-weight design of the school whose vehicles have been responsible for its most severe competition. Likewise, the automotive field can benefit immensely in its efforts to handle peak-load transportation from the lessons learned in 40 years of railway operation.

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Factors Contributing to

Effective, Economical Bus Maintenance

By Adrian Hughes, Jr.
Superintendent of Bus Transportation
The United Railways & Electric Company of Baltimore
Baltimore, Md.

Adequate, well-equipped shop buildings, an efficient organization, a carefully-arranged inspection system and co-operation between the maintenance division and all other divisions are listed by the author in this article, prepared for presentation before the Metropolitan sections of the A.E.R.A. and the S.A.E., as the four principal factors for efficient maintenance

GOOD maintenance is absolutely essential to good service, and efficient, economical maintenance has a large influence on net profit. The maintenance of buses is merely one phase of operation but an important one, and although it is influenced by the other phases it likewise influences them to a great extent.

Some of the principal factors contributing to effective, economical maintenance are the following: First, there must be adequate, well-equipped shop buildings, providing the space and facilities necessary for proper storage, inspection and repairs; second, there must be an efficient maintenance division made up of skilled and trained mechanics and shop men, headed by a competent supervisor; third, there must be a carefully arranged inspection system, systematically adhered to; fourth, there must be a practical means of co-operation between the maintenance division and all other divisions of the bus operating organization, that is, there must be a management which will act to co-ordinate the work of the entire organization in order to secure the most satisfactory service at the lowest possible cost.

The most important of these factors is the last-named —co-operation. It is difficult to segregate from the entire organization the part which can be considered solely responsible for maintenance. Where does the maintenance organization start? Where does it end? It seems necessary to include the entire bus organization in fixing the responsibility for this one phase. It includes the management, the office division, the operating division, the garage and shop division, and even the selling division. The work of these various divisions must be properly co-ordinated for satisfactory maintenance results. Each of the division organizations must know something of the work of the other divisions and have a comprehensive idea of the general organization, so that they will know where their work fits in with the whole.

The bus operation of the Baltimore Coach Company is entirely a city service but with a continually growing special bus business, made up of sightseeing, touring and chartered service. The equipment consists of 107 buses. Fourteen of these are 55-passenger, semi-inclosed, double-deck buses. The remainder are all single-deck buses, 25 or 29-passenger, and of the standard pay-enter city type, with the exception of a few coaches assigned to the special bus business and sightseeing, operated under the Gray Line Association membership. In addition to these buses, the Baltimore Coach Company maintains 38 trucks and 24 automobiles used by the railway.

Two Garages Serve the System

The storing and maintenance of the buses is provided for at the present time by two garages, each with a shop. The Charles Street garage, centrally located, takes care of the storage and maintenance of 61 buses which operate on seven routes, the storage and maintenance of all the automobiles and the maintenance of all the trucks. The Fleet Street garage is located in the eastern section of the city and takes care of 46 buses operating on four routes. There is a foreman at each garage. The shop forces consist of 52 shopmen and sixteen cleaners and janitors.

There is no general repair shop for the buses, the shop at each garage taking care of the maintenance of the vehicles which operate from it, but there is a certain amount of specialization between the two shops. At the Fleet Street shop all of the major body work, upholstery work, battery work and radiator repair work is done. At this shop also is located the oil reclaiming plant. At the Charles Street shop is located the modernly equipped spray paint shop where all of the bus painting is done. This shop also does most of the unit overhauling work on engines and all special machine and electrical work.

Too much emphasis cannot be laid on the importance of inspection for satisfactory maintenance. Careful and competent inspection is essential not only to insure satisfactory and uninterrupted service but also to keep the cost of maintenance at a minimum. Written reports or defect cards from the chauffeurs form an important part of the inspection system. To insure that they will not fail to report defects, a daily report is required whether a vehicle is defective or not. The interest of the chauffeurs must be kept up so that these reports will be filled

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The satisfactory appearance of buses can be obtained best by a daily shower bath with a scrubbing by soft brushes

out intelligently and not in a perfunctory manner. They are of great aid in guiding the maintenance division and preventing small defects from growing into costly repair jobs. Properly carried out, they take the place of frequent inspection periods in the shop which keep buses out of service and interfere with useful shop work.

Inspection for crankcase oil changing and for general lubrication is made every 1,000 miles with some variation for special cases. Lubrication is of the utmost importance. Inspection of the entire bus to detect defects and to make repairs or replacements is made every 2,000 miles. The periodical general inspections are indicated by a small card placed in a holder on the dash of each vehicle. A comparison between the mileage indicated on this card and the speedometer reading, as buses are stored each night, furnishes a ready means of picking out those which are due for inspection. This method has worked out well and eliminates the necessity of keeping a separate record of the regular inspection periods.

Brakes are perhaps the most important part of the operating mechanism on a bus, because good brakes are necessary to insure safety as well as service. Their care also contributes materially to the cost of maintenance. It has been found that a brake tester not only reduces the cost and time required for inspecting and servicing brakes but adds to the reliability. A brake-testing device is just as important as an engine-testing device.

Another important element of maintenance is cleaning. The satisfactory appearance of buses, with the least damage to paint, can best be obtained by a daily shower bath with a scrubbing by soft brushes, requiring about three minutes for each vehicle. A spray apparatus, composed simply of two upright pipes providing a spray through which the bus is moved, has been found just as satisfactory as a more elaborate spray rack, because the bus has to be moved in and out of the wash rack with any type, so that no additional time is consumed in the use of the simpler apparatus. Chassis and running gear should be cleaned about once a week with a high-pressure cleaning compound spray using steam or air. Engines and radiators should be cleaned once or twice a month in the same way. A clean engine is not only a great aid to inspection but it also prevents many minor troubles.

Important to Keep Buses Earning

The object of all this effort is to keep buses in service, because it is only then that they are earning money. This is accomplished by catching up small defects through these various inspection methods and by the use of the unit repair system. Interference with useful revenue work during busy seasons is minimized by scheduling certain major repair work to fit in with the seasons of least activity. Careful attention is given to such important details as specialization of mechanics, the application of labor-saving tools, the use of high-grade parts and materials, and the salvaging of usable material. Care also is taken to procure accurately such data and records as are necessary. Clerical work required by chauffeurs and shopmen is kept at a minimum, but it is most important that this information be turned in accurately as the entire value of the accounts and statistics depends on the accuracy with which the original data are secured.

These and many other shop practices and methods are important elements of good maintenance. The shop practices of this property are considered modern and up to date, but it is unsafe ever to become too well satisfied. Constant study and analysis of the methods and results must be continued and changes tried out. The study of articles about other properties, or better still, visits to other properties, is of great help in bringing about improvements that add to efficiency and economy.

Cost figures for this property might be of interest, although it is misleading to make comparisons of the cost per mile of operation between different properties, because of the variations in the many factors affecting these costs. A statement of revenue and expenses showing the general accounts in total cost per year and in cost per mile comparatively for three years is given in Table I.

The maintenance cost of this fleet of buses should make an interesting comparison with the average city operation that has been running for some time, because none of the equipment is new and should therefore represent a fair average over a long period. The newest buses in this fleet are a group of twenty which are three years old. The oldest buses are a group of 32 which are more than six years old, and the average age for the entire fleet is approximately 4½ years.

The total average cost of this bus operation, including the general expenses of the Baltimore Coach Company, all fixed charges and charges from the claim and other departments of the railway which do work for the coach company, for the year 1927 was 35.7 cents per mile. This compares with 37.8 cents in 1926 and 33.7 cents for the first six months of 1928. Of this figure of 35.7 cents for the cost of the operation in 1927, the maintenance of plant and equipment, as defined in the Classification of Accounts by the American Electric Railway Association, was 8.6 cents or 23.8 per cent of the whole. This does not include depreciation reserve, which was at the rate of 2.7 cents per mile in 1927.

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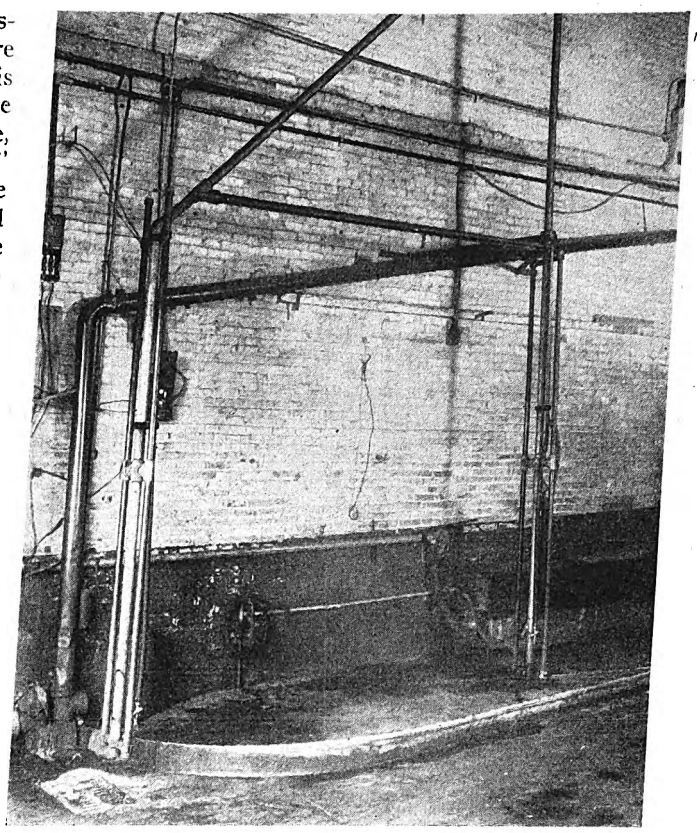
To determine the figure of expense which is susceptible of control by the maintenance division, there should be deducted the supervision expense which is more or less fixed, garage rents of $13,500 and the tire mileage contract, all amounting to 1.9 cents per mile, but there should be added from the "Operating Garage" account the items of "Garage Employees" and "Garage Expenses" made up primarily of cleaning, oiling and various garage expenses, as these are also under the control of the maintenance division. These amounted to 1.3 cents per mile in 1927. The result is 8.6 cents less 1.9 cents plus 1.3 cents or 8 cents per mile. This figure of 8 cents per mile out of the total operating cost of 35.8 cents per mile, or nearly one-quarter of the whole, can be divided into four items: 3.6 cents per mile for the labor and material of bus chassis maintenance; 1.5 cents per mile for labor and material for bus body maintenance; 1.6 cents covering service trucks, miscellaneous shop expenses, buildings, fixtures and grounds; and the 1.3 cents per mile from the "Operating Garage" account. They represent that portion of the expense which is incurred in the garages and shops through the activities of the maintenance division. This is the actual cost of inspecting, repairing, fueling and cleaning vehicles and keeping them in a safe and satisfactory operating condition.



The spray apparatus, composed simply of two upright pipes, providing a spray through which the buses move, has been found satisfactory

Determining the Proper Figure

The big question for consideration is not only what factors contribute toward keeping this figure at a minimum but also how to determine when the minimum has been reached. For any property, what should this figure be to represent an effective and economic maintenance, and who is going to be the judge when this satisfactory condition has been attained?

There is need for some practical direct method of indicating when the proper balance between the standard of maintenance and the cost of maintenance has been reached. This should not be left altogether to personal opinion. An effort has been made in Baltimore to use for a measure of the condition of the equipment in determining the proper allowance for this purpose the number of road failures or service calls per 10,000 miles of operation. This record has been frequently used to determine the degree of satisfaction of the service, but its value as an aid in determining the proper limitation of expense may not have been tried out fully. The trend of this item from month to month and from year to year should be a very positive indication of the condition of the equipment and should reflect the effect of the expense incurred for maintenance.

The details of the shop practices and methods have been treated in brief. The following paragraphs show the effect that co-operation with the other divisions and the general practices of the whole organization have on maintenance costs and effectiveness, point out practical methods for bringing this about in a bus operating organization, and also direct attention to the possibilities of using statistics on service calls to control the expenditures of the maintenance division.

The statement has frequently been made that maintenance begins on the street. It does begin on the street with the operating forces and it involves the men in the

TABLE I—REVENUE AND EXPENSES OF THE BALTIMORE COACH COMPANY FOR 1925, 1926 AND 1927

Account	1925 Amount, in Dollars	1925 Cost per Mile, in Cents	1926 Amount, in Dollars	1926 Cost per Mile, in Cents	1927 Amount, in Dollars	1927 Cost per Mile, in Cents
Total revenue	637,149.65	37.5	688,858.54	37.3	765,811.40	38.6
Expenses:						
Maintenance of plant and equipment expenses	151,476.45	8.9	172,964.89	9.4	170,021.45	8.6
Depreciation	77,490.27	4.6	64,507.08	3.5	50,757.08	2.6
Operating garage expense	98,746.56	5.8	103,628.72	5.6	104,305.29	5.3
Transportation	170,134.03	10.0	180,402.08	9.8	200,501.76	10.0
Traffic expense	14,194.63	0.8	23,196.57	1.3	20,928.90	1.0
General and miscellaneous	73,108.40	4.3	64,877.11	3.5	67,771.74	3.4
Total operating expense	585,150.34	34.4	609,576.45	33.1	614,286.22	30.9
Taxes	51,875.64	3.1	63,635.10	3.4	69,017.74	3.5
Interest	17,664.25	1.0	24,023.40	1.3	26,296.28	1.3
Total expense	654,690.23	38.5	697,234.95	37.8	709,600.24	35.7
Net income	*17,540.58	*1.0	*8,376.41	*0.5	56,211.16	2.8
Bus-hours			248,206			
Revenue passengers			7,819,778			
Transfer passengers			1,103,313			
Total passengers			8,923,091			
Load factor, in per cent			48.4			
Speed of operation (excluding layover time)			8.0			
Mileage	1925—1,700,226; 1926—1,844,299; 1927—1,986,128					

*Deficit.

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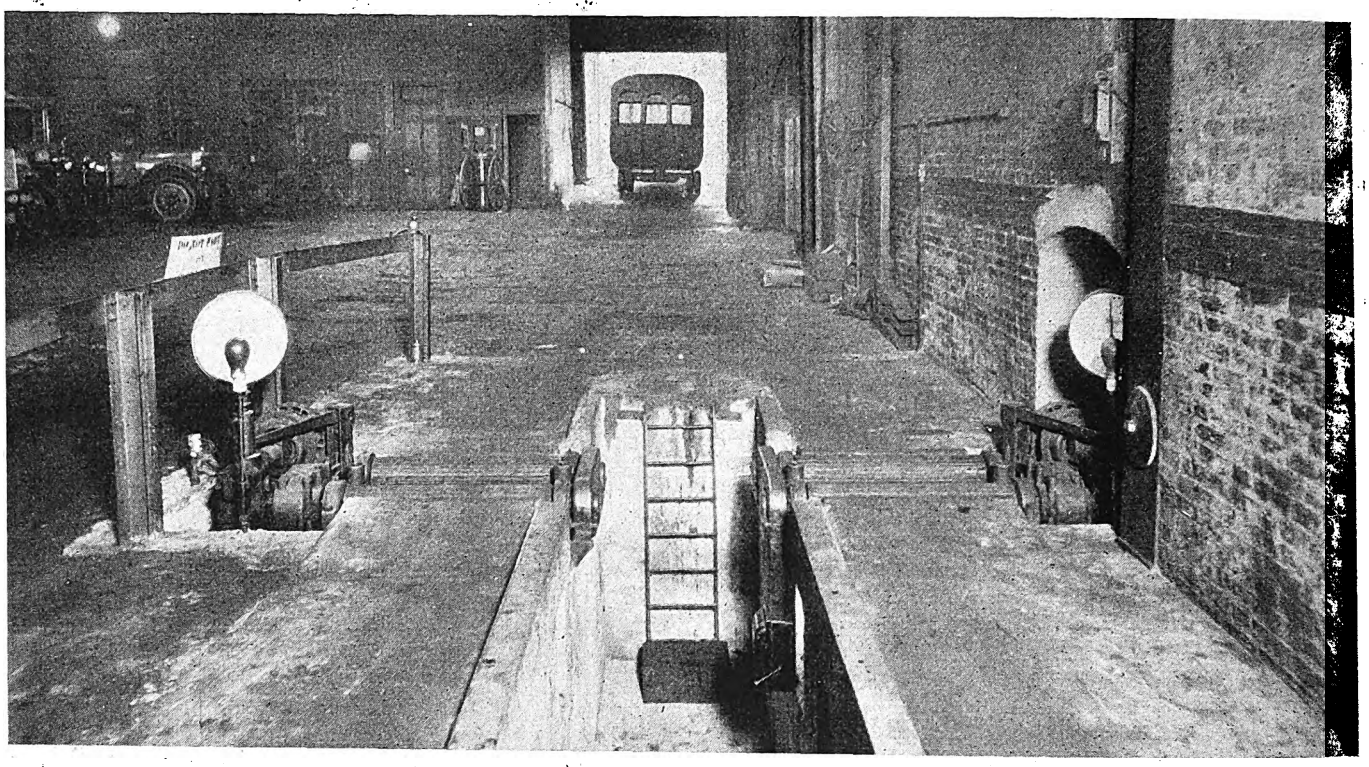

A brake tester not only reduces the cost and time required for inspecting and servicing brakes, but adds to their reliability

office. Just as the cost of maintenance is merely a part of the total cost of operating buses and is no more or no less important than any other part, so is the maintenance division just a part of the entire organization, just as important but no more so than any other part. Satisfactory functioning of the maintenance division depends to a great extent on co-operation from the other divisions of the organization. Not only must the work of each of these divisions be done as perfectly as possible, but it must be clear how and where the work of each fits in with the others. There must be frequent meetings and consultations by the supervisory forces of all of these various divisions. In fact, the success of a business or undertaking of any sort depends on the entire organization. There is no such thing as a one-man organization if there is more than one man required for getting out the work of that particular business.

The most effective way of bringing this about in Baltimore has been through the medium of weekly meetings of the entire supervisory force and the office forces. This system was found to give excellent results some few years ago in the power department of the United Railways & Electric Company and it has been just as effective with the bus company. The result of this system over a period of three years has been a constantly decreasing cost of maintenance with an improvement in the operation of equipment and a consequent increase in revenue.

These weekly meetings, conducted by the operating head of the bus company, are attended by the superintendent of operation with his street men and dispatchers, the superintendent of equipment with his shop foremen, the sales organization for the special bus business and the clerical force. The matters discussed vary from general information regarding the operation of both the bus company and the railway to minor details about a route, a bus or an individual. Financial statements for the operation as a whole and for the individual routes, various statistics on costs and accidents, results of special tests and investigations, and other information is presented and discussed. Thus each one is informed as to the general transportation situation and also acquires an understanding of the responsibility and scope of the work of the others.

Accounting is an important part of the organization work. Without a proper accounting system correctly carried out—and more important even that that, properly used—an organization is operated blindly. The statistics

TABLE II—OPERATING DATA OF SEVEN ROUTES IN 1927

	Charles Street	Chester Street	Fayette Street	Mount Royal Avenue	Monroe Street	North Point Road	Randallstown (Trackless Trolley)
Length of route, in miles	3.03	3.24	3.4	3.0	1.55	8.1	6.6
Buses assigned on peak	12	7	21	8	3	2	2
Buses assigned on base	8	4	13	6	2	1	1
One-way trips operated	113,664	71,396	148,594	90,608	37,726	15,000	18,814
Revenue passengers carried	2,306,512	1,059,367	2,373,706	841,476	234,122	219,052	276,172
Transfer passengers carried	.....	500,798	.....	.....	172,529	.....	.....
Total passengers carried	2,306,512	1,560,165	2,373,706	841,476	406,651	219,052	276,172
Load factor, in per cent	37.6	91.1	66.8	37.1	44.9	68	66.7
Cost per passenger, in cents	7.1	4.6	7.5	10.7	5.3	10.0	13.2
Average fare per passenger, in cents	10.0	4.9	7.0	10.0	4.3	10.0	8.2
Bus-hours operated	46,062	32,388	70,109	37,260	8,238	8,533	.....
Bus-miles operated	352,773	237,315	518,560	286,819	61,319	81,035	127,691
Total revenue, in dollars	231,423.88	76,710.31	166,862.98	84,713.04	17,393.71	22,090.58	22,732.55
Total revenue per mile, in cents	65.6	32.3	32.1	29.5	28.4	27.3	17.8
Total expenses, in dollars	164,278.98	72,128.58	177,631.40	90,226.64	21,662.83	21,928.73	36,495.08
Total expense per mile, in cents	46.5	30.4	34.3	31.5	35.3	27.1	28.6
Net income, in dollars	67,144.90	4,581.73	*10,768.42	*5,513.60	*4,269.12	*161.85	*13,762.53

*Deficit.

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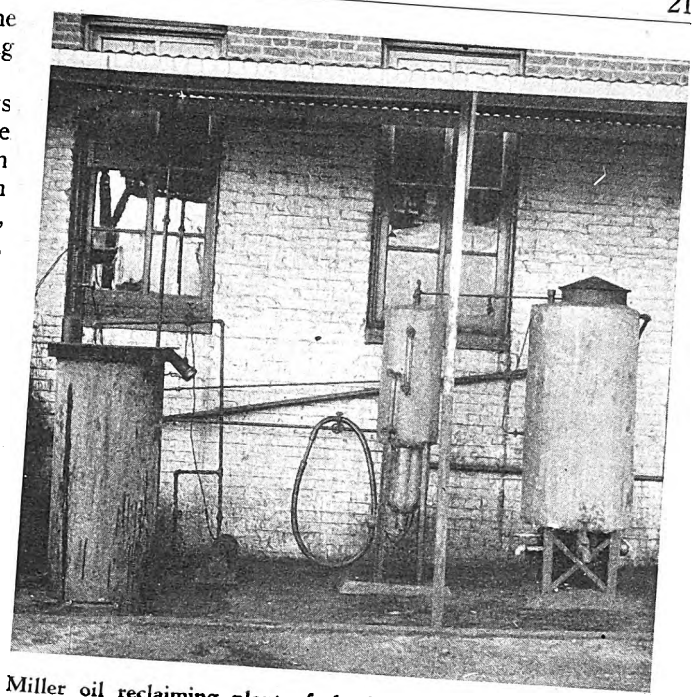
and data prepared by the accounting division are the eyes through which we see what our business is doing and what we can make it do.

The system of accounting used in Baltimore shows the cost of each individual route and each part of the operation, and from these the net profit or loss on each part. It is done quite simply by pro-rating costs on three units of the bus, the bus-hour, and the bus-miles, instead of averaging everything on the bus-mile unit, with its resulting fallacies and incorrect conclusions. The system has been indispensable in enabling us to change our bus operation from a $17,000 deficit three years ago to a $56,000 profit now. Table II is a statement of the cost of operation by routes for the year 1927, obtained by this pro-ration method and showing also other data of importance in analyzing each part of the operation.

Accounting is a great deal more than merely collecting all of the costs and all of the revenues and deriving from them the net profit. It is much more even than dividing these general costs into the classification of accounts. It must, in addition to this, provide the statistics and data which are so necessary to guide the management, the division heads, and the members of the supervisory force in the effective carrying out of their work.

Accounting plays an important part in the work of the maintenance division. Intelligent direction of that division would be difficult without statistics. Even in such things as the relative values of materials or kind of equipment, it is not safe to depend on the opinion of the shopmen. It will often be found that such opinions are erroneous and accurate data must, therefore, be collected. However, careful consideration must be given to the extent to which the statistical methods should be applied. There is a tendency on the part of almost every one to go too far, and collect so many data that it would be impossible for the management or the supervisory forces to make use of them. Table III contains statistics which are considered useful in analyzing and controlling maintenance costs.

The final control of all expenditures is effected by the use of the budget system. A budget is made in advance for each month of the mileage to be operated, the revenue to be expected, the expense to be incurred, and the net profit which will result, based upon statistics over a period of time, applied with a knowledge of existing conditions. The advantages of the budget system are well understood. It is useful for controlling expenditures and for preventing frequent and undesirable fluctuations. A comparison of the actual results with the estimated figures brings out clearly and promptly any unusual occurrences and any change in factors which affect the cost of operation. Table IV is the general budget statement for the month of October, 1928. Not only does the budget show to the accountant and to the management the allowance for each of the standard classifications of accounts, but it shows to each member of the supervisory force in detail how much money he is expected to spend in carrying out the work for which he is directly responsible. Thus, the foreman at each shop is informed



Miller oil reclaiming plant of the United Railways & Electric Company of Baltimore. Salvaging oil and other materials is an important duty of the maintenance division

TABLE III—COST OF BUS BODY AND CHASSIS MAINTENANCE BY SUB-ACCOUNTS FOR 1927

		Amount	Cost per Mile, Cents
	Bodies—Account 1304		
4-1	Painting	$4,426.51	0.209
4-2	Glazing	1,382.48	0.060
4-3	Signs	189.17	0.008
4-4	Fare boxes and registers	141.39	0.007
4-5	Body repairs	11,943.92	0.565
4-6	Batteries	3,008.07	0.142
4-7	Generators	2,985.13	0.141
4-8	Lamps	3,525.02	0.166
4-9	Signalling and warning devices	1,433.15	0.067
4-10	Damage due to accidents	1,907.27	0.090
	Total of maintenance of bus bodies	$30,942.11	1.455
	Average cost per bus	278.76	
	Chassis—Account 1305		
5-1	Engines	$16,706.88	0.790
5-2	Springs	4,595.89	0.217
5-3	Cooling system	3,758.84	0.177
5-4	Transmissions	5,107.89	0.241
5-5	Clutch	3,731.59	0.176
5-6	Brakes	10,527.09	0.498
5-7	Steering gear	2,960.39	0.140
5-8	Rear axle	11,431.02	0.541
5-9	Gasoline system	2,097.33	0.099
5-10	Frame	777.84	0.037
5-11	Wheels	5,648.95	0.267
5-12	Starters	557.00	0.026
5-13	Ignition	3,677.05	0.173
5-14	Speedometers	1,737.74	0.082
5-15	Damage due to accidents	582.94	0.028
	Total of maintenance of bus chassis	$73,898.44	3.492
	Average cost per bus	665.75	
	Average cost per bus for chassis and body	944.51	
	Total mileage	2,113,819	

TABLE IV—CONTROLLING SHEET OF THE BALTIMORE COACH COMPANY FOR THE MONTH OF OCTOBER, 1928

	Actual, 1927	Estimated, 1928	Actual, 1928
Miles	182,331.00	187,000.00	183,422.00
Bus operating revenues:			
Passenger revenue: Regular service	$56,643.13	$62,000.00	$61,447.38
Special buses	16,709.78	17,000.00	14,333.30
Total	$73,352.91	$79,000.00	$75,780.68
Other revenue from transportation	.....	.....	.....
Revenue from other bus operations	312.67	250.00	234.00
Total bus operating revenue	$73,665.58	$79,250.00	$76,014.68
Bus operating expenses:			
Maintenance of plant and equipment	$16,567.44	$20,000.00	$17,373.20
Operating garage expenses	8,765.58	10,000.00	10,357.66
Transportation	18,649.25	20,000.00	19,348.81
Traffic promotion	1,635.84	2,000.00	1,787.49
Administrative and general expenses	6,082.10	7,000.00	7,091.19
Total bus operating expenses	$51,700.21	$59,000.00	$55,958.35
Net revenue—bus operations	21,965.37	20,250.00	20,056.33
Taxes assignable to bus operation	5,996.92	3,800.00	4,482.69
Operating income	15,968.45	16,450.00	15,573.64
Non-operating income	45.75	.....	36.54
Gross income	16,014.20	16,450.00	15,610.18
Deductions from gross income	2,264.32	2,500.00	2,609.83
Net income or deficit	$13,749.88	$13,950.00	$13,000.35

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every month what his allowance is for the payroll for his mechanics and for the use of material. This allowance covers expenditures under two accounts: Maintenance of Plant and Equipment, and Operating Garage Expenses. The actual expenditures in the shop are compiled from day to day and each foreman is able to keep in touch, within a day or two, of the actual amount of money he has spent and the amount remaining in his allowance at any time during the month.

Making Use of Service Call Data

It is in the determination of the allowance for the shops that use is made of the statistics on service calls referred to previously. If the trend in the number of service calls per 10,000 miles of operation over a period of time is toward an increase, it is an indication that the allowance for maintenance has not been sufficiently liberal. A tendency towards a decrease, however, might not mean that a reduction should be made in the maintenance allowance. That would depend upon the rate of change in the reduction in service calls compared with the percentage of change in the maintenance expenditure—that is, it would probably be found that as service calls were reduced the expense of reducing them further would increase until the point would be reached where the slight improvement to service would not justify the high cost of obtaining this improvement. In practice a certain number of service calls is inevitable.

The amount of information obtained from the analysis of service call data is not limited to that required for determining the proper expenditure for maintenance. For that purpose alone merely the number of service calls might be sufficient, but with little additional effort other valuable information can be obtained. There are 44 classifications of trouble that are used at the present time, and these statistics aid not only in determining the allowance for maintenance but also enable the maintenance division to direct intelligently its attention and study to the particular things causing the most trouble, and indicates to the operating division how it can cooperate in the prevention of trouble.

Every case necessitating a chauffeur calling on the shop for assistance is listed as a service call. It is interesting to know whether trips were lost or time lost for any particular case of trouble, but the important fact is that trouble occurred on the road. The information desired is that which will show the nature of the trouble and the cause, so as to permit a study of the means of prevention. Lost time or lost trips might be more or less incidental. Every trouble call is potentially an interference with service.

For every call a report is required from the chauffeur and from the mechanic who is sent on it. It is important that these men supply the information required as accurately as possible, and they are therefore given to understand that the object is to collect helpful data rather than to place blame. These reports are examined daily by the superintendent of operation and the superintendent of equipment, who decide the proper classification of the trouble and which of these two divisions should be held responsible. Statistics are compiled monthly showing the number of calls under each classification of trouble for each group of buses, and the number chargeable against each of the two divisions. Information is available as to the number of calls for each bus, the number of calls for each chauffeur and the number of calls for each route, but so far this has been compiled only occasionally for special purposes.

It is considered that every one of the factors mentioned has a direct bearing on practical bus maintenance. Pertaining to the actual work of repairing and operating the buses, reference has been made to garage and shop building facilities, the shop forces, the maintenance division supervisor, the inspection system, lubrication and other shop practices which contribute to continuous service of the equipment. Pertaining to the cost of maintenance reference has been made to the responsibility for fixing this cost, the use of the budget system in controlling the cost, the value of statistics, and the use of service calls as a measure of this cost. Pertaining to the co-operation so necessary to make the maintenance methods effective at a minimum cost, a number of practical means of bringing about such co-operation were referred to: weekly meetings of the supervisory force, circulation of technical magazines, and conferences with chauffeurs and shopmen. These indirect factors of cost study, of control, and of co-operation practically applied, are just as important as the factors which apply directly to the maintenance division.

All Maintenance Efforts Contribute Toward Selling Rides

In every operation there must be a figure for maintenance cost and a figure for total cost beyond which it is impossible to go. It is, of course, most important that the cost be kept as close to this minimum as possible and every means for obtaining this should be used. Concentration of effort on this result must not be permitted to shut out from the minds of the organization the merchandising consciousness. It has been pointed out that in the transportation business, unlike most other kinds of business, the men who manufacture the product are also the salesmen for it. It is not sufficient to operate vehicles efficiently and economically. The business must be sold. There is a limit to cost reduction but there is no limit to selling.

Selling is a matter of knowing what people want to buy and keeping a jump ahead of competitors in supplying these wants. Then, after the customer has been secured, service must be satisfactory in every detail. This business is all a matter of detail and every detail is important. Every single customer must be satisfied every time he makes use of the service. So, therefore, while giving our best thought and study to efficient maintenance cost reduction, let us not forget that our primary responsibility and most important function is to sell our business, and that all of our efforts contribute to that end.

"Buddy" Gets a Permanent Pass

"BUDDY" is the only animal in Nashville, Tenn., allowed to travel without definite limitations on the local electric railway.

He is a German police dog, specially trained to lead the blind, and his quiet unobtrusive behavior has led railway officials to grant his master, twenty-year-old Morris S. Frank, a life pass for the dog on all the cars. Frank, totally blind, went to Switzerland last summer to obtain "Buddy" and to learn his system of guiding a master. Prominent Nashville business men, interested in the dog's work, plan the establishment of a school for training other police dogs for similar service. This institution, known as "The Seeing Eye," is to start operations early next year.—*Syndicated item originating in Nashville.*

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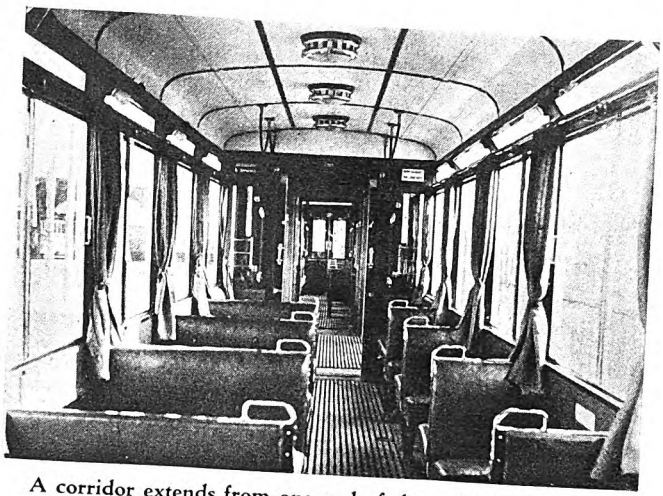
Brooklyn City Band Draws the Spotlight

FEATURED on the bills as "Attraction Extraordinary" the 30-piece band of the Brooklyn City Railroad has been appearing during the past few weeks at the Keith-Albee theaters in Brooklyn, presenting a program of popular music. The band, which was organized last August, is composed entirely of trainmen and is under the leadership of William Whitaker, a veteran band leader, but now a regular employee of the railway company. The men present a smart appearance in their neat uniforms patterned after those worn by employees of the train service, and the "act" has been very well received. Arrangements have been made for the band to appear in all the Keith-Albee theaters in Greater New York, and it is quite probable that the booking will be continued to cover the entire circuit, which would take it on the road for more than 60 weeks.

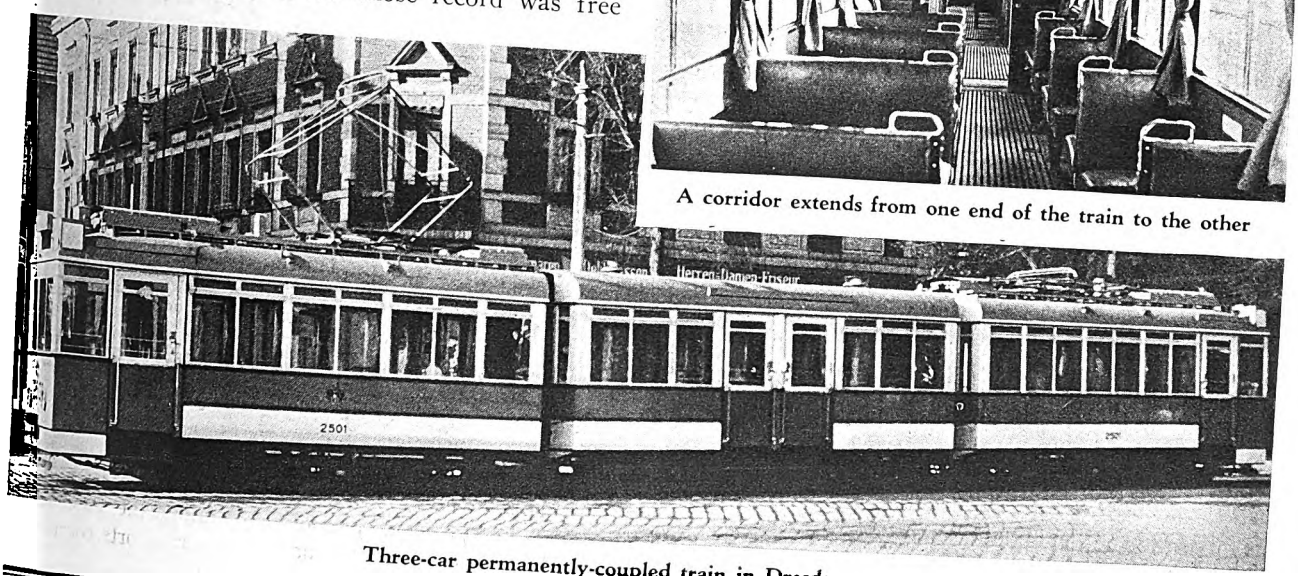
During the first week's appearance in Brooklyn Assistant General Manager A. L. Hodges, of the Brooklyn City Railroad, came out between numbers to deliver a brief address in the interest of community safety, in which he told of the contribution of the street car boys to this movement and made a plea for greater co-operation on the part of the public. He also spoke of the efforts of the trainmen to win the bonus which the company was offering to those whose record was free from "at-fault" accidents, and appealed to members of the audience to give their names to the trainmen when they witnessed an accident, so that its cause might be determined and an effort made to prevent other accidents of a similar nature.

German Three-Car Train Has Unusual Features

ON THE latest type of three-car train used in Dresden, Germany, there are platforms only at the ends of the train, and a corridor extends through all of the three cars. The entrance is in the center of the middle car, and the exits are at the front and rear ends of the train. Each end car has seats for 30 passengers and standing room for six, while the center car is primarily for standing passengers.



A corridor extends from one end of the train to the other



Three-car permanently-coupled train in Dresden

Contest Items May Be Submitted in Any Language

SO MUCH INTEREST has been aroused in the JOURNAL's Maintenance Contest that inquiries have been received from abroad with regard to Rule 12 of the competition. This rule requires all contributions to be written in the English language. The ELECTRIC RAILWAY JOURNAL believes, however, that good maintenance practice is just as commendable, wherever it is originated, and it solicits accounts of good maintenance methods by its foreign subscribers. It has decided that a communication need no longer be in English, provided the other conditions are fulfilled. It welcomes accounts in any language and will arrange for their translation.

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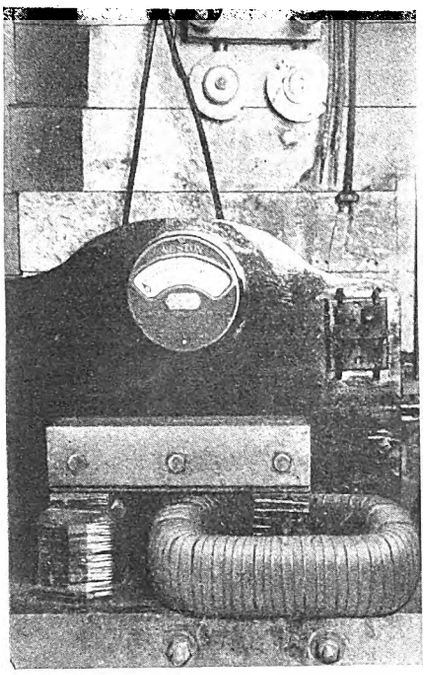
Time and Labor



Field coil in position for testing

Field Coil Tester a Great Convenience*

By E. M. Lunda
Superintendent of Shops and Equipment Grand Rapids Railroad, Grand Rapids, Mich.

In THE Hall Street shop of the Grand Rapids Railroad a field coil tester is used which has proved of great assistance in reducing fie'd coil troubles in service. The tester operates on the transformer principle. The magnetic circuit is of 3-in. square cross-section and made of No. 20 gage sheet iron laminations. The primary coil consists of 100 turns of No. 8 cotton-covered wire. It is wound around one leg of the core and the field coil to be tested is placed over the other leg, thus becoming the secondary coil. A removable top yoke completes the magnetic circuit.

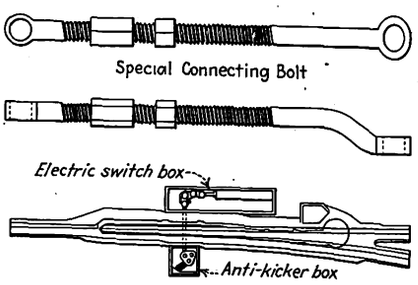
Ordinary current at 110 volts is used. When this is turned on the reading of the meter is directly proportional to the condition of the field. With a good field the current will be about 4 amp. or the same value that the primary current would be without a field coil in place, but with the top yoke on. However, when a short-circuited field is on test the current jumps to 50 amp. or more, depending upon the number of shorted turns.

With the tape removed the shorted turns can be found by noting the location of the sparking, or by leaving the applied voltage on until the field becomes heated by the induced current and causes the insulation to smoke.

Electric Track Switch Safety Device*

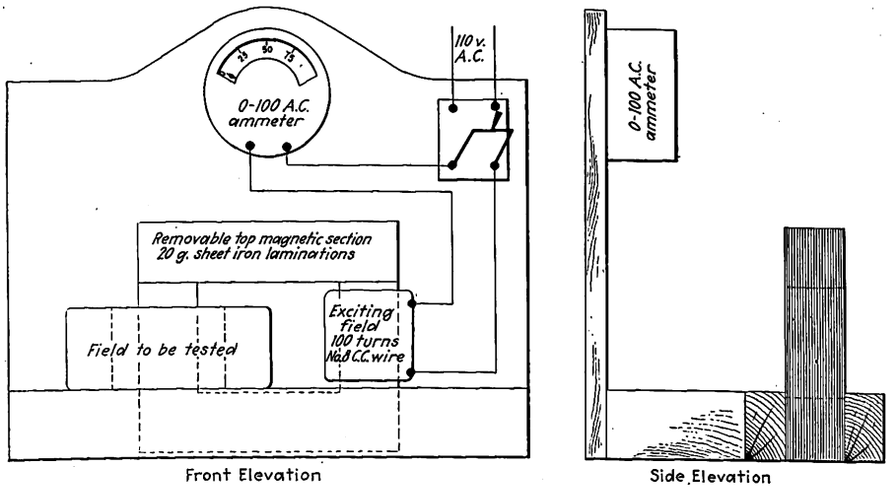
By Louis T. Botto
Superintendent Maintenance of Way Department, San Antonio Public Service Company, San Antonio, Tex.

An ACCIDENT, in which a car of the San Antonio Public Service Company split an electric track switch several years ago, led the maintenance of way department to take special precautions to prevent recurrence of this kind of mishap. On each of the track switches controlled by an electric throwing device, an anti-kicker was placed. This was installed on the opposite side of the switch from the electric box, and the throwing bolt of the electric switch was connected to the throwing bolt of the anti-kicker by a special nut, so that if any part of the electric throwing device becomes broken or out of order, the anti-kicker holds the tongue of the switch in position and thus avoids the danger of the car splitting the switch. The special connecting bolt is made in two parts, one end being 12 in. long and the other $5\frac{1}{2}$ in. long. The two nuts used on the bolt are $1\frac{3}{4}$ in. and $\frac{3}{4}$ in. long, respectively.



Special arrangement of electric track switch to prevent cars splitting the switch

*Submitted in Electric Railway Journal Prize Contest.



Construction and circuits for field coil tester

Chuck and Jig for Finishing Axle Bearings*

By Charles Herms
General Foreman, San Diego Electric Railway, San Diego, Cal.

In ITS endeavors to reduce noise in the operation of cars, the San Diego Electric Railway finds that frequent axle bearing renewals are necessary. This maintains proper gear center distances which would be impossible if the bearings are allowed to wear more extensively. To meet the demands for more frequent renewal of axle bearings and still keep maintenance costs from becoming excessive, particular attention has been given to the design of fixtures for the machine work.

The accompanying illustrations show a chuck and a jig for machining axle bearings. The first operation is to face the bearings at the split surface. This is done by holding the face against a 20-in. disk grinder using No. 00 carborundum paper. It requires approximately one minute for a half bearing to be faced, and one disk will finish 50 complete bearings.

A top and bottom part of an axle bearing are then clamped together

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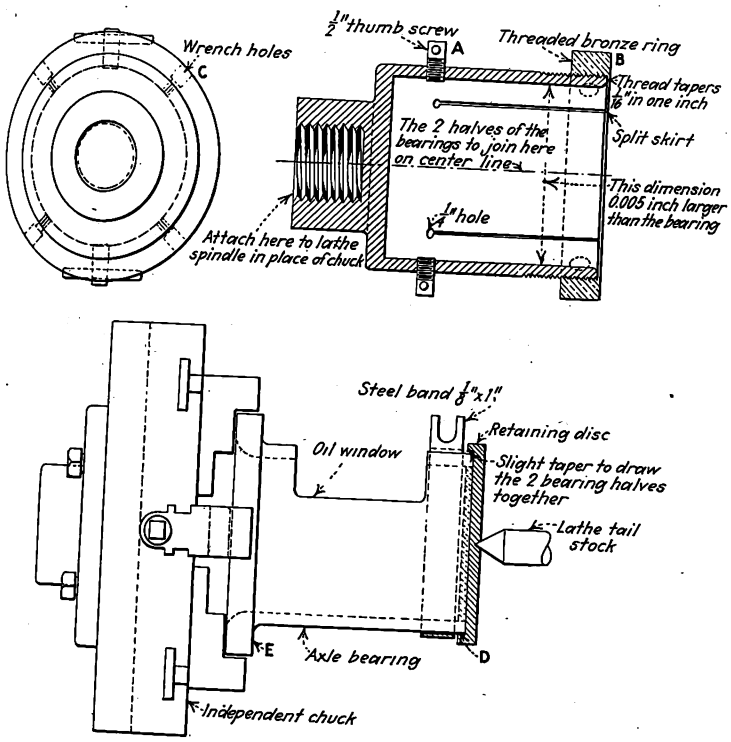
Labor Saving Ideas



Fixtures used by the San Diego Electric Railway for machining axle bearings

and mounted in a chuck. A steel band 1 in. wide is placed around the outside end. This allows part of the bearing at the end to project outside.

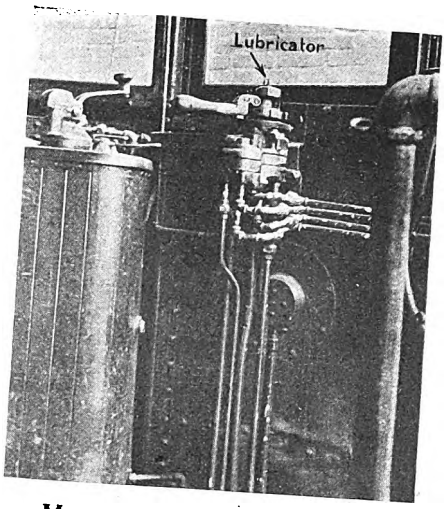
This protruding portion is turned to size as indicated at "D" and then a retaining disk is placed over the end of the bearing and the steel band is removed. The steel band has a thumb screw fastened permanently to one end, while the other is slotted so as to make installation and removal easy. With the steel band removed and the disk in place the remaining portion of the bearing is turned to size.

The inside of the bearing is bored out by placing the two halves in a special chuck. The thumb screws indicated at "A" in the accompanying illustration are tightened and the brass ring at "B" is screwed over the end of the chuck so as to clamp the bearing tightly. This end of the chuck has a tapered thread and is split at four points, so that by turning on the threaded ring the end of the chuck is compressed. After boring out the bearing, grooves for oil are machined and the bearing is then ready for service.

Lubrication of Motormen's Valves

WHEN motormen's valves are not lubricated properly they are difficult to work and abnormal wear and high maintenance costs are bound to result. Again, if an excess of oil is put on the valve stem this excess is deposited on the outside of the valve and often soils the clothing of passengers, with resultant claims for damages.

This condition was considered of such importance on the Richmond Railways, Inc., Staten Island, N. Y., that extensive experiments were made to improve the method of lubrication. It was determined that if the valve stem was drilled and tapped for the reception of a "Dot" lubricating fitting and suitable holes provided for the flow of the grease to the proper surfaces, all of the previous troubles could be prevented. The accompanying illustration shows a motorman's valve with a lubricating fitting attached to the top of the valve stem. This stem is greased on an 800-mile basis. It has been found that the motormen's complaints on hard acting



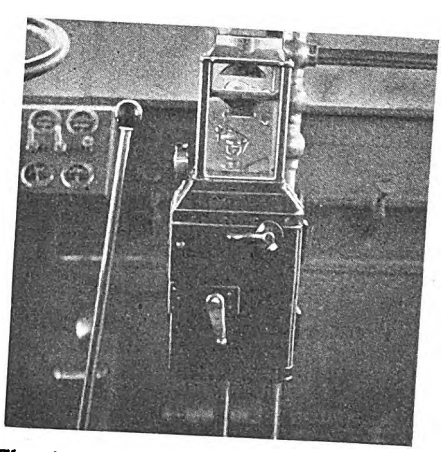
Motorman's valve with fitting for lubrication

valves has ceased, the maintenance cost has decreased appreciably and the external surface is kept clean.

Fare Box Lights Help Bus Operators*

By C. B. Hall
Chief Clerk Mechanical Department Virginia Electric & Power Company, Norfolk, Va.

DUE to the lack of sufficient illumination on fare boxes in buses of the Virginia Electric & Power Company, Norfolk, Va., it was hard to distinguish the denominations of coins and distinguish tokens when dropped by passengers. Interdepartmental conferences brought out a suggestion for installing a lamp to illuminate these boxes. A bracket type housing with a socket for a 3-cp., 12-16-volt lamp was installed. Rays from the lamp are focused on that part of the fare box where money is deposited. Electrical connections are brought from the headlight circuit and provide the same bright and dim effect as is used on general headlight wiring.



Electric light installations on fare boxes of buses operated by the Virginia Electric & Power Company

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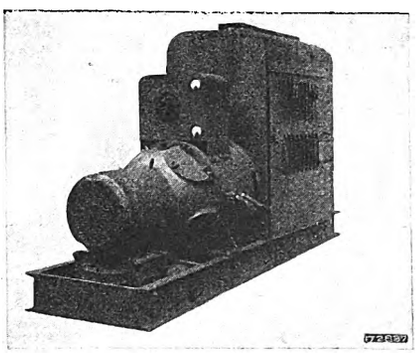
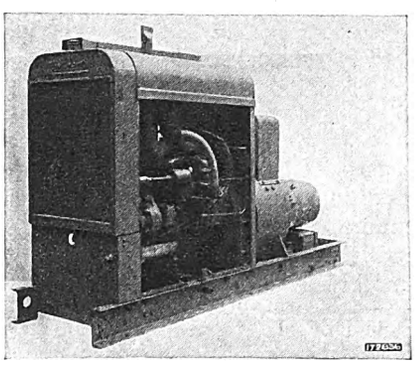
Improved Equipment Suggestions

Gas Engine Driven Arc Welding Set

GENERAL welding in isolated places not having electric power available may be performed with a new self contained, gas engine driven, arc welding set, recently developed by the Westinghouse Electric & Manufacturing Company. The machine is compact and rugged in design, requiring a minimum amount of floor space and capable of withstanding the most strenuous use. Its over-all dimensions are: length 73 in., width 25 in., and height 46½ in. The approximate net weight is 1,700 lb.

The complete set consists of a model P-20 Continental gas engine,





Welder driven by gas engine

directly connected to a new type Westinghouse 200 amp., arc welding generator, with directly connected exciter overhung from the generator bracket. To provide greater compactness, the generator has a special bracket which fits into the engine housing. Protective covers over the generator, commutator and engine head make the complete equipment weatherproof without the use of a canopy. The engine and generator, complete with all controls, are mounted on an all welded channel iron base. The equipment may be made suitable for either stationary or portable use.

The model P-20 is a four-cylinder Continental engine rated at 24 b.hp. at 1,450 r.p.m., the generator speed. It will operate under a normal load for eight hours on 10 gal. of gasoline. A Zenith carburetor with a friction type choke is operated by a positive centrifugal type governor. The lubricating system is pressure fed by a gear type pump. A centrifugal water pump and liberal radiator capacity provide an efficient cooling system.

The generator is a special type S.K., constant current, differentially compound wound machine. It is rated at 200 amp. for one hour, with a 50 deg. C. rise on a resistance load at 25 volts, in accordance with N.E.M.A. standard practice. The field rheostat, ammeter and voltmeter are all mounted in a control cabinet located on top of the generator frame. The welding range is from 60 to 300 amp.

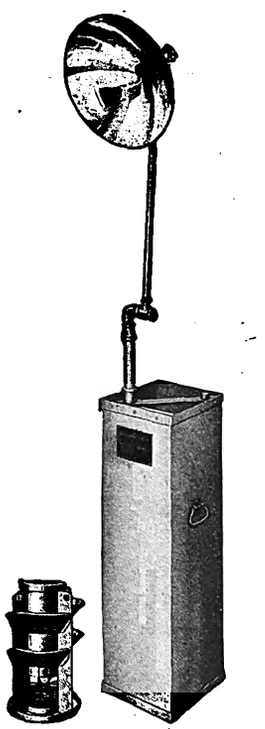
Thin Wall Threadless Conduit

WITH a wall only one-third the thickness of standard conduits a new electrical metallic tubing is being introduced by the electrical division of Steel & Tubes, Inc., Cleveland, Ohio. This is a thin-wall rigid conduit having all of the characteristics of the standard conduit. It is made from cold-rolled open-hearth steel. It is ductile enough to be bent readily to any desired shape and can be used without threading, connections being made by means of a union compression-type coupling. Part of this coupling may be used as an adapter to connect the conduit to standard threaded or threadless fittings.

Electrical metallic tubing is supplied in 10-ft. lengths, one union-type coupling being supplied free with each length. It is available in ½-in., ¾-in. and 1-in. electrical trade sizes with the same inside diameter as heavy wall conduit. The exterior is electro-galvanized and the inside coated with Bakelite enamel. Ends are protected by metal cap to avoid damage in shipping. The manufacturer claims as advantages that the new tubing eliminates all thread cutting, it is easy to work on the job, easy to handle because of its lighter weight and can be used with any threaded or threadless fittings. It presents maximum protection against corrosion, costs less and carries a standard resale price.

Choice of Fuels Provided with Carbide Light

A NEW kind of carbide light, which will operate with either lump carbide or carbic cakes, is announced by the Alexander Milburn Company, Baltimore, Md. This provides a light or welding generator,



New carbide light which uses either lump carbide or carbic cakes

with extra gas storage space which does not restrict the user to any particular kind of carbide.

The center of the carbide container is a cylinder which holds the carbic cakes and which is equipped with the proper facilities for taking care of the sludge. The outside of this container is filled with conical pockets for the reception of ordinary carbide. This duel fuel principle is incorporated in single lights of 8,000 and 12,000 candlepower and in the duplex light of 16,000 candlepower. This same principle will be incorporated in lights of other capacities on order.

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News of the Industry

More New York Central Electrification Rumors

In confirming the news that a power survey is under way, the New York Central Railroad on Jan. 2 said no conclusion had been reached on the question of the electrification of the lines of the company across New York State. An official announcement said:

For several years power companies, in conjunction with our own engineers, have been making surveys of our possible future power needs. These surveys are a normal procedure, inasmuch as the railroad has to look ahead many years. While the results of some of these surveys have been laid before the company, no conclusion as to the possible electrification of our lines between Croton-on-the-Hudson and Buffalo, N. Y., has been reached.

Tokens an Acceptable Gift in Richmond

A new method of selling transportation will be put into effect in Richmond, Va., by the Virginia Electric & Power Company. It is the outcome of the successful merchandising before Christmas of gift containers packed with tokens. The small metal cases held a fixed number of tokens in an attractive holiday box. The whole was offered to customers at the cost of the fares, plus 1 cent to cover the container. A total of 7,200 tokens was sold in this way.

After a trial in Richmond, the new plan may be adopted in the other cities served by the company.

Further Moves in P.R.T. Audit

In an ordinance introduced in the City Council of Philadelphia, Pa., on Dec. 27, City Controller Hadley is authorized to engage the auditing firm of Haskins & Sells, New York, to assist in the required examination of the books, accounts and vouchers of the Philadelphia Rapid Transit Company. The measure provides an appropriation of $30,000 for expenses of the audit which the fiscal officer is required to make under the city-P.R.T. partnership agreement of 1907. However, Controller Hadley has since then made public a newly drafted ordinance, authorizing full inquiry in the company's finances, which he intends to offer to Council's Transportation Committee as a substitute for the previous measure.

Mayor Mackey had previously expressed his pleasure at the manner in which the warring elements had been placated and his appreciation of the company's attitude in consenting to withdraw the Supreme Court appeal by which it had endeavored to block temporarily Mr. Hadley's move. He stated that any further recommendations which the controller cared to suggest should be incorporated in the ordinance when it comes up for action. It was his belief that the immediate accomplishment of the audit would expedite early consideration of vital administration projects, such as the new operating agreement for the Broad Street Subway and the contemplated municipal acquisition by the city of the underlying companies included in the system of the Philadelphia Rapid Transit Company.

Co-ordinated Transit for Cleveland

CLEVELAND'S transportation picture begins to unroll as the Van Sweringens, the Cleveland Railway group and local bankers get down to cases. A committee of the Cleveland Railway board will report to the directors within a short time plans for a system, co-ordinating the Van Sweringen interests with those of the railway for the development of rapid transit and surface lines to serve city and suburbs. This report, assuming its general acceptance, will mark the beginning of a new epoch in local transportation. In its general aspects the Van Sweringen program involves very little use of public highways but contemplates the use of private rights-of-way from the suburbs into the heart of the city. With so much money to be invested it would be wasteful folly to build competing systems. They should be co-ordinated on some basis fair alike to taxpayers and investors.

The proposal under discussion by the railway committee has many and obvious difficulties, but its purpose stands analysis. Completion of a co-ordinated system, such as that suggested, would put Cleveland among the foremost cities in the matter of local transportation instead of, as at present, among those worst equipped in this respect.

Service-at-cost as a transportation principle has stood the test of nearly twenty years' experience; we are not ready to abandon it even for the boon of rapid transit. First, to the directorate of the railway, then to the City Council, goes the program now nearing complete formulation. The authors of the plan start with whatever initial advantage there is in the fact that the whole community agrees as to the need of a comprehensive transit program.—*Cleveland Plain Dealer.*

Investigation for Relief in Massachusetts

At the request of Governor Fuller of Massachusetts, a new inquiry has been made into the possibility of some transportation relief between Boston, Chelsea and Revere. A report on the subject has been made to the Governor by Edward E. Whiting, a public trustee of the Boston Elevated. The main point in this report is that instead of the present 20-cent fare, which is 10 cents to the Elevated and 10 cents to the Eastern Massachusetts, there may be arranged a plan for a 15-cent fare which the two roads can divide equally. This would be partial relief, as there is a vast amount of travelling from Revere and Chelsea to Boston and the people have been objecting to the double fare. Mr. Whiting estimates that the reduced fare would mean a financial loss of about $25,000 annually for each company.

For a physical improvement in service the general proposition is that the Elevated should buy the Chelsea division of the Eastern Massachusetts, but on this there is no new evidence. The Governor has asked for a valuation of the Chelsea division, to be made both by the Eastern Massachusetts and by the Boston Elevated, with the suggestion that the public take care of the difference between the two sets of values. Evaluations are in progress, but are not completed.

One temporary proposition is that the Elevated should operate buses from Maverick Square in East Boston through a part of Chelsea to the Broadway section in Revere.

Ruling on Zone Rates in Milwaukee

An extension of the city fare limit on the Howell Avenue-Tippecanoe Line of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has been denied by the Wisconsin Railroad Commission. A petition, filed in August a year ago, requested the commission to investigate the feasibility of extending the single fare zone limit in the town of Lake. A hearing in the case was held in Milwaukee in the spring of last year.

The commission stated that while it was convenient and very frequently desirable in fixing street railway rates to make city limits the limit of the single-fare area, it did not necessarily follow that the two must coincide. Street railway rates must be based upon cost and where it could be shown that the particular line of a city system was unprofitable to an extent to burden the balance of the system, zone rates might

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properly be established on such a line to produce additional revenue without regard to the city limits. Considering that the city railway system had been operating without a full return, that the suburban railway system had been operating with practically no return and that the line under consideration was the least profitable of the entire system, the commission did not find that conditions would justify its ordering the extension.

Another City, Louisville, Suffers Traffic Delays

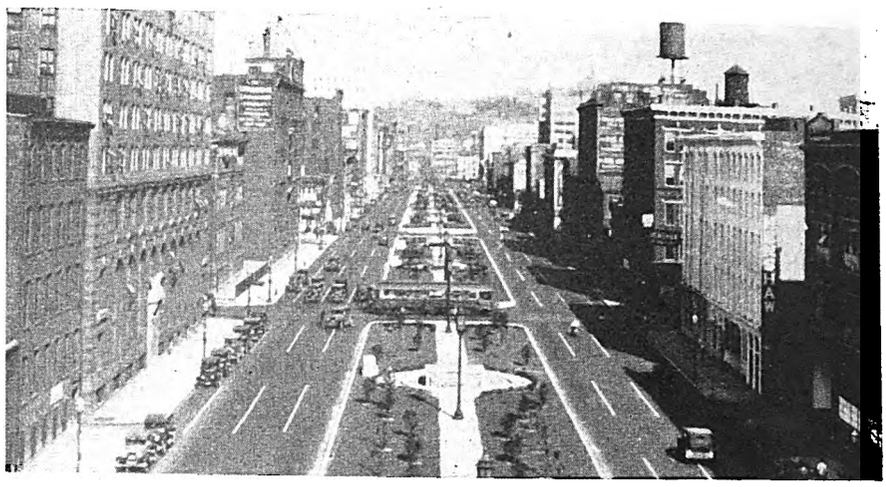
A plea for loading platforms as a means of relief to the cars of the Louisville Railway, Louisville, Ky., due to the new traffic light system recently completed, was made by Samuel Riddle, vice-president of the company, to the Board of Public Works recently.

Mr. Riddle said he had no complaint about the traffic control lights, but showed that congestion is resulting and that cars are delayed ten and twelve minutes over their previous schedules.

The traffic ordinance makes it mandatory for the Board of Public Safety to order the safety loading platforms throughout the central traffic district, wherever the street has sufficient room for their establishment. The ordinance also empowers the board to order motorists to keep to the right of platforms.

Mr. Riddle said that if the plan were to be carried out, automobiles could pass the street cars when the lights are green, remove the congestion of the streets, give greater convenience to passengers and help the railway to maintain schedules. If motorists were forced to keep off street car tracks inside the loading platforms, it would obviate the necessity of stopping the cars once or twice in each block and make for a better condition generally. He urged that steps be taken as soon as possible to bring about the relief aimed at in the traffic committee report and enacted into an ordinance by the Council.

The matter was discussed with the Public Utilities Bureau for its aid. During the discussion, George W. Hubley, engineer of the bureau, pointed out that motorists are again turning right against red signals in the central traffic district, a practice clearly unlawful. Mr. Hubley said taxicabs are reported to be among the worst offenders, although other drivers are also making the unlawful turn.



Magnificent boulevard built over rapid transit right of way

Parades Dedicate Cincinnati New Boulevard

When Cincinnati formally dedicated its new Central Parkway, the magnificent boulevard built for several miles on the top of the Rapid Transit tubes in the bed of the old Miami-Erie Canal, the occasion was marked by a celebration lasting three days, with a big parade each day from one end of the Parkway to the other. The first parade embodied all the functions of city government, among other things depicting the development of transportation. The second parade was composed of floats showing the early history of Cincinnati, and the third parade was composed of the city's fraternal organizations.

When the Cincinnati Street Railway was called upon to take part in the first parade and asked to help show the development of transportation, something of a problem was presented. None of the early horse cars used in Cincinnati have been preserved that might serve for exhibition purposes and there are no street car tracks on the new Parkway. The company therefore decided to show the development in motor coach transportation and at the same time call public notice to the fact that street car service still furnishes the backbone of urban transportation, and then demonstate it is also going right ahead in the development of better street cars. Accordingly the street railway float consisted of an ancient bus, an Armleder, built in 1916, which was followed in the parade by a modern Twin Coach. The old Armleder attempted to seat 20 passengers on longitudinal wood seats. It was equipped with solid tires. The Twin Coach carried the street car story with three posters in the windows on each side, which read as follows:

WATCH FOR THEM

We cannot run our beautiful new street cars on the Parkway, but you will soon see them on the streets.

PUBLIC SERVICE

Our Street Cars Carried
125,000,000
Passengers
Last Year.

PROGRESS

New Car Repair Shops.
56 Miles New Tracks.
19 New Power Stations.
100 New Street Cars.

Accidents Decline in Buffalo

An important contribution to public safety was made in November by the International Railway, Buffalo, N. Y., when Bernard J. Yungbluth, president of the company, announced the total number of accidents was 19.4 per cent less than during the corresponding month of 1927 and lower than any November in the last 12 years. Collisions between street cars and automobiles, which outnumbered all other types of accidents, were 24 per cent less in November despite the increased automobile registration. Derailments were reduced 23 per cent while the number of accidents due to car equipment was the same as in November, 1927.

Development of bus shown in parade on Cincinnati parkway

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Service Changes Made in Seattle

Drastic curtailments and service changes were put into effect on Dec. 3 on the Seattle Municipal Railway, Seattle, Wash. The program means new transportation service for the south end industrial district, but complete abandonment and rerouting of car and bus service for other areas. It contemplates:

1. Discontinuance of the Ray Street shuttle service on Queen Anne Hill.
2. Abandonment of service on the Youngstown shuttle line.
3. Stopping of service on the Lake Burien line outside the south city limits.
4. Cutting out of the Green Lake Bus Service.
5. Complete rerouting of the Seward Park buses.
6. Making Beacon Avenue and Spokane Street the terminus of the Beacon Hill bus route.
7. Inauguration of early morning and evening "tripper" car service between First Avenue and Pine Street and the Boeing Airplane plant.

Advance arrangements had been made, Mr. Avery announces, for the tripper cars to carry 165 employees of the Boeing factory to and from work night and morning.

Mr. Avery declares that the Ray street shuttle, two blocks long, is losing $308.16 a month; the Youngstown line, only six blocks from the Spokane Street car line, is losing $285.60 a month; the Lake Burien line has not paid for many months; the Green Lake Bus route, which is a duplication of the Green Lake railway service, is losing $1,650 monthly. By discontinuing the lines the system will save about $2,000 a month.

Fare Discussion in the Twin Cities

The City Council of St. Paul, Minn., is reported to be ready to sign an agreement with the St. Paul City Railway providing for a fare increase which would provide a 7½-cent fare token and a 10-cent cash fare if the Minnesota Railroad and Warehouse Commission will consent to the same rate of fare for St. Paul as Minneapolis. The Minneapolis City Council presented its case to the Minnesota Railroad and Warehouse Commission a week ago. The 7½-cent token fare to replace the present 6⅔-cent fare was considered a likely basis of settlement of the fare question.

Mayor George Leach of Minneapolis will oppose the plan which will give St. Paul the same fare as Minneapolis. The two cities adjoin and the interurban lines of the two companies pass from one city to another.

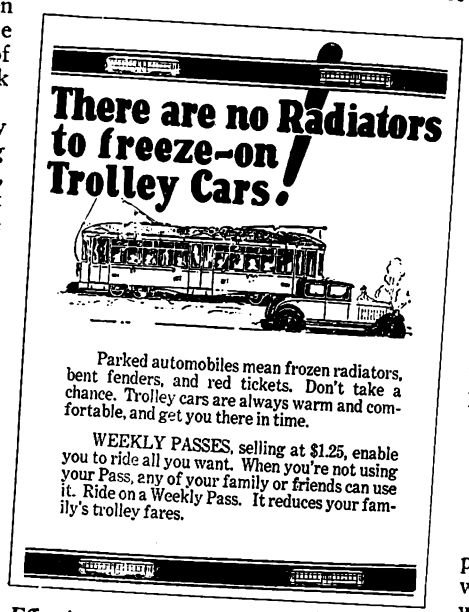
St. Paul is opposed to a rate of fare higher than that of Minneapolis, while Minneapolis contends that it is entitled to a lower fare because the earnings on valuation of property in Minneapolis have been larger than in St. Paul.

It is generally expected that the solution of the fare problem will be left to the 1929 Minnesota Legislature. A movement is under way to have the properties of the Minneapolis and the St. Paul companies of the Twin City Rapid Transit considered as one system for rate-making purposes and that is expected to be before the Legislature.

The latest report for a month shows that the St. Paul property in November was operated at a deficit of $15,000.

Keeping The Riding Public On Allentown Trolleys

With a keen originality, the Lehigh Valley Transit Company, Allentown, Pa., is keeping the desirability of transportation by trolley before the public through the medium of clever newspaper advertising. It may well be called "good will" advertising, for it points out the advantages which owners of other transportation mediums miss. It develops, too, a strong impression in favor of the railway's superior convenience. It may also be called "civic service" advertising. As many autoists as the Transit Company can win over to the railway, correspondingly fewer autos will be parked on the city streets. The labors of traffic police, the annoyances of traffic jams and the damage to autos are all materially decreased.



Effective appeal for riders at Allentown

Illustrations made up for the particular object of the advertisement strike a note that catches every reader. "There are no radiators to freeze on trolley cars!" is a statement that makes a man think. No one can delude himself into the belief that an auto is warmer, or more comfortable, or more adaptable in winter weather. Parked automobiles on snow-covered streets are always in danger of being struck by another skidding vehicle. Inability to get away, or to reach objectives in time to return for the car to avoid overstaying the parking time limit, may mean a red tag and a hearing. A frozen radiator means heavy expense. These points are brought out in a practical way through this advertising copy.

Traffic Engineer at Work in Detroit

Harold M. Gould, former traffic engineer of Dodge Brothers, who conducted the $30,000 police traffic survey, has been employed by the Department of Street Railways, Detroit, Mich., in the capacity of consulting traffic engineer. He was appointed by Commissioner William P. Rutledge. after the City Council had adopted a resolution creating the position.

Councilman Bradley's proposal said the post was particularly necessary now in view of transportation conditions. Moreover, the suggestion was in line with a communication presented later by Daniel T. Crowley, the new third deputy police commissioner. Mr. Crowley was present and was introduced to the councilmen by Mr. Rutledge.

Late in 1926, when a traffic survey was made by the city, Mr. Gould aided Arthur T. Waterfall, then director of public service, in the work, for which the City Council had appropriated $30,000. Mr. Gould has assumed his new duties.

On motion of Councilman Arthur E. Dingeman, the councilmen agreed during a general traffic discussion to restore the ban on outbound parking on Grand River Avenue between 4:30 and 6:30 p.m. As an experiment, the Council at the request of the merchants lifted the police order several months ago. Since then police officials have declared the privilege was abused and that some merchants were accustomed to park their own cars in front of their business places for nine hours at a time.

Subway Favored in St. Louis When All Are Benefited

The St. Louis Public Service Company favors the establishment of a subway in St. Louis, Mo., provided that it will serve all sections of the city, running fanwise out of the business district. Stanley Clarke, executive vice-president of the company, made the statement before the Optimists Club recently. Mr. Clarke is a non-voting member of the St. Louis Transportation Survey Commission. It was a fact, he claimed, that any progressive railway would favor a subway. Mr. Clarke also explained some of the problems that beset a railway and recited some of the accomplishments of the St. Louis Public Service Company during the year it has had charge of the St. Louis system.

Recommendations Made by Massachusetts Governor

In his inaugural address to the Massachusetts Legislature, Governor Frank G. Allen recommended continuance of private ownership and public control of the Boston Elevated Railway, liberal extension of rapid transit in Metropolitan Boston, and the early construction of another East Boston tunnel.

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No-Parking Trial Approved in Springfield

The Chamber of Commerce of Springfield, Mass., went on record on Dec. 12, by vote of its board of directors, as being unopposed to the proposed 90-day trial of a parking ban on Main Street between the hours of 4.30 and 6.30. It was voted at the same time to authorize Major Frederick J. Hillman, executive vice-president of the Chamber, to appear before the rules of the road committee of the city government and make known this change of attitude.

One of the strongest reasons why the Chamber previously opposed such a move was that the restriction of traffic in the busiest section of the town might harm trade in the stores in the affected region.

Will Experiment With Skip-Stop in Indianapolis

Development of a selective stop plan for speeding up the service on the East Washington Street line of the Indianapolis Street Railway, one of the busiest lines in Indianapolis, has been put up to the company by the Indiana Public Service Commission. Under the terms of the order, drafted by Howell Ellis, commissioner, officials of the company will have a reasonable time in which to work out a skip-stop plan and to submit it to the commission. If, in the judgment of the commission, the plan is feasible, it will be tried for 30 days and will be adopted permanently if successful.

Members of the commission estimated that the skip-stop plan will save approximately 10 minutes on a trip from the city limits to the business district. The commissioners will suggest verbally to the car company that alternate stops be designated along the line and that crosstown service be discontinued.

The matter of a selective stop plan went before the commission when a petition was filed by several patrons of the line, suggesting that cars bearing placards of certain colors be required to stop only at designated streets. A hearing on the plan was held. Officials of the company, asserted that the color plan would confuse both crews and patrons. In the order, this suggestion was overruled by the commission.

Parked Autos Scored in Montreal

Officials of the Montreal Tramways, Montreal, Que., recently declared that not until automobile parking on certain sections of the busier street car thoroughfares was prohibited directly after snow storms would tramway service be improved. During a recent storm the company did all it could in getting the tracks cleared, but this clearance made the motorists prefer the streets on which the street cars were run to the other thoroughfares. This influx of traffic to the street car lanes would not interfere seriously with the movement of traffic, if the automobiles were not lining the curb. Officials remarked that parking might be prohibited on certain streets throughout the entire winter months. If this were done, the flow of traffic through the busier sections of the city would be able to continue uninterrupted, and an improvement in service would ensue.

More Tips on North Shore Wanted

With the dawning of the new year, the slogan of the North Shore Line is a banner business year. To that end, a concerted drive for new business in all branches of the service was undertaken on Jan. 1. Roy Thompson, traffic manager of the Chicago, North Shore & Milwaukee, in outlining the aims of the drive, said that new business of all kinds was desired; that the company was not going to concentrate on any special phase of service. Under the plan, better business credits will be allowed for all revenue producing tips solicited by employees. Every successful effort toward building up patronage for the North Shore Line will be recognized.

A new feature of better-business activities is the introduction of a plan by which credits would be awarded to employees whose outstanding work to promote good-will and better public relations between the company and its customers is worthy of recognition. Any member of the North Shore Line family who performs some act of personal service which makes more satisfied customers will, on recommendations of the better business department, be given credit according to the value of the deed.

Six "Road of Service" boosters were awarded merit badges by the better-business department during the period from Oct. 15 to Dec. 1, 1928, and 81 revenue-producing passenger tips were turned in by employees participating in the better-business drive during that period. For these tips, a total of 363 credits were awarded by the better-business department.

$45,000 for Safe Operation in New Jersey

More than $45,000 was paid out in December, 1928, to operators of the Public Service Co-ordinated Transport, Newark, N. J., for operating without accident for the four-month bonus period ended Nov. 30. Under the company's "no-accident" bonus plan special inducements have been made to encourage operators to take every precaution possible to insure the safety of their passengers. The successful co-operation of the operators is indicated by the large number sharing in the awards. In the Passaic Division 371 operators received $7,342 in bonuses.

Toronto Opens Its Lake Shore Route

With the opening of the new double-tracks along the Toronto-Hamilton Highway as far as Long Branch, another route sign "Lake Shore" made its appearance on cars of the Toronto Transportation Commission, Toronto, Ont. Every second Lake Shore car runs the whole distance from Queen and Victoria to Long Branch, supplying an eight-minute service during normal hours and a more frequent service in rush hours. The rest of the cars on the route will be designated "Lake Shore Humber" or "Lake Shore Sunnyside." The fare to the city limits is one regular ticket or 7 cents, and a second city fare is collected between the city limit and Long Branch. Beyond Long Branch there is the "Port Credit" route supplying 15-minute service, with additional cars in rush hours, for a 5-cent fare. A half-hour service is supplied on the "Mimico" bus route, operating from the Humber west on Queen Street and then south on Church Street, Mimico, to the Lake Shore Highway. A regular city fare is collected on this route and free transfers are issued to enable passengers traveling west of the city limits to change from the buses to the Lake Shore route cars.

New Regulation for Utilities Urged by Economist

A different type of regulation for public utilities was urged by Professor C. O. Ruggles of Harvard University, an expert in public utility matters, at a meeting of the American Economic Association held in Chicago on Dec. 28. This regulation would call for the establishment of a number of federal regional commissions, which would control the activities of public utilities within the twilight zones between state and federal jurisdictions. Professor Ruggles declares that such regional commissions would probably stimulate the states to improve the efficiency of their commissions. If brains are needed and needed in greatly increased numbers within the industry itself, to him it appeared that an increase both in the number and in the quality of the commissions would also be a normal development.

A scientific study of the problem was emphatically urged by Professor Ruggles in a constructive suggestion which in part follows:

Whatever federal agencies are proposed for the control of utilities other than railroads deserve to be given some such study as was given to banking by the National Monetary Commission previous to the adoption of the Federal Reserve Banking Law. Regulation, both by the states and by the federal government, should give some promise of encouraging initiative in management, and indeed should give management a fairly free rein, but both operating companies and parent organizations should be held responsible for results and allowed a rate of return in accordance with the contributions which they make toward efficiency in management and toward the maintenance of satisfactory service.

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Committee on Insurance Meets with Underwriters Group

With a number of representatives of the Central Traction & Lighting Bureau attending as guests, the committee on insurance held its organization meeting in New York City on Dec. 13, 1928. It developed that the underwriters committee and the committee from the association were on common ground at many points, and that the results of fire prevention work, which have been sponsored and encouraged by both groups, are beginning to be reflected in the experience reports which have recently been collected by both bodies.

The committee concerned itself particularly with hazards which have arisen through the introduction of spray-painting and the use of lacquers, the nature of which is not yet thoroughly appreciated, and the view was expressed that, if the smaller companies would more generally avail themselves of the practices of certain larger properties in the matter of precautionary measures, the loss experience of the industry would be materially reduced. Bus operation has also introduced certain hazards that require special attention.

An effort is to be made to bring about a wider and more representative response to the committee's questionnaires, which are soon to be distributed, to the end that a more complete and comprehensive cross-section of the industry's loss experience may be obtained. The insurance group is collecting similar data and it is desired to have accord as complete as possible, between the two reports. The fact that some companies do not reply to association questionnaires on insurance data leads the committee to believe that these same companies, upon receipt of suggestions from the underwriters, fail to give them the attention they merit, with the result that the experience table of the entire industry is made to suffer.

Among those who attended the meeting were, H. B. Potter, chairman; B. L. Tomes, vice-chairman; Frank L. Butler, Ralph S. Child, N. H. Daniels, F. M. Hamilton, A. D. Knox, John H. Moran, Paul E. Wilson, L. S. Storrs, Guy C. Hecker and James W. Welsh.

The Real Spirit in Cleveland

That intangible thing — Christmas Spirit—took on practical form recently when the entire male chorus of the Cleveland Railway, accompanied by J. H. Cox, the company's director of welfare, journeyed to Sandusky, Ohio, for the purpose of staging a concert for the old and the sick in the State Soldiers' and Sailors' Home. There followed an hour and a half concert in the chapel. The singers went from ward to ward, rendering Christmas carols. They were even allowed in the incurable ward—the first time it's been done, so it is said.

This male chorus of the Cleveland Railway is now two years old. The director is Charles D. Dawes, who has made famous the Orpheus Male Choir. In addition to this activity the chorus traveled to Warrensville to spread more Christmas spirit and later sang at the railway men's big Christmas party held in the public auditorium and sponsored by the Cleveland Railway.

Christmas Awards in Nashville

Motormen and operators of the Nashville Railway & Light Company, Nashville, Tenn., numbering 104, participated in the $1,000 yearly prize offered by the company for safe operation of cars. In 1927, 79 men received the awards. The period is from Dec. 1 through Nov. 30, being thus arranged as a Christmas bonus. Motormen and operators who finished the year in this first class received $9.60 as their part of the yearly prize and $13.10 under the four months bonus, making a Christmas gift of $22.70. These men operated approximately 30,000 miles each during the year.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Jan. 14-18*—American Road Builders' Association, convention and road show, Cleveland, Ohio.**

***Jan. 15-16*—Kentucky Association of Public Utilities, annual meeting, Brown Hotel, Louisville, Ky.**

***Jan. 22*—New York Electric Railway Association, mid-winter meeting and dinner, Hotel Commodore, New York, N. Y.**

***Jan. 23-25*—Electric Railway Association of Equipment Men, Southern Properties, and Southwestern Public Service Association, Mechanical Division, joint meeting, Houston, Tex.**

***Jan. 25-26*—Central Electric Railway Accountants' Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 25-26*—Central Electric Railway Accountants' Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 28-Feb. 1*—American Institute of Electrical Engineers, annual convention, 33 W. 39th St., New York, N. Y.**

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, New Public Auditorium, Atlantic City, N. J.**

Purchases and Stores Committee Meets

Planning its work for this year was the main accomplishment at the meeting of the Purchases and Stores Committee of the American Electric Railway Engineering Association held on Dec. 17 at the association headquarters, New York City.

Activities of the four old special committees and the three new special committees were discussed. The subjects of the old committees consist of:

1. Manual review.
2. Standard packages.
3. Investment in material and supplies and the cost of operating stores.
4. Methods and practices for keeping price records and pricing materials and supplies received and issued.

In view of the resignation of C. A. Harris, chairman of Committee No. 3, Walter S. Stackpole, was elected chairman of this special committee.

The three new committees are:

Special committee No. 5, to recommend a method of standardization and of stock; special committee No. 6, to study control of material and supplies, including control of so-called "floating" and line stocks; and special committee No. 7, to study the reclamation of used materials and the sale of scrap and salvage. The chairmen of these new committees are: No. 5, R. A. Wuster, of the Chicago Surface Lines; No. 6, Edward F. Kelley, of the Louisville Railway; No. 7, W. A. Staub, of the United Railway & Electric Company of Baltimore.

To make this year's convention program as comprehensive as possible, a convention committee was appointed, consisting of the chairmen of the special committees, headed by the chairman of the standing committee.

Super Service in Little Rock

Again during the Christmas season the Arkansas Power & Light Company, Little Rock, Ark., had the service men on duty to assist the patrons with their bundles, to make change, and to find their cars in the rush hours. As pictured by the daily papers, it was a handsome and courteous crew of men.

Kansas City-St. Louis Project Before Washington Lobby

Prospects appear brighter for the building of the Kansas City-St. Louis Electric Railway, denied the right to build by a decision of the Public Service Commission of Missouri. It is said that Senator James Reed suggested the road be built across state lines, thus making the project a federal, instead of a local affair. This seems to be the procedure at present. The company has set up an office in Kansas City, Kan., and Albert Ross, attorney of Kansas City, is in

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Washington, D. C., seeking approval of the project.

Although the company secured a right-of-way across the state of Missouri, the Missouri Commission at Jefferson City held that no need existed for another railroad and especially no need for an electric one. More recently some of the land has been resurveyed through St. Charles County with the object of crossing into St. Louis County at a point nearer St. Charles than Weldon Spring, the site originally selected for a bridge. The question that remains is what will be done about this project at Washington.

Would Pay Losses on Equipment in Ten Years

The Massachusetts Public Utilities Commission has heard petitions of the Worcester Consolidated Street Railway, and the Springfield Street Railway of Worcester and Springfield, Mass., to extend over a period of ten years' payment of losses resulting from dismantling wiring and other equipment effected on certain motorized lines.

Attorney Bentley W. Warren, representing both traction companies, stated that the Worcester Consolidated had suffered a loss of $985,915, of which it proposed to assess stockholders premiums of $227,296, and cover the remainder by payments over a ten-year period. The Springfield company's losses were even larger, he said, amounting to $1,074,803. Of this amount $269,174 would be covered by premiums paid on capital stock, and the balance of $805,629 the company desired to pay over a ten-year period beginning this year.

Cascade Tunnel Service to Start Jan. 12

Service through the Cascade Tunnel near Seattle, Wash., by the Great Northern Railway scheduled to start on Jan. 12 will complete a $30,000,000 improvement program including 73 route-miles of electrification. Of this, the tunnel project amounted to more than $14,000,000, while the electrification of the 73 route-miles cost $6,000,000, new equipment cost $5,000,000, and the construction of the Chumstick cut-off cost $5,000,000.

The celebration in the opening of the tunnel will be participated in by representatives of Congress, railroad officials from the United States and elsewhere, officials of firms who were interested in the building of the tunnel and many others.

One feature of the program will be to send the first official train carrying the special inspection party through the new tunnel. The ceremonies at Scenic, at the mouth of the tunnel, presided over by Operating Vice-President C. O. Jenks, and those at New York City, presided over by President Ralph Budd will be broadcast over the national hook-up of the National Broadcasting Company.

Foreign News

Cape Electric Makes Report

The profit and loss account of the Cape Electric Tramways, Ltd., operating in Port Elizabeth and Cape Town, South Africa, for the year ending June 30, 1928, shows a profit of £38,347, and after providing for debenture interest, redemption of debentures and taking into account the balance brought forward from last year, a balance remains of £38,625. From this amount the reserve fund has been credited with the sum of £10,000, leaving a balance of £28,625. During the year under review, the tramways carried 30,803,751 passengers with gross receipts of £315,431 against 32,532,080 passengers with gross receipts of £388,378 for the year 1926-1927. Buses in Cape Town also carried during this period 10,689,580 passengers with gross receipts of £122,-639 against 3,169,585 passengers with gross receipts of £43,008.

In spite of the fact that the combined tramways and bus services show an increase over the preceding year of 5,791,-666 passengers and in receipts of £6,683, the reduction in fares together with the increase in the expenditure to meet bus competition have made serious inroads into the profits. At the same time wages remain at the high level which obtained when satisfactory profits were being made.

The capital expenditure amounts to £33,583 and represents the cost of buses, rolling stock, and additions to the permanent way in Cape Town and Port Elizabeth. This sum was provided out of the funds of the company.

Doctors Run Street Cars

FIVE hundred physicians and lawyers without clients have been given jobs as street car conductors in Budapest. They came mostly from former Hungarian territory, which is now attached to Rumania, Yugloslavia or Czechoslovakia. The regular conductors, whose places were taken by the professional men, have been transferred to farms which the government granted to them on a system of installment payment.

The wholesale exodus of doctors and lawyers from former Hungarian provinces gave this country far too many of those classes of professional men. They were unable to find work in competition with the 100,000 other unemployed of the country and had been living on government doles.

Count Stephen Bethlen, Prime Minister, remarks that Hungary is too small and too poor to feed all her former subjects who, because of patriotism, had refused to become citizens of the governments which have taken over former Hungarian provinces. In an attempt to alleviate the condition in the professions, the government has sharply restricted the number of students who are now being admitted to the medical and law schools of the university.—*Dispatch from Budapest to New York Times.*

Electrification Plan in Mexico Reported

Electrification of that part of the National Railways of Mexico between Monterey and Tampico is being considered as a part of a project now being promoted by the governments of the states of Nuevo Leon and Tamaulipas in conjunction with the federal government.

The plans under consideration involve the construction of a large dam and water storage reservoir at El Mezquital, state of Nuevo Leon, and the installation of a hydro-electric plant. The power from this proposed plant would be transmitted to Monterey, Victoria, Montemorelos and other cities and towns, and also a sufficient supply generated to operate the railroad between Monterey and Tampico.

It is stated that, when the surveys are completed, American capital may be invited to take over the project. The water supply afforded by the storage reservoir also would be used to irrigate a large area of land now in a wild state.

Australian Tramway Shows Profit

Financial report of the New South Wales Tramways for the year ended June 30, 1928, showed earnings of £4,556,561 and operating expenses amounting to £3,938,356, leaving a balance of £619,205. After paying interest charges amounting to £591,937, there was a profit of £27,808. During the previous fiscal year a loss of £269,916 was sustained. Although there were substantial increases in expenses, due to court awards, shorter hours, family endowment and a 44-hour week during this period, these were more than offset by the increase in revenue and by progressive improvements in operation.

Garage Development in Lancashire

A new garage, complete with workshops and washing plant and capable of accommodating 100 vehicles, was opened on Oct. 11 by the Lancashire United Transport & Power Company at its headquarters in Atherton, England. Three vehicles can be swept, dusted, fueled and washed every six

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minutes. The repairing and overhaul shops are also complete.

At other garages of the company about 120 buses can be handled. At present 150 buses, operating over 200 miles of route, are owned by the company.

This tramway is giving a great deal of attention to the development of its bus business and large extensions are now under contemplation.

Trackless Trolley Substitution in England

Installation of a trackless trolley system on an additional route, instead of relaying the worn-out tramway track, has been decided upon by the City Council of Bradford, England.

The report of the chairman of the tramways committee said that the comparative operating costs per annum of the three available systems were: Tramcars, £35,765; trackless trolleys, £30,051; buses, £30,936. He also said that trackless trolley vehicles could be run with cheaper fares, greater comfort and greater safety. If buses were used, the electricity department of the city would lose about £24,000 per annum, while the cost of relaying the tramway track would be about £148,000. Installation of the trackless trolley system would cost about £43,000, he reported, and the cost of installing buses would be about £35,000, but the buses would only stand about two years' service.

BUS CONTROVERSY IN ARGENTINA—Suit for 10,000,000 pesos has just been brought against the city of Buenos Aires by the Argentine Tramway, on the ground that buses and jitneys are violating their concession.

BUS SUBSTITUTION IN GERMANY—The City Council of Wiesbaden has decided to abandon the use of street cars and replace them with buses, with seating and standing room for 56 passengers.

SPANISH RAILWAY ELECTRIFICATION—Electric trains are now operating on the Barcelona-Manresa section of the Northern Railway of Spain and it is expected that electric trains will be operating over the Algorta-Plencia line by the end of 1928.

Electric Railway Extension in Italy

The Societa Anonima Ferrovie Elettriche Biellese, a private company which runs an electric railroad from Biella to Corsato and Vallemosso, has decided to build a branch line from Corsato to Masserano and later extend into other towns. This extension is guaranteed to be working fully by the end of 1929 and construction has already begun. The extensive population and agricultural importance of these sections have necessitated the new line.

Recent Bus Developments

Midwest Coach Deal Consummated

Operations of the Midwest Motor Coach Company, which renders motor coach service between Gary, Ind., and 63rd Street, Chicago, was formally taken over on Dec. 28 by a new corporation, the Midwest Motor Coach Company of Indiana, of which Charles W. Chase is president. Official approval of the purchase of the business and assets of the Midwest company, an Illinois corporation, was given on Dec. 24 by the Public Service Commission of Indiana, concluding negotiations which have been in progress for several months and which were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 22, 1928.

According to Mr. Chase, who also is president of the Shore Line Motor Coach Company of Gary, the new company will not be merged with the Shore Line, but will be operated as a separate unit. Co-ordinated schedules, established by the two lines on Jan. 2, now provide regular 15-minute service between Gary and Chicago. Alternate departures of Midwest and Shore Line coaches have been arranged from both terminals, replacing the previous 20-minute headway and identical leaving times of both bus lines.

For the Protection of Connecticut's Children

SCHOOL authorities throughout Connecticut are warning both parents and children of the dangers involved in the prevalent custom of school children who, on the way to and from school, beg rides from passing motorists. In addition to the fact that they usually get rides from strange motorists, and may ride with some who are reckless drivers or whose vehicles are not in safe condition, it is thought by school officials to be especially dangerous for several children to be placed in an open motor vehicle of any kind without a guardian, for the reason that the children, released from school discipline, more often than not will play with and jostle each other, with the possibility of disastrous consequences. The motorist is not liable for any accident that may occur to the children while in his car, unless it can be proved that he caused it intentionally or through reckless operation of his vehicle.

In discussing this problem, Vice-President W. J. Flickinger of the Connecticut Company said that the street railway company was given the responsibility of transporting many hundreds of school children to and from the schools each day. The employees of the company made every effort so to discharge this responsibility as to afford these children the maximum of safety, and the parents whose children rode the street car have no cause for worry.

Ohio Independent's Operations Curtailed

Protested by three transportation companies, the petition of the Warren-Salem Coach line for removal of operation restrictions has been dismissed by the Ohio Public Utilities Commission at Columbus. Shortly after the Youngstown & Suburban and the Stark Electric Railroad began a joint service of street car and bus between Canton and Youngstown, the Warren-Salem company asked permission to join with the Youngstown-Akron line, operated by the Penn-Ohio system, in giving through bus service between Youngstown and Alliance. In the original certificate issued the Warren-Salem company, this was prohibited.

When the hearing was held on the matter, the petition was protested by the Stark Electric Railroad and the Youngstown & Suburban, which at present are giving hourly service connecting Canton, Alliance and Youngstown, and by the Pennsylvania Railroad which operates a one-track branch line between Youngstown and Alliance. At the close of the hearing, Attorney C. M. Shelter, representing the Stark Electric Railroad, made a motion that the petition be dismissed on grounds that the Warren-Salem line failed to prove any necessity for the new service. He was joined in this motion by attorneys for the other two companies. Two days later the commission sustained the motion and dismissed the petition.

Applications of two other companies for permission to operate bus lines in the Canton, Alliance and Youngstown district are still pending before the state board, both of them being protested by the Stark Electric and the Youngstown & Suburban.

Would Supplant Railway Service in Santa Barbara County

Application has been made by the Pacific Coast Railway to the California Railroad Commission for authority to discontinue service on a portion of its track at Guadalupe Station, Santa Barbara County, and for a certificate of public convenience and necessity to operate auto stage service for the transportation of passengers and their baggage between Guadalupe and Santa Maria in place of electric railway service, between those towns.

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Traffic Suggestions Made for Kansas City

Recommendations for interurban bus traffic regulation have been made to the City Council of Kansas City, Mo., by the traffic committee of the Kansas City Safety Council. They are designed to eliminate much of the congestion due to the loading and unloading of interurban and suburban buses in the downtown section of the city. The recommendations are as follows:

1. After Jan. 1, no street loading of interurban or suburban buses will be permitted in the congested district. This district will be known as that which is north of 19th Street, south of 7th Street, west of Locust Street, and east of Central Street.

2. Only one discharge of passengers will be permitted in the congested district and that will be made off-street.

3. Pick-up of passengers will be permitted only off-street in the congested district and when more than one stop is made for this purpose, it shall be made on the route specified by the routing committee and in no case will it cause the bus to double back through the congested district.

4. The route traveled by the buses within the city limits shall be approved by the Police Commissioners, the Director of Public Works and the Park Board.

5. All ordinances establishing bus loading zones for interurban and suburban buses shall be cancelled and none other shall be established.

In addition to these recommendations the following memorandum was submitted to the Council:

In the interest of the safety of passengers, the Safety Council recommends that the City Council pass such ordinances that it will permit the operation and the sale of tickets in Kansas City only by such lines as are authorized to do business in Missouri by the state commission. This will assure the public that the company is properly regulated and insured. It will also assure the city that it is receiving its proper share of the license fee.

Tax Judgment in Connecticut Stands

A judgment that the Connecticut Company, Hartford, Conn., pay bus taxes under the personal property tax act to the amount of $2,011 on 26 buses assessed at $95,800 as of July 1, 1926, was allowed by Judge Brown in a recent court session. The tax was opposed by the Connecticut Company, which was joined by the state on the theory that the equalization tax of 3 per cent paid the state on property was in lieu of all existing taxes.

The state of Connecticut and the railway sought an injunction to restrain collection of the fixed tax of $2,011 and Judge Brown enjoined the city from collecting or attempting to collect any further payments upon or under said assessments. Since that date a change in the state laws provides that the state take over this phase of taxation. The Connecticut Company will pay the city of Hartford this tax and the state of Connecticut has agreed to credit the company through the equalization tax.

Agitation Over Elkhart Accident

As a result of a recent bus accident in Elkhart, Ind., a movement is underway in the state to enlist the aid of the Indiana delegation in Congress to put through a bill to limit the hours a bus driver may be permitted to work. The bill in its general purpose would be along the same lines as the present 16-hour law applicable to trainmen in railroad service. The accident, climaxing a series of less serious ones, claimed the life of one man and resulted in the serious injury of thirteen others.

The county prosecutor declared that the crash primarily was due to negligence in permitting extra drivers to work for long periods of time with inadequate rest. It developed in the investigation that Julian Spooner, driver of the bus, and his relief driver, both employed by the Pony Express Lines, had been on duty nearly 48 hours, each having slept in buses while the other was driving. Both drivers had to be sent to the hospital in Elkhart and Spooner is at liberty on a $2,000 bond pending outcome of the investigation.

It also was declared by the investigators that the bus was speeding and failed to heed a traffic stop sign.

Stock Issue in Los Angeles for Equipment Acquisition

Authority has been granted to the Pacific Electric Motor Transport Company by the Railroad Commission to issue and sell at par, on or before June 30, 1929, 1,000 shares of its common capital stock of aggregate par value of $100,000, for the purpose of acquiring motor trucks and other equipment. The Pacific Electric Railway, Los Angeles, Cal., has been authorized to acquire and hold said stock.

Bus Succeeds Trolley on Line in Rome, N. Y.

The Public Service Commission granted the petition of the New York State Railways on Dec. 31 to discontinue operations for the year along Madison Street in Rome and the petition of the Utica Railway Co-ordinated Bus Line, Inc., for a certificate to operate a bus line on a 30-minute schedule, the fare rate to be the same as charged on the trolley line. The bus line will serve the same territory as at present served by the trolley line which will be temporarily discontinued. City authorities of Rome favored the grant of the two petitions. No opposition to the changes proposed was expressed at the hearings before Commissioner Lunn.

Franchises Sought in Sacramento

Application for franchises on a number of newly selected bus routes was filed by the Pacific Gas & Electric Company, Sacramento, Cal., with the City Council on Dec. 13. Ten years would be the life of the franchises, based on the authority of the Council to withdraw present railway service on G and H Streets. The new lines would not become operative until the railway line is abandoned.

Sunset Boulevard Extension Denied

After further hearing the California Railroad Commission has denied the petition for rehearing filed by the Los Angeles Railway Corporation and the Pacific Electric Railway, operating under the name of the Los Angeles Motor Coach Company, on its application for a certificate to extend its Sunset Boulevard motor coach line. The commission, however, amended its previous order to eliminate transfer privileges from the cars of the Los Angeles Railway to the motor coach line. The transfer privilege to cars of the Pacific Electric Railway, and the round trip fare of 25 cents on the coach lines, are retained.

Order Revoked on Chicago Motor Coach Rights

Judge Otto Kerner of the Cook County Circuit Court in Chicago handed down an opinion on Jan. 2 which revokes an order issued last fall by the Illinois Commerce Commission permitting the Chicago Motor Coach Company to extend its operations over approximately 35 miles of streets on the northwest side of the city. The opinion held that the commission's order of Oct. 2 was invalid because it was given without a hearing of evidence and without notice to the Chicago Surface Lines and other interested parties.

The Surface Lines was seeking the right to operate feeder buses over practically the same streets in a case pending before the commission at the time it issued the order favoring the Chicago Motor Coach Company. An appeal was taken by the Surface Lines and by several civic organizations which demanded that the car lines be permitted to establish feeder bus service in that section of the city. The surface lines proposed to adopt a 7-cent fare with free transfers to all connecting car lines, while the motor coach company insisted on a 10-cent fare with free transfers.

Attorneys of the Chicago Motor Coach Company have indicated that they would take an appeal from the Circuit Court decision. The order does not affect the operations of the buses, which the company started the day after the order was entered, but simply holds that the commission acted illegally in assigning the routes to the motor coach company.

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Financial and Corporate

Dividend Prospects Better in Ottawa

By those with a close knowledge of the company's operations, it is felt that 1929 is certain to witness the resumption of dividends on the common shares of the Ottawa Traction Company, Ottawa, Ont., so says the Canadian Financial Post.

The company paid its last dividend just a year ago and in the intervening period has obtained its fare increase. Until January, 1928, the company paid 5 per cent annually on its stock—4 per cent and 1 per cent extra.

As soon as the new fare rate went into effect, the number of passengers carried by the Ottawa trams declined substantially. The company put its rate increase into effect in August, 1928. At that time the number of passengers carried dropped off very sharply.

Recently the number of passengers carried has steadily increased, particularly during the seasonal weather of the past five or six weeks. Ultimately, it is felt the number of passengers carried can hardly fail but to creep back to the old level. Despite the first adverse results the net is now improving.

The Ottawa Traction Company operates the tramways through the ownership of virtually all the common shares of the Ottawa Electric Railway.

New Utility Investment Concern in Chicago

Formation of an investment company in Chicago with assets of approximately $24,000,000, to be known as the Insull Utility Investments, Inc., was announced on Dec. 27 by Samuel Insull, president of the new organization. Incorporation papers were filed with the Secretary of State of Illinois at Springfield. Although the assets of the company at the outset will consist primarily of substantial blocks of the common stocks of the larger public utility properties, controlled by Mr. Insull and associates, the company will have the power to acquire, hold, sell and underwrite securities of all kinds. For the present, however, it is stated the company will limit its holdings and dealings largely to public utility securities.

The company contemplates issuing publicly in the near future $6,000,000 of 5 per cent debentures and $6,000,000 of 5½ per cent prior preferred stock. Each debenture and each share of preferred stock will carry common stock subscription warrant. The details of this financing have not as yet been completed.

Martin J. Insull, brother of Samuel Insull, and Samuel Insull, Jr., will serve as vice-presidents and P. J. McEnroe will be secretary and treasurer of the new company. The directors will be Walter S. Brewster, Britton I. Budd, Edward J. Doyle, Louis A. Ferguson, George F. Mitchell, Stuyvesant Peabody.

Slight Decrease in Brooklyn City Net

For the five months' period ended Nov. 30, 1928, passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., was $4,609,300 against $4,645,690 for a similar period ended 1927. Operating expenses and taxes showed an increase from $4,065,633 for the 1927 period to $4,116,120 for the five months' period of 1928. After income deductions, the net corporate income was $405,624 compared with $464,189 for the five months' period ended Nov. 30, 1927.

Traffic, Fare and Wage Figures

The number of revenue passengers, including bus passengers, reported by 237 companies to the American Electric Railway Association for the month of November, 1928, compared with November, 1927, is as follows:

November, 1928	805,709,218
November, 1927	817,596,427
Decrease, per cent	1.45

This decrease in November indicates that the increase reported for October was due to the favorable distribution of the days in the month of October, compared with October, 1927, rather than to any material improvement in the trend of electric railway traffic.

The average cash fare in cities of 25,000 population and over:

	Cents
Dec. 1, 1928	8.2475
Nov. 1, 1928	8.2358
Dec. 1, 1927	8.0841

The rise in the average was due to an increase in the city of Lorain, Ohio, where on Nov. 28 the fare was increased from 5 cents straight to 8 cents cash with 5 tickets for 35 cents.

The average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:

	Average Hourly Rate Cents	Index Number 1913=100 Per Cent
Dec. 1, 1928	57.52	211.08
Nov. 1, 1928	57.52	211.08
Dec. 1, 1927	57.29	210.24

Partial Abandonment in Columbus

Service, supplied by the Columbus Railway, Power & Light Company, Columbus, Ohio, will be abandoned in East Mound Street after Jan. 15. The Mound Street tracks have been rented from the Ohio Public Service Company.

Controversy Terminated in Ogdensburg

Articles of compromise were signed recently by Mayor W. Allan Newell and representatives of the Ogdensburg Street Railway terminating the 10-year legal controversy between the city of Ogdensburg and the company. The city received in cash $4,906 in full payment of all claims due on account of paving and the railway will pay $5,000 as its part of the contemplated paving in King Street. The city agrees to the abandonment of the entire railway and its franchise thereon. Permission is given the company to remove its rails in certain streets.

In August, 1922, the street railway was thrown into bankruptcy. A receiver was appointed and creditors enjoined from bringing any action against the company for any sum of money. The total deficit of the company was $84,181. The road carried 470,353 passengers in 1927 and provided a year-round system of transportation. As a result of the action the sum of about $10,000 will be brought into the city treasury from a bankrupt concern.

Boston Board Personnel Completed

Lester Watson, chairman of the board of directors of the Eastern Massachusetts Street Railway, Boston, Mass., has been elected by the directors as the third member of the Board of Public Trustees, the other two having been named by the Governor, as reported recently. This completes the board under the new legislation providing for a five-year extension of public control.

Long Island Company Dissolved

The Ocean Electric Railway, Far Rockaway, N. Y., under provisions of a court order, has filed a certificate of dissolution of its corporate existence in the office of the Secretary of State. This line, a subsidiary of the Long Island Railroad, has not been in operation for some time.

$4,200,000 Realized in Spartanburg Sale

The South Carolina Gas & Electric Company, serving Spartanburg and many large textile and other manufacturing centers in the Piedmont section of South Carolina, was sold recently under foreclosure to the Southern Public Utilities Company, Inc., under the laws of the State of Maine for $4,200,000. It was conducted by a special master under authority of a decree of foreclosure and sale made by the United States District Court. The action seeking to foreclose the property was brought by the Merchants and Farmers Bank of Spartanburg as trustees under a mortgage made by the South Carolina Gas & Electric Company under date of Aug. 1, 1924.

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E. C. Marshall, president of the South Carolina Gas & Electric Company, is also president of the Southern Public Utilities Company, which owned 95 per cent of the common stock of the gas company. The new concern is affiliated with the Southern Power Company with headquarters in Charlotte, N. C.

Equipment of Staten Island Line Sold

Federal Judge Grover M. Moscowitz in Brooklyn on Dec. 19 signed an order authorizing Mortimer Brenner, receiver for the Staten Island Midland Railway, to accept three offers to take over items comprising the bulk of the railway's equipment.

The offers were one by the Transit Equipment Company to purchase all the company's cars, stored in the Clove Road carhouse, and two electric converters, with all equipment and appurtenances, for $10,000; another by the Irving S. Van Loan Corporation to purchase all the wire—trolley wires, feed wires, etc.—for $24,000; and a third by the Tompkins Bus Company to rent the substation and carhouse at Concord for $416.67 a month.

All parties interested in the railway, which has been inoperative for some time, consented to accept the offers.

Sale of Tulsa Property

The Tulsa Street Railway, Tulsa Okla., will be sold at auction at the courthouse there on Jan. 23, according to C. Kline, receiver. Total holdings of the company have been appraised at $350,000.

The United States District Court for the Northern District of Oklahoma recently entered a decree giving the Seaboard National Bank of New York City judgment against the Tulsa company for $546,561, also giving the bank power to foreclose the lien of the mortgage for that amount. A forced sale is the result of this court ruling. No bids for the property, Mr. Kline stated, would be received unless accompanied by a certified check for $25,000, payable to the receiver, and unless the bid totals at least two-thirds of the appraised value.

Freight Service in Providence Discontinued

The United Electric Railways, Providence, R. I., by a decision handed down by the Public Utilities Commission, Dec. 24, is permitted to discontinue all its trolley freight service throughout the state, with the exception of one small line and a switching service in connection with the New Haven Railroad in Providence.

It did not petition for discontinuance of the switching service but had asked to be allowed to discontinue the other trolley freight service.

The report of the commission says:

A study of the traffic figures and revenues of the suburban trolley lines shows a steady decline. The question naturally arises as to whether the future of trolley transportation, covering the suburban communities above mentioned (in Rhode Island), is sufficiently secure to warrant the expenditure necessary to renew tracks and structures with a useful life of some 25 years.

Albany System Sold

Properties controlled by Delaware & Hudson, of which Mr. Loree is head, pass to control of E. L. Phillips, owner of Rochester and Syracuse lines

ELLIS L. PHILLIPS, New York, announced on Jan. 3 that he was completing the purchase of the United Traction Company, serving Albany and vicinity, and of the balance of control in the Schenectady Railway, from the Delaware & Hudson Company. In June Mr. Phillips acquired the New York State Railways, which had a half-interest in the Schenectady property, and the Mohawk Valley Company for $41,758,000 from the New York Central. On behalf of Mr. Phillips it was said:

We believe in the future of traction properties if properly located in suitable cities and properly managed. Its continuance is inevitable and essential to the welfare of our cities.

The sale of its utilities by the D. & H. is consistent with policies the railroad has recently followed. Only a short while ago the Delaware & Hudson Railroad Corporation was formed by its officers to acquire all its railroad properties except those in Canada, which are being sought by the Canadian National Railways. Reports have had it that the Delaware & Hudson would sell its iron mines and Adirondack hotels. While retaining its coal properties, the Delaware & Hudson is divesting itself of properties not immediately associated with railroad operation and is, therefore, putting the Delaware & Hudson lines in a position where they may readily be merged in any eastern consolidation. At the head of the Delaware & Hudson is L. F. Loree, who several years ago said that the $6,000,000,000 investment in electric railways in the United States should be written off.

Mr. Phillips's associates in the New York Central deal were described as the Manufacturers' Trust Company and W. C. Langley & Company, but these organizations would seem to be acting merely in a financial capacity. Mr. Phillips said on Jan. 3 that his associates in both deals were the same, but went no further.

The consideration in Mr. Phillips's latest deal was not disclosed. Albany advices said he would pay $1,250,000 in cash and assume more than $6,000,000 in debts, but Mr. Phillips said that the price and obligations to be assumed were not yet definitely fixed.

The United Traction Company operates electric lines in Albany, Rensselaer, Troy, Watervliet, Cohoes and Waterford, with a mileage of more than 97, and it owns the Capitol District Transportation Company, Inc., which operates trackless trolleys in Cohoes and buses in Rensselaer. It also operates gasoline-electric buses in Cohoes, Troy, Rensselaer and Albany.

The Schenectady Railway, which Mr. Phillips now controls fully through his purchases from the D. & H. and the New York Central, operates 140 miles of electric lines in Schenectady, Albany and Saratoga Counties. The New York State Railways owns and operates the city lines in Rochester, Syracuse, Utica and Oneida, interurban lines, and certain suburban lines in the vicinity of Syracuse. It leases from the West Shore Railroad the electrified line between Utica and Syracuse.

A sketch of Mr. Phillips was published in the JOURNAL for June 16, 1928, at the time the deal was announced under which he took over the electric railway holdings of the New York Central Railroad.

Formal Cessation of Service by Milford Company

The Milford & Uxbridge Street Railway Milford, Mass., operated its last car over the route Dec. 31 and, with the ringing in of the new year, went out of existence. This company was originally chartered to give transportation service in the towns of Framingham, Hopkinton, Holliston, Medway, Hopedale, Mendon, Uxbridge, Grafton and Upton. Service in the section will be taken care of by buses. The Milford, Framingham & Uxbridge Coach Company will place in service additional buses to take care of that territory, while the Johnson Bus Lines Company will give the required service between Milford and Boston via Medway, and between Milford and Worcester via Grafton, Upton and Hopedale.

Would Discontinue a Buffalo Line

Application was made by the International Railway on Dec. 27 to the Public Service Commission for approval of a declaration of abandonment of its line in Best Street, Buffalo, from Genesee Street to Elm Street.

The company alleges that this portion of its line is no longer necessary for successful operation; that the expenses of maintenance and operation is in excess of revenues, and that public patronage has greatly decreased because the line is unnecessary.

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Legal Notes

ALABAMA — *Company Responsible for Injury to Child from Unguarded Vessel on Street.*

While engaged in street work, employees of an electric railway company used a vessel in which a fire was burning, and while it was unguarded a child came in contact with it and was injured. The company was held responsible even though the vessel might not be considered especially attractive to children. [Birmingham E. Co. vs. Kirkland, 118 S. 640.]

CIRCUIT COURT OF APPEALS—*Assessment of Road Tax on Railroad Held Unconstitutional.*

One of the road laws of Arkansas relative to the construction of highways requires railroads to construct crossings and defined a crossing to embrace all of the highway line within the boundaries of the railroad's right of way. In addition, it required payment of assessments on railroads as taxpayers. This law was held a violation of the Federal Constitutional Amendment No. 14, guaranteeing due process and equal protection. [Road Improvement District No. 7 vs. St. Louis-San Francisco R. Co., 28F. (2d), 825.]

CONNECTICUT — *Burden of Proof on Pedestrian.*

The burden of establishing the conditions required for the application of the last clear chance doctrine, where a pedestrian has been struck by a street car and sues for damages, rests upon the pedestrian. [Budaj vs. Connecticut Company, 143 A., 527.]

INDIANA — *Company Responsible for Boarding Accident at Point Only Recently Abandoned as Stop.*

A police order changed the location of a bus stop from one side of the street to the other side and notified the bus company which notified its drivers. Two hours after the order went into effect a bus stopped at the former stopping point, not to receive and discharge passengers but in obedience to a traffic signal. A person attempted to board the bus at this point to take passage, but was not seen by the driver and was injured after the bus started by being crushed between the bus and a parked automobile. The court held there was an implied implication to enter the bus and that the company was responsible. [Stradling vs. Hahn, 163 N.E., 527.]

KENTUCKY—*Duty of Bus Driver When Meeting Cattle on Road.*

A statute required the operator of any motor vehicle, when on a public highway, to operate it in a careful manner, with due regard to the safety of pedestrians and that of the traffic upon the highway. In another section the statute dealt with his duties to prevent the frightening of any animal "being ridden or driven" on the highway. Where a bus collided with the cattle which had spread over the entire width of the highway, the court held that the prescribed statutory precautions in such cases were not exclusive but were cumulative to those required by the common law, and a verdict for the owner of the cattle was upheld. [Consolidated Coach Corporation vs. Sphar 10 S. W., (2d), 482.]

MASSACHUSETTS—*Dangers Assumed by Truck Laborer.*

Under the Massachusetts law, a street railway track laborer assumed obvious risks incident to street employment of laborers, but he did not assume risks which arose in part from the neglect of duty of fellow servants. Where a track laborer was injured by a passing automobile which got out of line after it had passed the superintendent in charge of the gang, a verdict directed by the trial court for the defendant was sustained by the Supreme Judicial Court. [Pagano vs. Worcester Consolidated Street Railway, 163 N. E., 764.]

MICHIGAN — *Anti-Jitney Law Held Valid.*

An ordinance relating to the regulation of jitneys was held not to vest arbitrary authority in the Mayor in permitting him to grant, refuse or revoke licenses, where the ordinance specified the age, character, etc., of the owners and drivers to whom the license should be issued, and thus set up certain standards which must be met. It was not invalid because of depriving the Public Utility Commission of jurisdiction, because the city had a constitutional right to reasonable control of its streets. It was not discriminatory because it permitted the police to allow outside jitneys to use certain streets, while withdrawing such use from resident owners and drivers, since it prohibited all jitneys from using certain streets. The court did not determine the validity of a provision limiting the granting of licenses to residents of the city, where no non-resident was before the court asking for a license, nor did it determine the validity of a provision requiring bonds to be furnished as indemnities from damage, where no driver or owner was before the court seeking a license without a bond. [Red Star Motor Drivers' Association et al. vs. City of Detroit, 221 N.W., 622.]

MISSOURI—*Duty of Guest in Automobile.*

A guest or passenger in an automobile about to cross a railroad track need not exercise the same vigilance as the driver, but must use ordinary care. If he knew, or should have known, of danger at a railroad crossing and the driver had no knowledge of it, or if he had a clear view of an oncoming train and failed to warn the driver, he was contributorially negligent. [Cox vs. St. L. & St. F. Ry. 9 S.W. (2d), 96.]

NEW JERSEY—*Court Will Not Interfere In Matter Determined by Discretion of Commission.*

When the Public Utility Commission acts on applications for certificates of convenience and necessity, the Supreme Court will not disturb its opinion unless it appears that the commission reached its conclusion by manifest violations of law or by clear abuse of its discretion. The commission refused a franchise to a bus company to operate in competition with another public utility, although the bus company offered to carry passengers for a lower fare. The Commission gave as its reason "public interest," not necessarily the public in the immediate locality, but the interest of the general public. The court held that this reason was adequate for the refusal to grant the certificate. [Fornarotto et al. vs. Board of P. U. Com. of N. J., 143 A., 450.]

OHIO—*Damages to Property Need Not Be Set Forth In Detail.*

A railway car jumped the track and crashed into a house. When damages to the amount of $6,000 had been awarded in the trial court, the company appealed on the ground that the different items of damages should have been listed with the amount of damages claimed for each item, and that the loss of use of the ground floor for business purposes and of good will for a period of time should be cancelled. The Court of Appeals held that the fixing of value on each item of property damage was not necessary, and that the amount of the verdict was supported by the evidence. [Cincinnati St. Ry. Co. vs. Hickey 163 N.E., 310.]

OHIO—*Utilities Commission May Consider Motive of Applicant for a Certificate of Convenience and Necessity.*

Where an applicant for a certificate for an interstate motor bus line was refused a certificate by the commission because, among other reasons, it believed that he intended to do an intrastate business, its action was upheld by the Supreme Court. [Interstate M. T. Co. vs. Public Utilities Comm. of Ohio. 163 N.E., 713.]

PENNSYLVANIA—*Care at Crossing Required of Car Operator.*

Street cars must exercise a certain control at public crossings to the extent of slackening speed to aid others under stricter control to avoid accidents, but a charge requiring the motorman to have the street car at a crossing under such control that he can stop it to avoid an accident placed too great a burden on the carrier and was error. [Weschler vs. Buffalo and L. E. T. Co., 143 A, 119.]

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Personal Items

J. B. Trumbull—Holds New Office With New Haven

James B. Trumbull, Wollaston, Mass., at one time principal assistant engineer in charge of the electrification of the New York, Westchester & Boston Railroad, has been appointed industrial development agent in the territory served by the eastern lines of the New York, New Haven & Hartford Railroad with offices at the South Station, Boston, Mass., and the Union Station, Providence, R. I. Mr. Trumbull became connected with the New Haven on May 29, 1926, and has been affiliated with the various branches of the engineering department. He has had charge of the construction work at Boston, Worcester, Providence and New York.

H. I. Harriman—Chairman Boston Elevated

Henry I. Harriman, one of the new members of the Board of Public Trustees of the Boston Elevated Railway, Boston, Mass., has been elected chairman of the board. He is now president of the Boston Chamber of Commerce for his second term in office, and has for more than five years served as chairman of the metropolitan planning division, in addition to carrying many other responsibilities both public and private in nature. In acceding to the Governor's request that he accept public service as one of the trustees of the Elevated, Mr. Harriman made it a condition that he should be allowed to retire from his post as chairman of the metropolitan planning division.

E. A. Armstrong Retires

After more than 40 years service with the Public Service Corporation of New Jersey and its predecessors, Edward Ambler Armstrong, associate general counsel, has retired. He was local counsel of Public Service in Camden, N. J., for many years and became assistant general counsel in 1911.

E. M. Lunda Assumes New Duties in Toledo

Ernest M. Lunda, formerly superintendent of shops and equipment for the Grand Rapids Railroad, winner of the 1927 Coffin award, has been appointed superintendent of equipment of the Community Traction Company, Toledo, Ohio. This appointment was announced by C. H. Forsgard, general superintendent.

Mr. Lunda was graduated from the University of Wisconsin in 1922, having taken a degree in electrical engineering and having specialized in the electric railway field. For the first three years out of college he was general master mechanic of the Wisconsin Public Service Corporation properties at Green Bay and Manitowoc, Wis. He joined the Grand Rapids Railroad in 1925.

He will have headquarters at the Central Avenue carhouse, now the center of all railway and bus activities of the company, and will have general engineering oversight over all buses, cars and garages.

Other changes in Toledo follow:

P. J. Kearney, formerly inspector, has been named division superintendent of the Community Traction Company, in charge of street cars operating out of the Central Avenue carhouse.

A. L. Snyder, division superintendent, has been placed in charge of bus operations.

W. C. Hopkins, for twenty years in the service of the company as inspector and later division superintendent, has resigned.

Change in Journal Staff Organization

TO PERMIT him to devote his entire time to the technical side of electric railway operation with which he is intimately familiar from long experience, Morris Buck, managing editor of this paper since 1925, has been appointed engineering editor effective Jan. 1. At the same time, John A. Miller, Jr., associate editor since 1925, becomes acting managing editor. With local transportation becoming more and more a matter of engineering economics, it was felt that greater advantage should be taken of the wide experience of Mr. Buck along these lines, not possible under the conditions incident to his discharging the duties of managing editor, duties that do not permit of the original research for which he is especially fitted by temperament and training. On the other hand, the duties of managing editor fit in more closely with other work that Mr. Miller is doing at the present time.

Mr. Buck's connection with the paper dates from 1923, when he resigned from the Beeler Organization, consulting engineers of New York City, to take the position of associate editor of the JOURNAL. He continued in that capacity until 1925 when he became managing editor. His experience in the electric railway field has been long and varied, since he received the degree of mechanical engineer from Cornell University in 1904. It includes work as engineer for the Westinghouse Electric & Manufacturing Company and the Mechanical Appliance Company, cost analyst for the Mellon National Bank of Pittsburgh and special apprentice with the Delaware, Lackawanna & Western Railroad, operating out of New York.

For six years Mr. Buck was assistant professor of railway electrical engineering at the University of Illinois, from which institution he received the degree of electrical engineer. At this time he became well known in the electric railway field for original work done in the solution of electric railway engineering problems by graphical methods and for his text-book "The Electric Railway." Other teaching experience of Mr. Buck included a year as professor of electrical engineering at Clarkson College of Technology, two years as assistant professor of electrical engineering at New Hampshire State College and one year as instructor at Cornell.

During the seven years Mr. Buck was associated with the Beeler Organization, he had charge of important investigations of electric railways throughout the country, including surface, rapid transit and interurban lines. Among the properties which he studied are those of Boston, New York, Philadelphia, Washington, Newark, Richmond, Chicago, Kansas City and New Orleans. This work involved a wide range of operating and engineering problems which will prove of inestimable value in his future activities as engineering editor of the JOURNAL.

Mr. Miller's connection with the JOURNAL also began in 1923. Prior to that time he had been connected with the Public Service Railway of New Jersey more than seven years. After his graduation from Yale in 1915, he started work as a cadet engineer on that property. He worked as rodman and transitman in the track department, as test engineer in power stations, as shopman in the mechanical department and as lineman in the electric distribution department. During the World War, he served overseas as a lieutenant in the 104th Regiment of Engineers. Returning to the employ of the Public Service Railway he worked as car timer, motorman, conductor, assistant supervisor of the Montclair Division, later being made special instructor of safety car operation in Paterson and instructor at the trainman's school at Hoboken. In 1921 he was made traffic investigator, a position which he held for two years until he joined the editorial staff of the JOURNAL as editorial assistant. He was promoted to assistant editor in 1924 and to associate editor in 1925.

JAMES J. CLARK, for the past nine years connected with the equipment department of the Eighth & Ninth Avenues Railway, New York City, N. Y., as general foreman, has joined the sales department of the Galena Signal Oil Company. Previous to his affiliation with the Eighth & Ninth Avenues Railway he was with the New York Railways.

JAMES E. MURRAY has succeeded C. B. Melton as assistant treasurer of the Eastern Texas Electric Company, Beaumont, Tex.

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Additional Construction Livens Market

New York board will receive bids on construction of Brooklyn Subway. $357,000 grade crossing eliminations in Milwaukee ordered. Reading Transit Company plans improvement

ON FEB. 5, the New York Board of Transportation will receive bids for the construction of part of the Fulton Street Subway in Brooklyn from St. Felix Street to Washington Avenue and along Lafayette Avenue from Fulton Street to South Oxford Street, as well as from the second section of the Fulton Street Line from Washington Avenue to Nostrand Avenue.

The Board of Transportation also set Jan. 29 as the date for the receipt of bids for contractors on the contract to build the section of the proposed Schermerhorn Street route between Bond and St. Felix Streets, Brooklyn. The Schermerhorn Street route, as proposed in plans for the new system, will connect the East River Tunnels under Jay and Cranberry Street with the Fulton Street and Brooklyn crosstown lines, which are laid out to converge in the downtown Brooklyn district.

In Brooklyn only two short elevated sections of the Jay-Smith Street Culver Line remain to be contracted for to put the city's new system under construction from the upper Bronx to Coney Island.

Additional Contracts to be Let

One of the principal projects on the board's program for work in Brooklyn and Queens during the new year is the completion of the proposed Queens Boulevard subway line which will connect the Eighth Avenue subway in Manhattan with Jamaica, Queens. Twenty-nine contracts covering construction of all routes of the line not under contract at the present time, are to be let during the year.

Contract awards and bids for eighteen sections of New York City's new independent subway system in 1928 reached $77,000,000. This amount exceeded the awards for the same purpose in 1927 by $9,000,000. The contracts covered principally construction work in Brooklyn, the Bronx and Queens, and the total awards since 1925 amount to $295,853,825. The Board of Transportation's rapid transit construction contract awards in 1928, including those applying to the existing privately operated lines, reached the grand total of $80,733,714.

The total of $259,853,825 for the city's system includes 29 miles of routes in Manhattan, Queens, Brooklyn, and the Bronx, $248,108,184; 24 stations along the main line on Eighth Avenue, Manhattan, $2,903,401; for 104 miles of track from Harlem River Shops and Yards at 207th Street to the lower end of Manhattan, $1,574,237. Miscellaneous items totaled $7,268,003, nearly $6,000,000 of which was for the 207th Street Yards and Shops and those at Jerome Park.

Actual payments on rapid transit contracts reached a total of $81,706,023 in 1928, of which $72,952,782 was for the City System work, exceeding the 1927 mark for that purpose by $22,000,000. Since 1925 the Board of Transportation has approved vouchers for city subway system contracts amounting to $173,082,024. For the same period the vouchers approved, covering all transit systems in the city, totaled $225,960,000.

Milwaukee Construction

The Wisconsin Railroad Commission has ordered grade crossing eliminations to be made, at a cost of $357,000, along the Northern Interurban Line of the Milwaukee Electric Company, Milwaukee, Wis. Ellers Street, Roosevelt Drive, and Silver Springs Road will be constructed to pass over the track right-of-way and the Hampton Road and Villard Avenue crossings will pass under the tracks. The city will be required to pay $58,000, the town of Milwaukee, $60,000, the county $20,000, and the Milwaukee Electric Company to pay the balance. The order calls for the completion of the grade crossing eliminations by Dec. 31, 1929.

Five new Twin Coach passenger buses have been ordered by the Virginia Electric & Power Company, Richmond, Va., from the Twin Coach Corporation at Kent, Ohio. These coaches are now being completed, and it is expected to place them in service on the streets of Richmond within a few weeks. This fleet of five buses represents an investment of $60,000, and brings the total number of buses now operated by the company up to 80.

Sioux City Service Rebuilding Cars

Sioux City Service Company, Sioux City, Iowa, has rebuilt eight of its street cars as the first step toward the rehabilitation of all rolling stock owned by the company. The rebuilt cars will be more powerful, swifter, more convenient for operation, and neater in appearance. The work is being done in the shops of the company in Sioux City.

The larger type cars will have four 30-hp. motors instead of the two 40-hp. motors now used. This change is expected to enable the cars to maintain an average speed of 11 miles an hour including stops, instead of 9 miles an hour, and will have a greatly increased acceleration. The small Birney type cars will have no motor change, but the equipment in these cars will be thoroughly overhauled. The switching and control equipment at the front of the cars is being enclosed entirely in cabinets, and the operator's platform has been slightly raised. The fenders are of new spring construction.

The cars are being painted with a bright orange enamel, and a light blue and cream trim. The interior work and sashes are finished in mahogany. The seats have been recovered with new rattan, finished in ivory Duco. Linoleum flooring material has been used to replace the old open work. The large cars will seat 46 passengers, and the small Birney type will provide seats for 33 passengers. The lighting arrangement has been redesigned to eliminate glare.

Reading Transit Making Plans

Although plans are not completed for the 1929 program of the Reading Transit Company, Reading, Pa., tentative plans call for the usual amount of repair and maintenance work. Switches and crossovers are to be placed at Fifth and Penn Streets, and also at Second and Penn Streets. Tentative program provides for the complete rebuilding of about fifteen blocks of track in the city of Reading. The most expensive of this company's construction job completed in 1928 was the rebuilding of the track in the Borough of Shillington in connection with the construction of the new concrete highway. A number of other important construction changes were made.

The Houston Electric Company, Houston, Tex., has placed in operation one of the new 44-passenger Twin Coach street cars. They are constructed by the Twin Coach Corporation, Kent, Ohio. This car, which weighs 17,000 lb., will be thoroughly tested before it is put in service. In addition to this new type of car, the company expects to receive in the very near future one of the new light-weight Birney type cars constructed by the St. Louis Car Company.

The Chicago, North Shore, and Milwaukee Railroad, Chicago, Ill., has purchased from the Union Switch & Signal Company, track circuit materials required for the control of crossing gates at 26 locations on its lines. Included in the equipment ordered are 79 single impedance bonds, 60 a.c. relays, 40 track transformers, 26 copper oxide rectifiers, and the necessary accessories. The recommendation to the Interstate Commerce Commission by the examiner incorporates a finding that public convenience and necessity are not shown to require the construction of the proposed branch line of the Sacramento Northern Railway, Sacramento, Cal., from Vacaville Junction to Creed, Cal., a distance of 7.5 miles. It was pointed

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out that, while the line would be of use in connecting the Suisun Branch with the remainder of the company's system, the existing connection, by means of the Southern Pacific Railway, is not shown to be inadequate to a degree indicating the need for the construction of a line giving parallel service.

Work has been started on the completion of the track zone on Breese Terrace, on which a double track will be laid by the Madison Railways, Madison, Wis. Approximately $80,000 has been spent on track construction by the British Columbia Electric Railway, Vancouver, British Columbia, during the year 1928. A large amount of this work was on the Vancouver and New Westminster City Interurban and Fraser Valley Lines. The West Penn Railways, Pittsburgh, Pa., has completed the installation of $40,000 worth of new machinery in its Connellsville shops.

Rolling Stock

It is reported that the Allegheny Valley Street Railway, New Kensington, Pa., will place orders in the near future for a number of new cars. It is expected that this new equipment will be put in service during the coming spring. The Los Angeles Motor Coach Company, Los Angeles, Cal., has ordered six urban type Twin Coaches and the Los Angeles Railway Corporation has ordered two urban type Twin Coaches. The Union Traction Company of Anderson, Ind., has received permission from the Indiana Public Service Commission to extend its motor bus routes in the city of Muncie, Ind. The Northern Ohio Power & Light Company, Akron, Ohio, has placed orders for six urban type Twin Coaches.

The Key System Transit Company, Oakland, Cal., has purchased ten Twin Coaches. Bus service will soon be started between Granite City, Ill., and St. Louis, Mo., by the Illinois Power & Light Corporation. The United Electric Railway, Providence, R. I., has ordered five express buses from the Twin Coach Corporation, and the Boston Elevated Railway, Boston, Mass., has received five urban type Twin Coaches. Permit to operate freight carrying motor trucks, in addition to passenger carrying motor coaches, has been granted to the Southern Michigan Transportation Company, Jackson, Mich. This company is controlled by the Michigan Electric Railway.

An equipment storage and distributing plant to cost $45,000 is planned by the St. Louis Service Company, St. Louis, Mo. The purchasing department of the city of Seattle has opened bids for 30,000 ft. of 600-volt copper wire.

METAL, COAL AND MATERIAL PRICES F.O.B. REFINERY

	Jan. 2, 1929
Metals—New York	
Copper electrolytic, cents per lb.	16.5
Copper wire, cents per lb.	18.375
Lead, cents per lb.	6.65
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	49.875
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.50
Central, Ill., screenings, Chicago, net tons	1.20
Kansas screenings, Kansas City, net tons	1.80
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.5
Weatherproof wire base, N. Y., cents per lb.	19.25
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.4
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.2
Turpentine (bbl. lots), N. Y., per gal.	.6675

Weekly Business Conditions

The volume of money turnover during the week ended Dec. 29, 1928, was greater than in the corresponding week of 1927, according to the weekly statement of the Department of Commerce. Operations in steel plants were on a higher level than in either the preceding week or the same period of the preceding year. Petroleum output during the last reported week was running higher than in either the previous week or the same period of the preceding year. Bituminous-coal production was also greater than in either period.

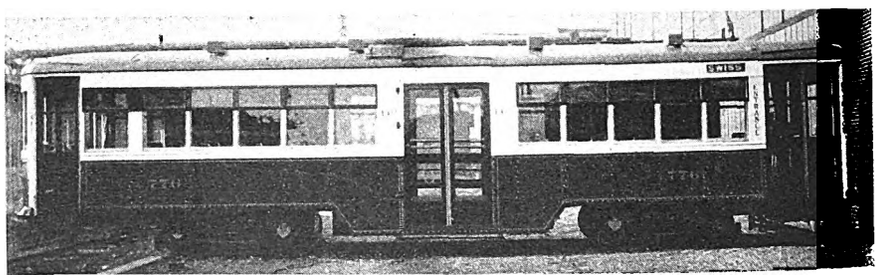
Prices for iron and steel showed no material change from the previous week but were higher than a year ago. Copper prices were also higher than in either the previous week or the corresponding period of 1927.

Loans and discounts of federal reserve member banks showed further expansion. Interest rates on time money averaged higher than in either the previous week or in the same period of 1927. Prices for stocks averaged higher than in the previous week. Bond prices showed a fractional gain over the preceding week but were still below the level of 1927.

Dallas Cars Delivered

Seventeen two-man, motor, passenger cars have been delivered to the Dallas Railway & Terminal Company, Dallas, Tex., by the St. Louis Car Company. These cars, which were fully described in the Aug. 4 issue of Electric Railway Journal, are of the double end, double truck Peter Witt city type, and seat 42 passengers, exclusive of the four seats, one of which is across each end door.

The cars are 45 ft. 8½ in. long, 8 ft. 5 in. wide, and weigh 39,300 lb. The bodies are semi-steel construction with arched roofs and both center and end doors. The center side doors are sliding, and the end doors are folding types. The rear exit doors are treadle operated. The trucks are equipped with 26-in. steel wheels, and two inside hung motors. The truck wheelbase is 5 ft. 4 in. Heat treated axles and plain type journal and armature bearing are used.



The new Dallas cars are finished in green and ivory enamel

TRADE NOTES

Wagner Electric Corporation, St. Louis, Mo., announces the addition of N. H. Spencer to its Dallas, Tex., sales force. His experience includes the office of manager of the Olean Electric Light & Power Company, Olean, N. Y.; district manager of the Niagara, Lockport & Ontario Power Company from 1914 to 1919; and eight years with the Pittsburgh Transformer Company, Pittsburgh, Pa.

George Shields, for the past ten years sales representative of the Dayton Manufacturing Company, Dayton, Ohio, has been transferred to New York City with the title of Eastern Sales Manager with offices at Room 918 Havemeyer Building, 25 Church Street. Before going with the Dayton Manufacturing Company, Mr. Shields was connected with the American Car Company, St. Louis, Mo.

Weekly Business Indicators

(Weeks ended Saturday. Average 1923–25 = 100)

	1928				1927			
	Dec. 29	Dec. 22	Dec. 15	Dec. 8	Dec. 31	Dec. 24	Dec. 17	Dec. 10
Steel operations	107.9	105.3	107.9	110.5	75.0	88.0	83.0	80.0
Bituminous-coal production	.....	113.8	113.2	115.0	81.5	100.7	100.4	99.4
Lumber production	.....	85.0	90.0	92.3	57.3	88.2	102.3	104.5
Petroleum production (daily average)	.....	122.5	122.3	121.0	116.2	116.8	118.0	119.4
Bldg. contracts 37 states (daily average)	.....	105.5	101.6	106.0	104.4	121.1	124.9	142.9
Price iron and steel, composite	.....	87.5	87.5	87.3	84.7	84.8	84.8	84.8
Copper, electrolytic, price	.....	114.5	114.5	114.5	100.0	100.0	99.3	100.8
Interest rates, call money	251.5	178.8	190.9	218.2	133.3	103.0	97.0	103.0
Interest rates, time money	191.4	188.6	177.1	168.6	97.1	97.1	97.1	97.1
Federal reserve ratio	79.5	83.2	82.8	83.6	86.2	86.7	89.3	91.2

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGraw-Hill Publishing Company, Inc.
James H. McGraw, *Chairman of the Board*
Malcolm Muir, *President*
H. C. Parmelee, *Editorial Director*

CHARLES GORDON, *Editor*

Louis F. Stoll,
Publishing Director

Volume 73 New York, Saturday, January 12, 1929 *Number 2*

Basic Improvements Accompany Another Year of Readjustment

FATHER TIME has closed his books for 1928. His journal of daily events in the local transportation industry has now become history. Successes and failures alike are indelibly recorded. It is wise, therefore, at the beginning of the new year to examine the footings carefully; to note well the gains and losses. And it is even more important to determine the causes behind the actual record so that those who are responsible for policies may profit from the experiences of the year.

This entire issue of *Electric Railway Journal* is devoted to the factual record. Figures of extensions of track and reconstruction work exceed those of last year, which were higher than for any year during which these statistics have been collected. This is convincing evidence of increasing confidence in the future of public transportation on rails. At the same time, bus purchases for 1928 exceeded the 1927 figure by an appreciable margin. This, combined with the fact that more unprofitable track mileage was abandoned than for any other single year, indicates that transportation companies are gradually cleaning house and are utilizing the bus freely where it offers advantages over rail service. On the other hand, purchases of new cars were at the lowest ebb in the history of the industry. This is no indication of lack of attention to the importance of replacing obsolete equipment, or lack of interest in the possibilities of new cars. Nor is it, in the last analysis, attributable to lack of buying power on the part of the railways. The money spent for track construction and for bus purchases is definite refutation of that assumption. There remains, therefore, only the conclusion that the types of cars offered by the builders have not offered assurance of their superiority over existing equipment in attracting riders, sufficient to convince the man that is responsible for putting up the money. There are strong indications, however, that the slump in car buying has run its course. Reports from operating companies indicate definite plans in 1929 budgets for car purchases that promise to exceed the figures for the past several years. There is little question but that equipment replacement may be expected to proceed at an increasing rate during the next several years.

THE level of street railway fares continues to move upward, and it is now quite apparent that the public is willing to grant equitable rates when management offers reasonable evidence of good faith in improving facilities and service. Accompanying the rise in the average rate of fare has been a distinct improvement in public relations throughout the country. The modern policy of frank and open discussion of railway problems and of the education of trainmen to a better understanding of the business of which they are a part is proving its wisdom. All of this is likewise being reflected in the liberalization of franchise terms on the part of the public, and in recognition on the part of operating companies that their right to the use of the public streets and the future security of their business are based more upon the value of the service which they render the public than upon the terms of a specific franchise. Transportation men have come to realize that a franchise to lose money is worth very little.

Financial housecleaning is accompanying the physical rehabilitation of local transportation. The flood of receiverships during the industry's most severe period of stress following the war has receded steadily, and there has been a gradual reduction, through reorganization, in the amount of bonds in default. During 1928 the railway mileage which went into receivership was the lowest in the entire period during which the *Journal* has been compiling this record.

Thus, in perspective, there has been a material improvement in basic conditions. There has been substantial progress toward meeting the changed

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conditions with which the industry has been faced for a number of years. It is probable that in the future, we shall find that the actual corner was turned several years ago, and that the industry moved ahead much faster in 1928 than was apparent to those close to the firing line of daily operations. Perhaps the most significant fact gleaned from the record of the past year, as it has stood out for almost a decade, is the immense vitality of the public transportation business. Carried along by an amazing momentum, the manufacture and sale of automobiles has established new records, and a new flood of rubber-tired vehicles has been turned loose on the streets of American cities. There seems to be no limit to the ingenuity of those who design these cars to devise new features of style and to improve performance, and the public has amply demonstrated its willingness to pay for these improvements. But despite all of this the need for organized public transportation shows no diminution. Though the registration of automobiles has risen to unprecedented levels, their use for daily transportation remains economically and physically impracticable.

ONLY a few years ago, credulity would have been strained to predict that physical saturation of street capacity would become the limiting factor in automobile usage, but that, nevertheless, has become a fact in every large city and in many smaller ones as well. Traffic congestion has assumed major proportions as a community problem. It threatens to defeat the very forces which have brought the modern city into our social and economic life; namely, convenience and economy of business and social intercourse. The inconvenience, cost and delays caused by congestion threaten to overbalance the advantages of the compact community.

Grandiose schemes are being brought forth with recurring frequency for the construction of double-deck streets or other major street improvements at public expense for the accommodation of individual vehicles. Only recently has American business begun seriously to consider the relative economic importance of the organized public transportation agency and the private vehicle. Only recently has the relative efficiency of the public and the private vehicle in the use of street space become apparent. Even today, the general public does not understand that money expended for the construction of one 4-track rapid transit line, either subway or elevated, will provide accommodations for as many people in the rush hour as will 25 express boulevards for private vehicles. Nor is business and industry, in the face of this fact, giving the serious attention which its importance warrants, to the question of whether or not American communities can afford to assume the overhead costs of encouraging the further use of individual automobiles by major street construction programs. Undoubtedly there is a limit to the overhead cost which can be imposed upon the modern city, without unbalancing the very economic forces that have caused its development and growth.

DURING the past year, public transportation men have begun to play a more important part in the study of these fundamental phases of the transportation problem in their relation to community development. At the same time, they have given increased attention to the underlying economic factors in their own business. The effect of load factor on the costs of providing transportation service has received serious consideration as have also the influences which affect the load factor through their bearing on off-peak riding. Throughout the industry, there is agreement that the wide fluctuation between rush hour and non-rush hour business is a major element in the cost of providing service. But in only a few cities has there been any appreciable progress in building up off-peak volume. Where this has been done, the success achieved has been attributed to greater speed, to scientific scheduling with the objective of having a car always in sight, and to persistent and consistent ride selling through intelligent publicity and properly trained employees. Relatively little has been done in developing a scientific basis of rates proportioned to the cost of the service furnished to various classes of riders, as a means of building up off-peak business. But greater attention has been directed to this important subject than at any other time for a number of years.

THE industry is, of course, still a long way from being established on a really profitable basis—a basis that will insure the free flow of needed new capital to keep pace with public requirements. In practically every large city transportation facilities lag behind the requirements of the community because of the difficulty in attracting new capital to a business which still does not show a satisfactory balance sheet. In the smaller communities the volume of riding is not satisfactory. It is apparent that improved equipment and service, combined with a more scientific schedule of fares, offer the greatest promise of building up revenues to a profitable level. The industry is still far from the position of having exhausted its possibilities. But in the very progress that has been made since post-war days lies the greatest assurance that local transportation men have the energy and the enthusiasm to carry public transportation forward as an agency vital in the upbuilding of American communities.

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Local Transportation Industry Proves Its Stability

Despite rising flood of competition from automobiles only slight changes are evidenced in general traffic figures of electric railways

INHERENT stability is the most significant factor which stands out from an examination of operating statistics of the local transportation industry for the year 1928. Despite unprecedented production and sales records for automobiles, amounting to more than 4,000,000 passenger cars in the United States and Canada, the number of riders on public transportation vehicles operated by electric railways remains practically constant. As the use of buses by electric railways to supplement existing lines has gradually led to the cleaning out of unprofitable rail mileage, the number of passengers carried by electric cars shows a slight recession, while the number of passengers handled by buses shows a corresponding increase. But these changes represent at most merely minor adjustments in character of service. Far surpassing them in significance is the fact that local public transportation agencies are holding their own in the face of unprecedented increases in the number of private automobiles in the hands of the public. When it is considered that there are now over 21,500,000 private automobiles registered in the United States and that approximately $1,500,000,000 was spent in 1928 for highway improvements to provide them a place to operate, the results achieved by the local transportation industry in the face of this almost overwhelming competition stand out in full relief.

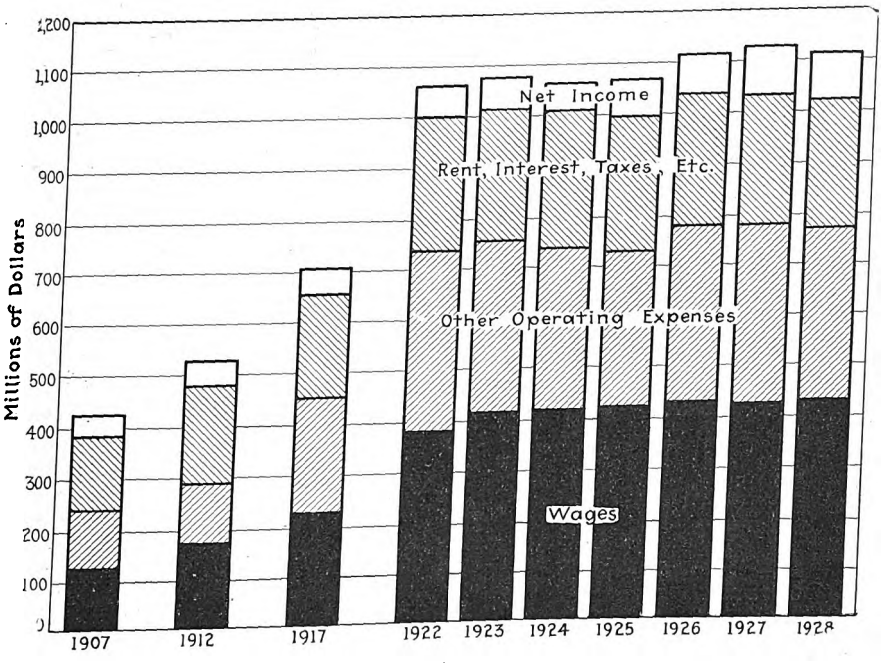

Chart 1—Distribution of revenues of electric railways of the United States compiled from U. S. Census figures for 1907, 1912, 1917 and 1922 and from data collected and prepared by American Electric Railway Association for intervening years

Comparisons of the figures from one year to another are of little value in analyzing the economic status of electric railways. For that reason, accompanying charts prepared with the co-operation of the statistical department of the American Electric Railway Association and based upon available census figures supplemented by those collected by the association, are presented to give an adequate perspective of the basic economic trends. In Chart No. 1 are shown the revenues from all sources for the census years 1907, 1912, 1917 and 1922, and for each year from 1923 to 1928 inclusive, based upon A.E.R.A. compilations. The chart is arranged to show the division of revenue for these years between wages, other operating expenses, rent, interest and taxes, and net income. It is worthy of note that since 1922 there has been little change in the general trend of total revenue or of any of the principal divisions of the chart. The trends have all been gradually upward, with net income remaining about constant. The period from 1922 to 1928 witnessed the active introduction of the bus by local transportation companies. The figures for 1928 show little variation from the general trend since 1922. The approximate totals for this latest year are as follows: revenue from all sources, $1,110,000,000; wages, $430,000,000; other operating expenses, $338,000,000; rent, interest, taxes, etc., $264,000,000; net income $78,000,000. Wages represent approximately 38.7 per cent of the total revenue; other operating expenses 30.5 per cent; rent, interest, taxes, etc. 23.8 per cent; and net income 7 per cent.

Examination of the specific figures for passenger traffic on local public transportation vehicles further emphasizes the status of organized community transportation as a basic necessity. In Chart No. 2 there is shown the total number of passengers carried by electric railways in the United States, for the years from 1917 to 1928 inclusive, the figures for the census years 1917 and 1922 being those compiled by the census bureau

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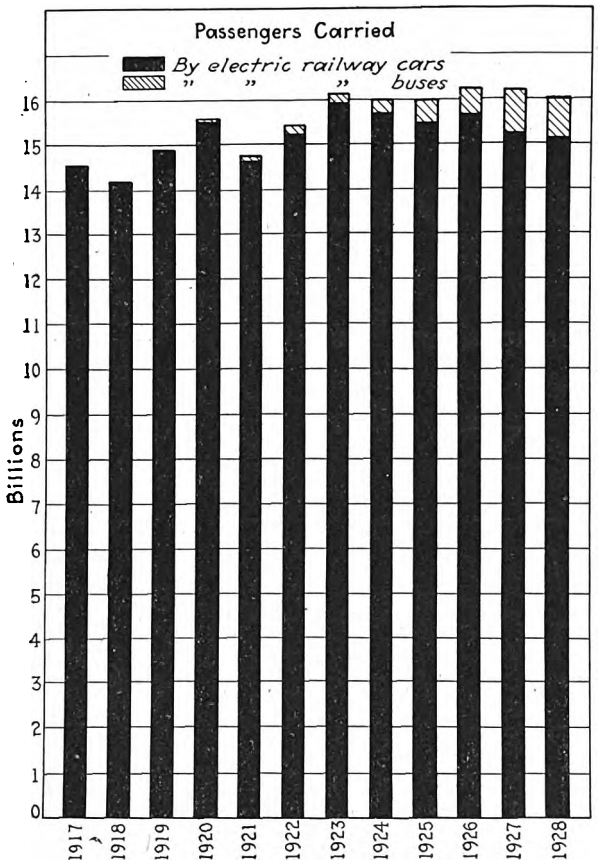

Chart 2—Total passengers carried on electric railways and their bus subsidiaries in the United States. Compiled from U. S. Census figures for 1917 and 1922 and from A.E.R.A. data for remaining years

and those for intervening and succeeding years being based upon estimates compiled by the American Electric Railway Association. The totals are divided each year to show passengers carried on electric railway cars as well as those carried on buses operated by electric railway companies or their subsidiaries.

During 1922, the last census year for which complete figures are available, the total revenue passengers carried amounted to 15,361,402,000. Of these, 15,331,402,000 were carried on cars and 30,000,000 on buses. As the use of buses has been extended by electric railways, there has been a consistent increase in the number of buses operated, in the annual bus mileage operated by electric railways and in the number of passengers carried by bus. It is interesting likewise to note that there has also been a steady increase in the average mileage per year per bus owned, and in the number of passengers carried per bus, indicating more intensive use of bus equipment. For the purposes of this analysis, however, the important fact is that neither the increased use of buses nor the enormous increases in the registration of private automobiles has materially reduced the number of passengers who depend upon electric railways for their daily transportation. In 1923 the peak of car passengers was reached with a figure of 15,989,000,000, or an increase of approximately 4.3 per cent over 1922. In 1924 car passengers were 2.4 per cent above 1922; in 1925, 1.1 per cent above 1922; in 1926, 1.9 per cent above 1922; in 1927 practically equal to 1922; and for 1928, 1.8 per cent below 1922. During this period the number of passengers carried on electric railway buses increased from approximately 30,000,000 in 1922 to approximately 900,000,000 in 1928. Adding these bus passengers to car passengers the total for 1923 is 4.6 per cent above 1922; 1924, 3.5 per cent above 1922; 1925, 3.3 per cent above 1922; 1926, 5.4 per cent above 1922; 1927, 4.9 per cent above 1922; and 1928, 3.8 per cent above 1922. Thus, although automobile registrations increased during this period from 10,864,128 in 1922 to 21,630,000 in 1928, or practically 100 per cent, public transportation agencies held their own in the number of passengers carried.

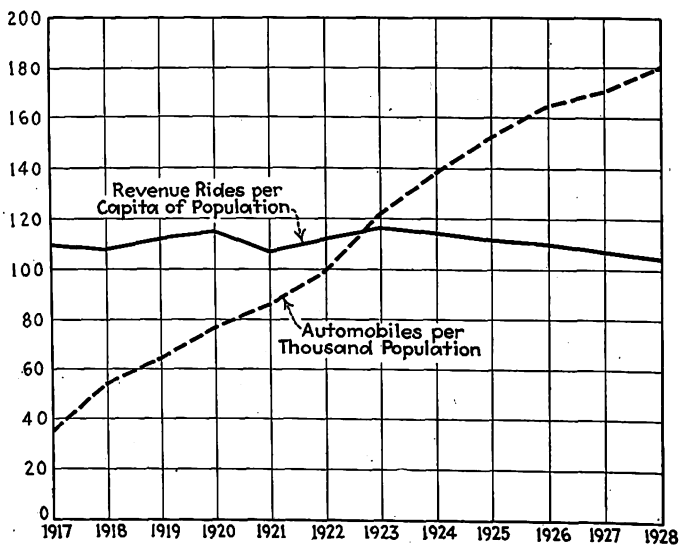

Chart 3—Revenue rides per capita of population on electric railways of the United States and subsidiary bus lines, in comparison with automobile registrations. Chart prepared by A.E.R.A. Traffic figures for 1917 and 1922 from U. S. Census. Balance of traffic figures from A.E.R.A. estimates. Automobile registrations from N.A.C.C.

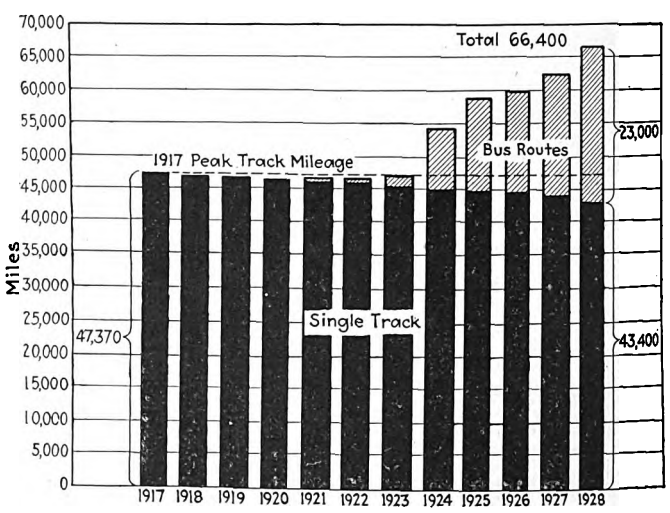

Chart 4—Electric railway track and bus route mileage in United States and Canada. Data for the United States for 1917 and 1922 from U. S. census. Canadian mileage and intervening years from data collected from McGraw Electric Railway Directory, annual statistical numbers of *Electric Railway Journal* and A.E.R.A. data

All of this is not to say that the growth in the use of private vehicles has not had serious effects upon the public transportation business. Although the number of riders has remained about constant, public transportation rides have failed to keep pace with the growth in population, and the number of rides per inhabitant has dropped steadily during the period under discussion. Furthermore, there has been a large increase in the habit of moving about, produced primarily by the con-

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venience and comfort of individual transportation. To put this another way, there has been an increase in the market for transportation, but public transportation agencies have failed to profit by any material proportion of this increased demand.

The situation is shown graphically in Chart No. 3 prepared by the American Electric Railway Association. A steady drop in the number of revenue rides per capita of population is shown from 1923 to the present time. It is therefore apparent that since the total rides on public transportation vehicles has remained about constant during this period, the drop in riding habit has just about balanced the increase in population.

Thus it requires more than a mere year-to-year comparison of traffic figures to show in true perspective the status of the local transportation industry. It has failed to gain in total number of riders. There has been a gradual reduction in the miles of track in service as unprofitable lines have been lopped off; but there has been a greater gain in bus routes and in bus mileage than the decrease in rail mileage, so that the total miles of route of public transportation service have increased materially.

From 1922 to 1928, the total length of single track operated by electric railways was reduced about 3,000 miles. On the other hand, preliminary figures indicate approximately 23,000 miles of bus routes operated

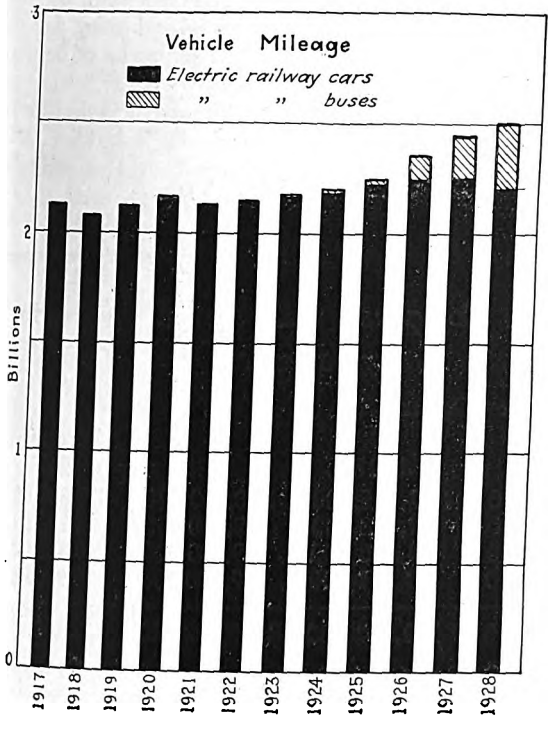

Chart 5—Total revenue car-miles and bus-miles operated annually by electric railways. Car mileage for 1917 and 1922 from U. S. census. Car mileage for other years from A.E.R.A.

in regular scheduled service by these companies or their subsidiaries at the end of 1928. These figures are shown graphically in the accompanying Chart No. 4.

A measure of the character of service rendered by public transportation vehicles is given in Chart No. 5 showing car and bus mileage by years. Referring again to the last complete census date, 1922, the total revenue car-miles operated were 2,124,523,000. In 1928 the figure was approximately 2,190,000,000 revenue car

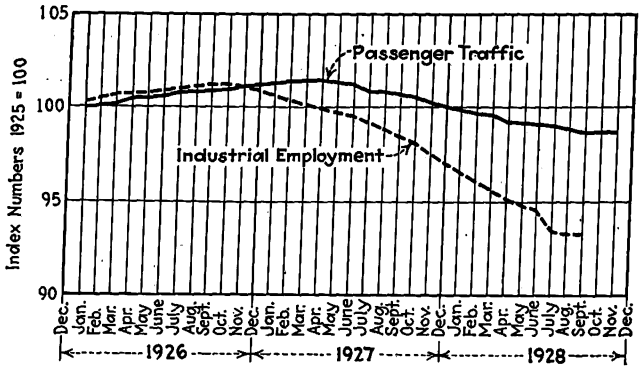

Chart 6—Trend of passenger traffic and industrial employment. Chart prepared by A.E.R.A. Curves represent the moving monthly average obtained by dividing the totals for twelve months at the end of each month by 12. Employment data from U. S. Bureau of Labor Statistics

miles, or an increase of approximately 65,000,000 car miles per year, despite a decrease of approximately 3,000 single track miles of track in service. Furthermore there were operated in 1928 approximately 310,000,000 bus miles, thus making a total of 375,000,000 vehicle miles of increased service operated in 1928 in comparison with 1922. The variations by years are shown graphically in Chart No. 5.

Two additional charts complete the presentation of basic trends in the industry. Chart No. 6 shows the relation between passenger traffic on electric railways and industrial employment, as prepared by the American Electric Railway Association from car and bus passenger data reported by 201 properties, and from employment statistics furnished by the United States Bureau of Labor Statistics.

Explanation for the increased revenue figures shown in Chart No. 1 in the face of a static volume of riding, is found in the gradual shift of the basic fare from 5 cents to 10 cents, shown clearly in Chart No. 7.

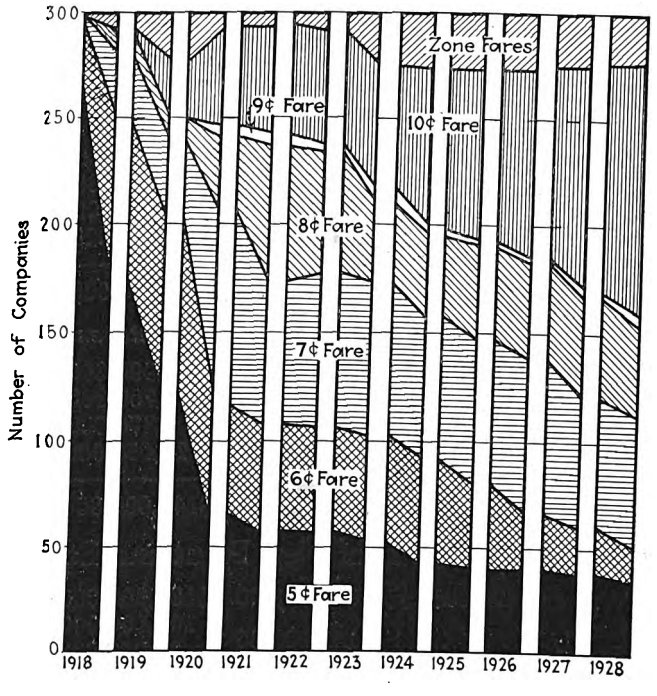

Chart 7—Distribution and trend of fares based upon reports by 300 companies in cities of more than 25,000 population, to the American Electric Railway Association

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Upward Trend Shown by

BUDGET FIGURES

Total expenditures for 1928 exceeded those for 1927, with a further increase indicated for 1929. Car purchases will show a large increase and bus purchases a slight increase, while expenditures for power equipment and way and structures will recede slightly

RECOVERING from the low ebb of 1927, total expenditures for new plant and maintenance materials in the electric railway industry showed a moderate increase for 1928. Budgets for 1929 indicate that expenditures during the coming year will be substantially larger than during the past twelve months. Although the figure for 1928 of $225,730,000 is only a slight increase over the low mark of $225,271,000 in 1927, it indicates that the decrease has been checked. This fact is further supported by the forecast for 1929, which was placed by the industry at $229,500,000, an increase of $4,000,000. This is not a large increase but it is sufficient to indicate that the industry plans to do better than hold its own.

Electric railways have been making improvement plans for some time, and the expenditures, the best business barometer known, are showing the results. With operating costs, both for material and labor, mounting steadily and little relief coming in the way of increased fares, the situation was discouraging. Naturally, this had a serious effect on the expenditures. Fewer cars were bought, less track was built and savings were made wherever possible in maintenance material. The awakening of the railways to the need for readjusting their methods and thinking brought about an entirely different situation. When this occurred it was only a question of time when the industry would re-establish itself and restore its purchasing power. The small decrease which occurred between 1926 and 1927 was a good indication that the bottom had about been reached. The process of development now seems to be definitely under way. No startling increases can be expected in the next few years, but a steady climb can reasonably be looked for. The upturn was accomplished through consistent efforts to improve service, equipment and public relations, and the

Purchases Planned by Electric Railways for 1929, Compared with Actual Figures for Past Years Compiled by "Electric Railway Journal"

New Plant and Equipment—Capital

	1924	1925	1926	1927	1928	Forecast 1929
Way and structures	$56,000,000	$52,400,000	$51,200,000	$77,365,000	$90,050,000	$77,800,000
Cars	60,200,000	50,400,000	40,000,000	34,758,000	18,900,000	31,100,000
Buses		15,680,000	17,540,000	14,368,000	19,100,000	20,300,000
Power equipment	17,000,000	5,150,000	7,640,000	3,561,000	7,300,000	6,900,000
Total	$133,200,000	$123,630,000	$116,380,000	$130,052,000	$135,350,000	$136,100,000

Maintenance Materials—Operating

Way and structures	$57,500,000	$56,900,000	$50,000,000	$40,517,000	$31,040,000	$32,750,000
Cars	54,000,000	54,700,000	47,800,000	36,941,000	35,200,000	36,100,000
Buses		7,370,000	7,500,000	9,451,000	15,040,000	16,100,000
Power equipment	18,000,000	22,650,000	11,370,000	8,310,000	9,100,000	8,450,000
Total	$129,500,000	$141,620,000	$116,670,000	$95,219,000	$90,380,000	$93,400,000

Total of New Plant and Equipment, and Maintenance Materials

Way and structures	$113,500,000	$109,300,000	$101,200,000	$117,882,000	$121,090,000	$110,550,000
Cars	114,200,000	105,100,000	87,800,000	71,699,000	54,100,000	67,200,000
Buses		23,050,000	25,040,000	23,819,000	34,140,000	36,400,000
Power equipment	35,000,000	27,800,000	19,010,000	11,871,000	16,400,000	15,350,000
Grand total	$262,700,000	$265,250,000	$233,050,000	$225,271,000	$225,730,000	$229,500,000

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progress in the future will depend on how earnestly these efforts are continued.

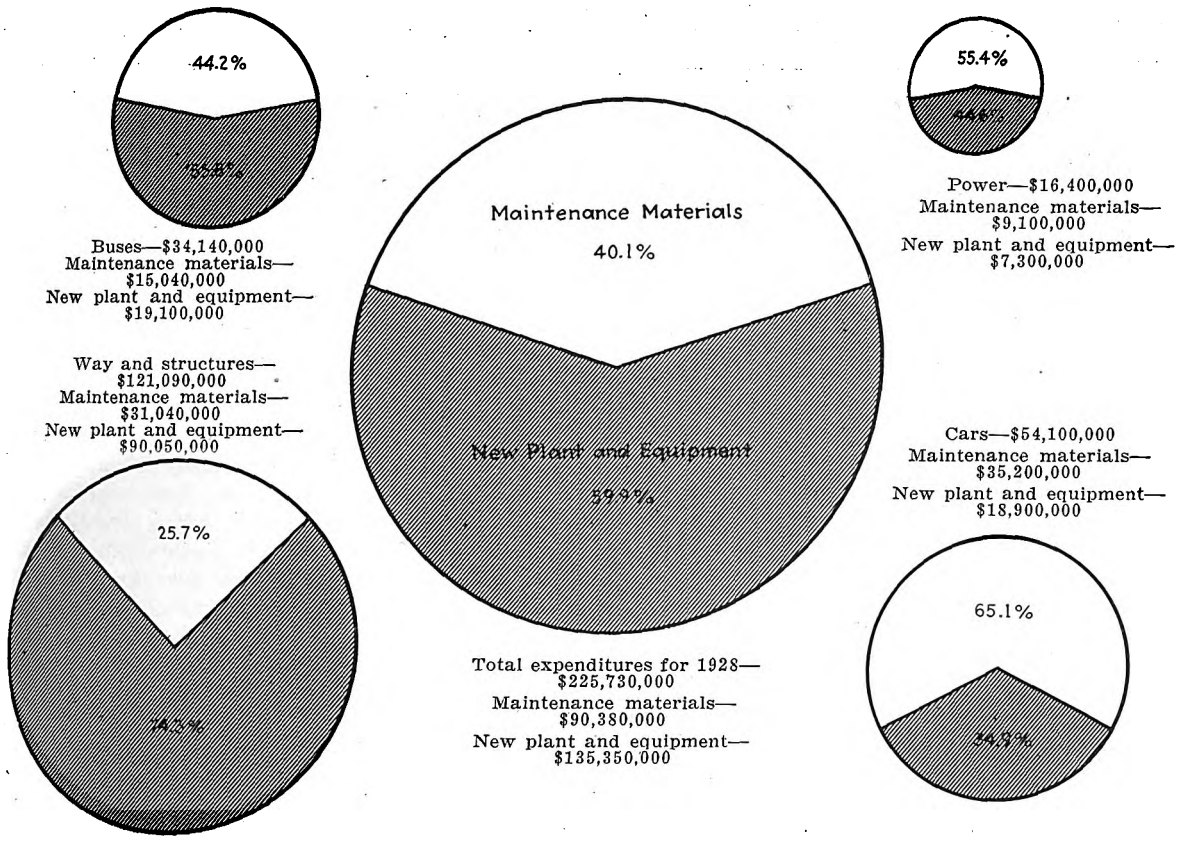
Aside from the important trend of total expenditures, there are two other outstanding trends shown by the figures. The first is the large increase contemplated in car purchases and the second the track activity preceding this buying. The budgets indicate that the car figure will soar from $18,900,000 in 1928 to $31,100,000 for 1929. This is an increase of $12,200,000, or 64.5 per cent. The figure for 1928 represents approximately $14,000,000 for new rolling stock and $4,900,000 for rebuilding cars and other overhaul work charged to capital account. The estimated figure for 1929, however, probably will include a larger percentage for new cars.

Estimates of expenditures are confirmed by definite plans for the purchase of new cars. Six railways alone have indicated that they plan to purchase a total of 513 cars, in lots of 115, 106, 100, 100, 50 and 42. Considering the fact that only 700 passenger cars were bought during 1928, the definite information that these six companies will buy 513 cars this year is extremely encouraging. Moreover, numerous other companies have stated that they intend to buy new rolling stock. In fact 40 per cent of all the railways submitting budget figures expressed the intention of making expenditures for new cars and car equipment.

While the volume of car purchases in 1928 was regretably low, this was not entirely unexpected. For the past three years the car manufacturers have been experimenting with new cars and operators have been delaying their purchases, awaiting the outcome of this experimentation. It was anticipated that no radical developments would be made during the past year and that the electric railways would decide to invest in more rolling stock, but the experimentation continued and several new designs made their appearance, some embodying radical departures from the standard practice. This, of course, had the effect of causing managements to postpone purchases and was largely responsible for the decrease in cars bought. Satisfactory designs including the latest developments are now available, and companies that have been delaying their ordering of equipment for the past two or three years evidently intend to go ahead with purchases.

Expenditures for Way and Structures Reach New High Mark

Great activity in track construction and reconstruction during the past year is reflected in the large increase in the way and structures item. Although the expenditures for 1927 showed an increase of $26,000,000 over the 1926 figure, the 1928 figure shows a still further increase of $13,000,000, making the new total $90,050,000. It is notable that the actual expenditures exceeded by half a million dollars the forecast made for the year. Many large properties rehabilitated their tracks in 1928 and made extensions, several companies investing extremely large sums in new track. The information received a year ago indicated that the track activity evidenced in 1927 was to continue and the actual figures for the past year proved this forecast to be true. A considerable number of garages, carhouses and other buildings were constructed during the year, helping to increase this figure. Conditions vary so greatly on different properties that it would be impossible to arrive at an average figure for the division of way and structures expenditures between way accounts and structures accounts, but it is evident



How the total of $229,500,000 was divided among the four accounts of way and structures, cars, buses and power equipment. Each circle is divided to show how the amounts are allocated, the shaded portions representing new plant and equipment, and the unshaded portions the maintenance materials

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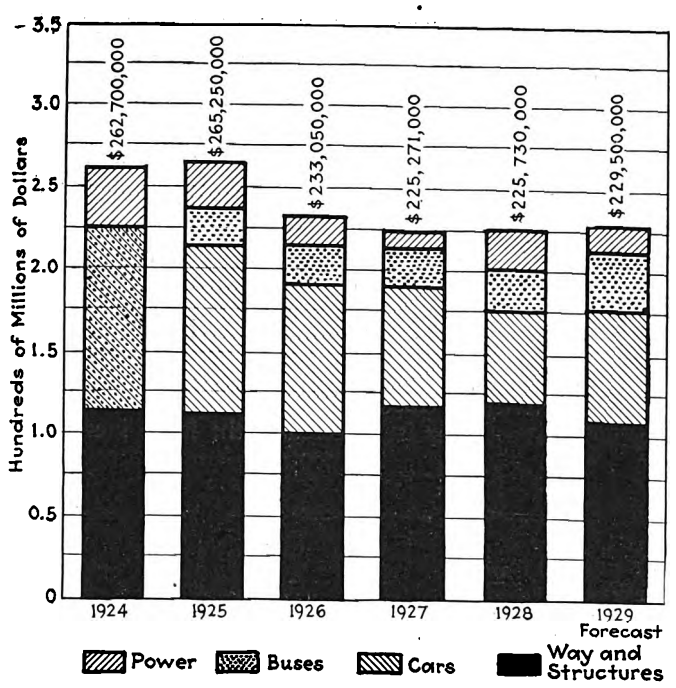


The slight increase in total expenditures in 1928 over 1927 and the estimated increase for 1929 indicates that the decline during the three preceding years has been checked and that a steady upward climb may be expected

that the latter represent a large proportion of the total.

The budget for 1929 in way and structures shows a slight recession from the $90,050,000 mark to $77,800,000. This is not serious, however, because the figure is still above the previous high mark for 1927.

The steady decline in car purchases for the past three years with the indicated increase for the coming year and the opposite trend in way and structures, an increase for the past three years and a decrease predicted in 1929, indicates a definite trend. Operators were taking advantage of the unsettled car situation to rehabilitate track, but now that they have their track in fair condition they are turning to the purchase of new cars. No doubt many companies will reconstruct more track after securing new equipment. This should give a balancing effect and a resulting return to normal in most accounts in another year or two. This trend further supports the explanation in the opening paragraph that the industry is taking the necessary steps to improve its service and equipment and that a gradual stabilization is being obtained. The fact that the industry is improving its track and preparing to buy new cars is also conclusive proof that the leaders have faith in the local transportation business.

1928 Shows Big Increase in Buses

Bus manufacturers enjoyed the best year in sales to electric railways since the Journal has been recording these budget figures. The total number purchased exceeded 2,400, surpassing the previous high mark made in 1926 of more than 2,200. The purchases totaled the sum of $19,100,000, exceeding the figure for 1927 by almost $5,000,000, and the forecast for 1928 by $4,000,000. The amount expended for buses in 1928 exceeds the figure for 1926, when the next highest number of buses were purchased, by a million and a half dollars. More than 450 double-deck buses and large capacity street car type coaches, Twin Coaches, A.C.F. Metropolitans and Versares, were bought during the year, and of the smaller buses almost 1,000 had seating capacities of between 29 and 33 passengers.

It is of particular interest that the bus purchases for 1929 are estimated to exceed the 1928 figure by more than $1,000,000. No doubt, each year more and more buses are being bought to replace old ones. This type of vehicle has been used intensively now for more than four years and many of the first buses bought are being replaced. Each year this figure will account for a larger share of the total buses bought. Railways have been careful in adopting the bus and have determined its proper place, thus assuring the stability of this form of transportation. Because of this fact, it is reasonable to assume that in another year or two, the buses for replacement will be approximately the same as the number ordered in the years when it was being adopted.

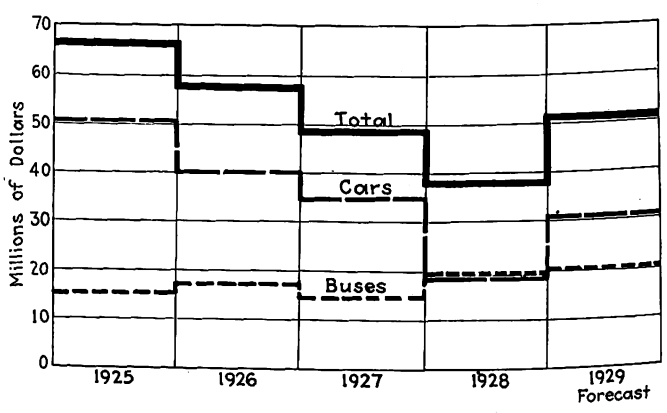
Total Figure for Buses and Cars Is Low

Because of the large decrease in car purchases during the past year the total figure for cars and buses dropped to a new low level. In 1925, the total was $66,080,000, but this fell to $57,540,000 in 1926, to $49,126,000 in 1927 and to $38,000,000 in 1928. For the past two or three years the car situation has been unsettled, as pointed out previously, and this accounts for the interruption of car buying and the resulting decline in the totals. The definite information, however, that bus purchases will increase approximately $1,000,000 during 1929 and car purchases more than $12,000,000, indicates that the low point was reached in 1928 and that there will be a resumption of active buying during the present year. The diagram below shows the car and bus purchases for the years 1925 to 1928, with the forecasts for 1929.

Expenditures for new power plant, substation and line equipment showed a substantial increase over those for 1927. The figure mounted from $3,561,000 to $7,300,000. This figure is almost exactly what was forecast for 1928, showing that operators carried out their substation and distribution reconstruction programs as planned. Several companies in the past year installed new substation equipment as a part of their general modernization programs. The figure for 1929 of $6,900,000 represents a slight decline, but is far in excess of the 1927 figure and indicates that a great deal of activity will be shown in this department during the present year.

Maintenance Material Figures Remain Steady

The total figure for maintenance materials and supplies, charged to operating accounts only, shows a decrease for 1928 over 1927, but this is not an appreciable



Car purchases continued to decline through 1928, while bus purchases mounted. It is significant, however, that both will show substantial increases during 1929

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Maintenance Materials and Labor

		Way and Structures	Cars	Buses	Power	Total
1927 Expenditures	Material	$40,517,000	$36,941,000	$9,451,000	$8,310,000	$95,219,000
	Labor	66,874,000	44,952,000	6,592,000	8,244,000	126,662,000
	Total	$107,391,000	$81,893,000	$16,043,000	$16,554,000	$221,881,000
1928 Expenditures	Material	$31,040,000	$35,200,000	$15,040,000	$9,100,000	$90,380,000
	Labor	50,400,000	49,300,000	11,870,000	6,580,000	118,150,000
	Total	$81,440,000	$84,500,000	$26,910,000	$15,680,000	$208,530,000
1929 Estimated Expenditures	Material	$32,750,000	$36,100,000	$16,100,000	$8,450,000	$93,400,000
	Labor	58,900,000	49,800,000	12,600,000	6,460,000	127,760,000
	Total	$91,650,000	$85,900,000	$28,700,000	$14,910,000	$221,160,000

amount and is explained largely by the decrease in maintenance materials for track, this, in turn, resulting from the great amount of track rebuilding activity of the past year. The total for 1928 was $90,380,000, as compared with $95,219,000 for 1927. The total estimated for 1929 shows a slight increase, reaching the figure of $93,400,000. The total of maintenance materials for cars shows only a $1,700,000 recession from the 1927 figure, which is a favorable figure compared with the previous recessions of $11,000,000 and $7,000,000 in the years 1927 and 1926, respectively. The 1929 figure shows a slight increase, so that it is evident that the low mark has been reached.

The way and structures figure shows a decrease amounting to more than $9,000,000, but this was to be expected with the large track reconstruction program carried out in the past year and the resulting charging of most of the material to capital account. An increase has been predicted, however, for the present year. This is in accordance with the decrease in way and structures expenditures charged to capital account, estimated for 1929. Materials for power plant, substation and line maintenance do not vary much, showing an increase in 1928 of $790,000, but dropping again to approximately the same figure in 1929.

Total for Maintenance Materials and Labor Drops Slightly

Expenditures during 1928 for maintenance materials and labor combined did not reach the 1927 figure. The total fell from $221,881,000 to $208,530,000, the figure for materials decreasing approximately $5,000,000 and for labor $8,500,000. The decrease is accounted for in the slight falling off in the power figure and the large decrease in the way and structures figure. To offset these decreases, there were increases in both the car and bus maintenance accounts, an increase of almost $3,000,000 for cars and almost $11,000,000 for buses. The advance recorded for buses no doubt is due to the large increase in the number to be maintained each year and the growing average age of the buses in service. The 1929 estimates show an increase in the total for all accounts, bringing the figure to $221,160,000, or approximately the same as for 1927. A slight decrease is predicted for power plant, substation and line maintenance, but increases are estimated for the other three accounts, the increase for way and structures being placed at $10,000,000. The variations in the maintenance accounts naturally are not very great, because most companies follow certain standards and do not change them much within a period of a year. The variation in the way and structures item, of course, is caused by the track reconstruction programs with the charging of much of the material and labor to capital account.

It is interesting to note the ratio of material to labor in each of the accounts. For way and structures, material represents 38.2 per cent of the total, for cars it represents 41.7 per cent, for buses 55.9 per cent and for power plant, substation and line maintenance, 58.1 per cent. With all accounts taken together the amount spent for material represents 43.3 per cent of the total. These percentages are approximately the same for the individual accounts as those indicated by the figures compiled last year.

Pertinent Facts Revealed by the Budget Data

During 1928:

The total for new plant and equipment and maintenance materials showed an increase, the first since 1925.

Bus purchases totaled $19,100,000, and increase of almost $5,000,000.

Way and structures expenditures exceeded the previous high mark made during 1927 by $13,000,000.

Power equipment expenditures more than doubled.

During 1929:

The total of all expenditures for new equipment and maintenance materials will increase almost $4,000,000.

Car purchases will increase $12,200,000, or 64.5 per cent of the 1928 figure.

Expenditures for power equipment, way and structures will drop slightly but will still remain high.

Buses will reach a new high mark at $20,300,000.

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Electric Railway Executives Confi

Comment from many sections of the country tells of improvement in conditions. A fare adequate to permit companies to function properly is needed. Stimulation of off-peak riding is a pressing problem

SIGNIFICANT outlines of transportation conditions in 30 of the larger cities of the United States and Canada are given in a series of statements received from prominent railway executives in response to inquiries recently made by this paper. Wide variation is found in the problems which these executives are facing and in the methods used in their solution. A general tone of optimism runs through these statements. Confidence is expressed in the future under a fare adequate to permit the companies to function properly. A slight decrease in traffic is reported in some of these cities. In general, however, the net revenue has shown a small increase despite the reduction in traffic. Prospects for 1929 are encouraging. Definite predictions cannot be made concerning the volume of riding during the present year but indications are that it will not vary materially from that during the year just ended.

Traffic Promotion Directed Toward Stimulating Off-Peak Riding

BOSTON—No reason is seen by Edward Dana, general manager of the Boston Elevated Railway, for feeling that 1929 will be materially different from 1928. Speaking from the standpoint of street railway operation in a large city, it occurs to Mr. Dana that traffic figures must be looked on in the light of what is actually transpiring. As he sees it, the gross figures of revenue passengers carried for a twelve-month period on a street railway do not indicate the true situation. A mass transportation agency in a large city which carries the backbone of the traffic is subject to constantly increasing traffic during the rush hours, but is also subject to loss during the summer months owing to the increased practice of vacations throughout the business world and the improvement in the standard of living which allows families to use the automobile for pleasure. Not only that, but the apparent affluence of a very large part of the public has given it a taste for the taxi, a service coming more and more into public favor for quick individual haul for people who have the means to pay for it.

Mr. Dana wants to flatten the peak brought about by this situation. He is very frank. He says that the efforts of the Boston Elevated Railway in traffic promotion have been directed to the three summer months where traffic is off 10,000,000 revenue passengers a month compared with the winter months. In other words, as things have stood, rush-hour service, both in capacity provided and passengers handled, may be constantly increasing, yet the total number of passengers carried for the year shows a slight reduction. A state of affairs of this kind gives rise to erroneous conclusions as to the importance, necessity and actual facts of mass transportation service. On the Boston El. 1928 traffic shows a falling off of 1.2 per cent over 1927. A margin as close as that on a total of 37,000,000 people does not, in Mr. Dana's opinion, permit accurate prediction as to whether the totals during 1929 will be slightly less or slightly more.

SPRINGFIELD AND WORCESTER—With the improvement in the textile and other industries the Springfield Street Railway and the Worcester Consolidated Street Railway look forward to increased income during 1929. With the economies effected and the savings made through the addition of 50 new lightweight modern cars on each of the properties, C. V. Wood, the president, believes that in the coming year the systems will better the results of 1928. With considerable satisfaction he finds that the Springfield Street Railway net, exclusive of depreciation charges, is 3.4 times the bond interest requirements, and that of the Worcester Street Railway 2.3 times the bond interest requirements.

Approximate figures for the Springfield Street Railway and the Worcester Consolidated Street Railway available at this time show the total operating revenue of the Springfield Street Railway to be $2,763,000, the total operating expense $2,199,000 and the net operating revenue $564,000. This, notwithstanding a loss of more than $90,000 in revenue as compared with the year 1927, was made possible through a reduction of more than $158,000 in operating expenses. For the Worcester Consolidated Street Railway the total operating revenue was $3,088,000, the total operating expenses $2,466,000, leaving the net operating revenue $622,000. This, notwithstanding a loss of $58,000 in revenue as compared with 1927, was made possible through a reduction of more than $193,000 in operating expenses.

In both Springfield and Worcester more car-miles were operated during 1928 than in 1927. In the expenses as stated are included depreciation on electric cars, buses, power stations, other buildings, machinery, tools, etc. While the systems have sustained a loss in gross the expense of operation has been reduced through co-ordination of cars and buses and other facilities, resulting in an increase in the net income. The budget of the Springfield Street Railway for 1929 covers expenditures for new plant and equipment of $305,000, and maintenance, materials and labor of $515,000. On the Worcester property, new plant and equipment in the 1929 budget total $230,000, and maintenance, materials and labor $620,000.

NEW BEDFORD—Elton S. Wilde, president of the Union Street Railway, New Bedford, Mass., is optimistic over the prospects for 1929. During 1928 conditions with the company were not good, but then the great textile strike was in progress, lasting six months. In 1928 gross revenue of the railway at New Bedford decreased about 14 per cent compared with 1927.

NEW YORK CITY—In New York City, of course, the companies are struggling heroically against the limitations imposed by the 5-cent fare. There is one city system in particular, however, which reflects both urban and suburban operating conditions. It is the Third Avenue Railway. Not only that, but the company is a large operator of buses. The service rendered includes electric operation in Manhattan and the Bronx and all of lower Westchester County, including the cities of Yonkers, Mount Vernon, New Rochelle, the Pelhams,

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Co dent of the Future

White Plains and the Village of Tarrytown. In addition buses are operated in the Bronx and in Westchester County connecting the city of White Plains with the villages of Elmsford, Ardsley, Dobbs Ferry, Hastings, Scarsdale, Tuckahoe, Harrison and Mamaroneck.

Thus it will be seen that the operation varies from the difficult and dense volume of traffic in midtown and lower Manhattan to service in the sparsely populated sections in Westchester County. Despite the trying conditions under which it operates the company has been able to keep its net revenue for the ten months of 1928 at a figure comparable with that of previous years. Operation of the electric lines in Manhattan shows a small decrease in the passengers carried and the gross revenue, but the electric operation in the Bronx shows an increase which a little more than offsets the decrease in Manhattan and accounts for the electric operation in both boroughs showing a slight advance.

Bus operation in the Bronx was not started until 1928, but the volume of traffic on the buses has increased steadily and the feeling is that this traffic will continue to increase in 1929.

The officers of the system are understood to feel that while operation in Manhattan may not show an increase, the system as a whole, because of the development north of the Harlem River —that is to say, in the borough of the Bronx and in the cities and villages in lower Westchester County—will continue to show through 1929 an increase in passengers carried and also an increase in the gross revenue. The ability of the management to increase the net revenue in the ratio comparable to that of the probable increase in the gross naturally will depend, to a great degree, on the cost of labor and material.

NEW YORK CITY—Better than at any time in the last five years is the outlook for the industry, according to W. H. Sawyer, president of Stevens & Wood. As Mr. Sawyer sees it, the industry has a fairly definite appreciation of the lines and routes and companies which have been or can be readjusted to meet the changed conditions. As a result there should be, and Mr. Sawyer believes there will be, an appreciable amount of buying of new equipment and rehabilitation material. This will not, in his opinion, be confined simply to the larger city companies, but will include an appreciable number of smaller companies in the smaller cities. He expects that interurban progress and buying will be spotty, the greatest development being on those lines which are making a definite and constructive drive for freight business at the same time they are rehabilitating their passenger equipment, so that they can not only get more passenger business but can have the benefit of a public-pleasing passenger department as an aid and advertisement for the securing of freight business.

Super-Service a Feature of New Jersey Operation

NEWARK—Material progress was made by the Public Service Co-ordinated Transport operating in New Jersey during 1928 in improving the local transportation provided and in placing its operation upon a sounder economic basis. During 1928 the company extended and improved its bus operation not only as regards regular local and intercommunity service, but also in respect to what the company calls "super-service," namely, service provided at higher rates with a more luxurious type of equipment. At the same time the company has built up an increasing charter bus business which has become an important part of its operations. It has improved its facilities for and its methods of maintenance, has expanded its operations both as to interstate and intrastate service and has been able to co-ordinate street car and bus operation to advantage.

In spite of the competition of the privately owned automobile, the demand for local transportation in the territory served by the company is increasing. The management of the New Jersey Company feels that such demand can be further accelerated by providing service which more closely meets the requirements of the riding public, and while there are many obstacles in the way—notably the outstanding obstacle of traffic congestion—the management is confident that, with the co-operation of the public authorities, it will be able to increase the attractiveness of the service it offers and so increase the number of its riders.

So far as the future development of the property is concerned, the policy of the company is firmly fixed. Its aim is to create for the territory it serves a comprehensive system of transit that shall embrace the various types of transportation facilities adapted to transportation needs. Experience is rapidly teaching the company how to make the most efficient use of these facilities, both from the standpoint of practical service and from that of sound economics.

This statement reflects the opinion of management of the company that while the problem presented is by no means solved, the outlook is more favorable than it has been for some years and there is reason to believe that the company is now on the upgrade.

PITTSBURGH—Continued efforts by the electric railways toward modernization of equipment and improvements in comfort and speed should result in greater achievements for the industry in 1929. So says Thomas Fitzgerald, general manager of the Pittsburgh Railways. He feels that the accomplishments of the electric railways in the face of severe automobile competition show the indispensability of this facility for mass transportation. He regards the present superiority of the electric car in point of economy, convenience and safety to be unquestioned. The Pittsburgh figures show total passenger revenue in 1927 to be $20,895,633 compared with $20,139,577 for 1928. The number of revenue passengers in 1927 was 262,061,272 compared with 251,874,571 in 1928.

HARRISBURG—Business conditions in and around Harrisburg, Pa., are only fair, reflecting the sluggish condition in the coal industry. On the Harrisburg Railways traffic for 1928 fell off slightly over 1927. This was due to the poor business conditions previously mentioned, and also to the fact that the use of the private automobile continues to increase at an amazing rate. In July, 1928, the company increased its cash fare from 6 cents to 7 cents. According to C. S. Crane, assistant to the president, prospects for 1929 indicate that railway traffic will probably continue to decline, but that the falling off may be expected to be less pronounced than the slump that was experienced in 1928.

ERIE—There are 25,000 registered automobiles in Erie, Pa., a city of 130,000 inhabitants. This means practically an automobile for each home. The Erie Railways has carried on most intensively in the past, and it intends to continue to make a bold bid for patronage, realizing, according to A. F. Tideswell, general manager, that the only way to hold patronage is to handle passengers with less waste of time en route to destination. To this end the company intends to endeavor to speed up its railway schedules approximately to 9 miles in the congested area and 11 to 12 miles in the more open territory, and to maintain its coach schedules at a speed of 15 m.p.h., between terminals. In Erie in 1928 there were 16 per cent fewer revenue passengers than in 1927. The gross revenue of the company at Erie was off 5 per cent over the similar period the year before and the net revenue off 5 per cent.

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Fare Increase Helped Baltimore Company

BALTIMORE—Approximate figures for 1928 show a decrease in revenue passengers of 8.3 per cent on the lines of the United Railways & Electric Company, Baltimore, Md., an increase in operating revenue of one-half of 1 per cent, and an increase in net income of 5 per cent. The feeling of the management is that if the fare had not been increased the year undoubtedly would have shown a large decrease in both revenue and net income. The Baltimore management regards the outlook for 1929 as promising.

Factors believed to have contributed to the decrease in patronage in Baltimore are the large amount of unemployed persons and the inaugurating of a five-day week by sixteen of the 22 crafts in Baltimore, resulting in a loss of approximately 16 per cent of riders of these crafts. No other city, with the exception of St. Louis, where eight of the 22 crafts have adopted the five-day week, approaches Baltimore in this respect.

Baltimore's bank clearings were the lowest since 1925; postal receipts show a decrease of more than 1 per cent, compared with 1927; the construction of dwellings dropped from 3,343 in 1927 to 2,440 in 1928—a decrease of 27 per cent. Meanwhile pleasure automobile registration increased approximately 16 per cent.

Traffic in Baltimore has been slowed up by the installation of numerous traffic signals and this tends to decrease the number of revenue passengers, because, with the large increase in the number of privately owned automobiles, prospective street car patrons are quite frequently picked up by passing machines, and their fares thus lost to the railway.

The decrease in taxicab rates to 10 cents for a half mile ride and the adoption of cabs of the type of a private automobile have tended to take the short-distance riders from the street car.

WASHINGTON—Fare increases are not popular, as J. H. Hanna, president of the Capitol Traction Company, Washington, D. C., realizes, but along with Owen D. Young, he also realizes that the transportation industry cannot prosper in communities that have failed to acknowledge that an economic problem is involved and that the payment for service must at least equal the cost of the service, including a proper return on the value of the property used in the interest of the public.

Mr. Hanna says that no opportunity should be overlooked to make public transportation as attractive as possible, but at the same time he does not see any real justification for expecting improvement in the situation in the immediate future. He feels that rail transportation in cities is and will continue to be necessary and that the present facilities are bound to be adjusted within the next two or three years.

The number of revenue passengers carried by his company decreased 3.7 per cent in 1928, compared with the previous year, a rate slightly less than prevailed during the preceding year. Existing standards and service were maintained. Operating expenses decreased less than 2 per cent. Washington has a particularly trying parking situation, but despite this, the use of the private automobile has increased, and this, of course, is the principal reason for the loss in revenue by the Capitol Traction Company. He is opposed to the institution of any measures that would tend to decrease the effectiveness of the present service, but he feels that only by the use of one-man cars and in some instances the use of larger units is it possible to effect substantial savings in operating expenses without jeopardizing the quality and attractiveness of the service, thus defeating the desired aim. Any further falling off in traffic can be met only with an increase in fares.

WASHINGTON—Opinions similar to those expressed by Mr. Hanna are held by W. F. Ham, president of the Washington Railway & Electric Company. As Mr. Ham sees it, the downward trend of traffic will probably not reach its limit until the use of private automobiles approaches a higher point of saturation than appears now to exist. Traffic, according to him, will have to be further increased before the necessary remedial action is taken by regulatory authorities further restricting the parking of the automobile. When such rules have been promulgated, the railway can then hope for a return of much of its lost traffic. On his own line the loss in traffic is attributed solely to the use of the private automobile, the registration of such vehicles in 1928 showing an increase of more than 10 per cent over those for 1927. Indications are that the loss in passengers carried by the company in 1928 will be approximately 1½ per cent. There will be a loss in gross revenue in 1928 of approximately $60,000, but through economies, the company expects that its operating income in 1928 will be approximately that of 1927. For 1929 the traffic outlook does not seem to be any brighter. The company anticipates a loss in traffic of about 1¾ per cent.

More Intensive Selling Plan Ahead in Virginia

RICHMOND—Estimates of earnings from transportation operation made by the Virginia Electric & Power Company show that the gross earnings for the year 1928 will be less than 1 per cent below the earnings for the year 1927. The railway operations for 1928 show a decrease of 4.5 per cent and the bus operations show an increase of 9.3 per cent. The officers of the company have estimated that the total gross earnings from transportation operation for 1929 will be approximately the same as for the year 1928. In arriving at this figure they have been mindful of the ever-increasing use of the private automobile and the general tendency of earnings from transportation operation to decrease in cities of the size of those in which the company operates.

With the natural increase in riding which results from increase in population and activities in the communities which the companies serve, together with a more intensive plan of selling transportation which the company expects to put into effect, the officers believe that any further loss in revenue due to increased use of the private automobile during the year 1929 will be offset, and that the total gross earnings of the company from transportation operations will be not less for the year 1929 than for the year 1928.

W. E. Wood, president, says that the company's estimate of transportation operating expenses for the year 1928 shows a reduction of 2.2 per cent below the operating expenses for 1927, railway 6.5 per cent decrease, and bus 8.1 per cent increase. The decrease in railway expenses was brought about by greater use of one-man cars and increased efficiency in maintenance.

The company is now operating about 30 per cent two-man cars, the replacement of which with one-man operation would mean a considerable further saving in operating expenses.

ATLANTA—F. L. Butler, vice-president of the Georgia Power Company at Atlanta, says the system there has been able to hold practically all of its business, and with improved service expects to be able to continue to do so. The number of revenue passengers carried in Atlanta decreased, but the increase in fare enabled the system to show an increase in revenue from transportation of slightly more than $250,000 for the first eleven months.

General business conditions in Atlanta have been quiet during 1928, and revenue for December suffered as a result of the "flu" epidemic. Mr. Butler says one of the big problems facing the large cities is traffic congestion on downtown streets. Sight should not be lost of the ability of the street car to relieve this situation, and to that end the advantages of the street car should be brought to the attention of the city authorities, automobile clubs, and retail merchants' associations. The experiences of the past few years convince Mr. Butler that the street railway properties which make use of modern

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methods and equipment will be able to show satisfactory net returns from their operation. The modern street car has so many inherent advantages for mass transportation in large communities that the public cannot fail to realize that it is the proper vehicle to use when safety, speed, comfort, convenience, and economy are considered. The revenue from transportation in Atlanta in 1928 was the highest in the company's history, and an increase is confidently expected by the company in the revenue in 1929.

NEW ORLEANS—Officers of the New Orleans Public Service, New Orleans, La., estimate that traffic on the railway and bus lines for 1929 will decrease 4 per cent. In 1927, the gross revenue of the railway department was $7,491,250, the net revenue $2,165,484, and the total of passengers carried 145,948,565, compared with gross revenue for 1928 of $7,122,168, net revenue of $1,979,501, and total passengers carried of 139,274,776. These figures are for the twelve months ended Nov. 30 in each of the years mentioned.

Greater Speed, Neighborhood Development, Intensive Operation and Merchandising Effective

CHICAGO—Chicago Surface Lines is preparing confidently for another increase in business. Although the Surface Lines are operating on a day-to-day permit and have therefore been unable to work out a financial policy which would make possible the extension of lines and an adequate increase in equipment, the consistent growth of business and the optimistic outlook for the future have justified the purchase of new cars by the use of a special renewal and equipment fund, and specifications are being worked out preparatory to ordering at once 100 new cars of improved design.

For 1928 the Chicago Surface Lines reports an increase in both riding and revenue. While the increase in revenue passengers was only 1.08 per cent, it tops a consistent annual increase for the last seven years, amounting to a total of 19 per cent since 1921. G. A. Richardson, vice-president, regards it as significant also that this growth in riding was made in the face of a decrease in industrial payrolls in Chicago of approximately 10 per cent in 1928, and also in spite of very active competition by other transportation agencies. Revenue passengers in 1928 totaled approximately 892,000,000 compared with 882,458,647 in the previous year, an increase of 9,541,353. Total rides were 1,618,200,000. Total revenue was $62,270,000 compared with $61,624,752, an increase of $645,248. Net earnings after deduction of operating expenses, taxes, renewals, and city compensation, were $10,250,200 compared with $10,235,993, an increase of $14,207, or 0.14 per cent. Service was increased to the extent of 635,083 car-miles, or 0.47 per cent. The total car-miles, including buses, for the year was 136,290,000.

Some new records were made in the twelve months. In October there were more passengers and earnings were greater than in any other month in the history of the system. Saturday, Dec. 22, set a new record for the number of rides in one day. Every month during the year with the exception of one showed an increase in total rides as compared with the corresponding month in previous years.

Among the reasons assigned for the consistent increase in riding on the Chicago Surface Lines are the following:

Increase in riding habit.—The number of rides on street cars has increased more rapidly than the poulation. It is an established fact that there is a growing tendency in Chicago to use street cars more for trips to shopping centers in the day and theaters and other amusements in the evening. This is shown particularly by the increase in off-peak riding. A considerable portion of the added service, as indicated by the increase in car-miles, has been in off-peak periods. Automobile owners are finding it more convenient to use the street cars to and from theaters and shopping centers because of the increasing difficulty in finding parking space. For errands about town the advantage of the street car as compared with the automobile are being recognized as never before. Advertising and publicity have helped to crystallize this opinion.

Greater convenience.—Careful scheduling and supervision of cars have resulted in placing service where and when it is needed. Every effort has been made to have a car always in sight of the waiting passengers. For example, on some of the heavy lines, where two-car trains are used for rush-hour periods, single car operation is maintained in the non-rush hours.

Neighborhood development. — The rapid growth of business centers in outlying sections of the city is encouraging more rides per person. Where shopping is done in the neighborhood center more trips are made to and from the stores than when a long journey must be made to the central business district. The influence of the growth in these neighborhood centers is reflected in the increased earnings on many lines.

Greater speed.—For some years the Chicago Surface Lines has been increasing the speed of operation, and passengers have learned that they reach their destinations by street cars almost as quickly as they do in using their private automobiles if time of parking and walking to and from parking space is taken into consideration. Street railway service is as rapid as taxicab service through congested areas. This encourages short-haul riding.

Greater courtesy and efficiency of employees.—Service has been made attractive by increasing the interest of employees in their work and making them better salesmen of the service.

Good maintenance of equipment.—Roadbed and equipment have been maintained in first-class condition, thus inviting rides.

Publicity and advertising.—By calling attention constantly to the convenience, economy and comprehensiveness of street railway service and by advertising special events and points of interest, considerable increase has been made in off-peak riding, such as Sunday service

FOR a business which popular opinion, a few years ago, put on its last legs, local transportation is doing very well. It made a far better showing than most businesses in 1928 and it is going forward to still greater accomplishment during 1929. Better understanding exists today between the public and local transportation companies than ever before in history. Service is being improved and costs kept down by co-ordinating rail cars and buses. Great improvements are being made in cars. Fares are being steadily increased. And the public is recognizing the need for common carrier transportation. The outlook is both hopeful and interesting, for a great transformation is taking place. —LUCIUS S. STORRS

Managing Director American Electric Railway Association

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to the parks, morning and afternoon service to shopping centers and evening service to theaters.

Mr. Richardson feels that the continuance of this program and the addition of new equipment should result in another increase in riding during the coming year.

Improvement in business conditions and the solution of the Chicago traction problems—two possibilities in 1929—would have the effect of greatly stimulating street car riding.

CHICAGO.—According to Britton I. Budd, president of the Chicago, North Shore & Milwaukee Railroad, the year 1928 emphasized more clearly than ever before that service must be stressed to a still greater degree if the electric railway is to hold its patronage and increase its popularity with the public. Many of the companies are meeting modern requirements by getting improved equipment, by operating on faster and more frequent schedules, by adopting salesmanship methods in merchandising transportation service; and where this has been done the electric railway has not only held its own but has increased its business. That the electric railway is indispensable in local transportation service is today generally recognized. Its success in the future depends on how fully it seizes the opportunity to give the public better service than is given by any other transportation agency.

CINCINNATI—"Space, like time, is money," said Hudson Biery, public relations director of the Cincinnati Street Railway, Cincinnati, Ohio, speaking for his company recently. "People," Mr. Biery concluded, "have been converted to the soundness of saving downtown space as well as time."

Mr. Biery said his company during the coming year expected to consolidate the gains it has made during 1928. Among these, he listed track reconstruction, delivery of the remainder of the 100 new cars ordered from the Cincinnati Car Company, completion of the automatic power system and maximum benefits from the corporation's new and extensive car shops.

Cincinnati street cars, during 1927, carried 7,000,000 more passengers than in 1926. Mr. Biery predicted that the figures for 1928 would show an even more remarkable increase.

KANSAS CITY.—Riding during the peak hours in Kansas City is as great as or greater than at any time during the company's history. Despite this the decline in railway patronage has been 3½ per cent per annum and for the year 1928, compared with the year 1927, the same percentage decline is found. The loss has been sustained in the off-peak riding, influenced undoubtedly by the increased use of the private automobile, by the growth of outlying business community centers, with the consequent reduction in shopping riding, by the outlying picture theaters and increased use of the radio.

Gross revenues have closely followed the decline in the number of passengers, but net revenue from railway operation have increased slightly, reflecting the economies and reduction in operating expenses introduced in an effort to stem the tide of rising costs and falling patronage. The slight gain in railway operation has, however, been more than offset by the losses suffered through bus operations, making the net revenue for 1928 from all operations a decrease 15 per cent compared with 1927. For the coming year there appears to be no indication in Kansas City of an abatement of the influences to which the company there attributes the past steady decline in patronage. Mr. Buffe, vice-president in charge of operations, says the railway must make its product more salable and then sell it.

No Difficulty Under Broadminded Municipal Policy

OMAHA—It is becoming increasingly evident and more generally acknowledged, in the opinion of J. N. Shannahan, chairman of the Advisory Council of the American Electric Railway Association, and president of the Omaha & Council Bluffs Street Railway, that the electric railway is an essential industry and must receive a rate of fare which will pay a fair rate of return, thus inducing the flow of necessary money. The only alternative is to supplement a rate unfairly low by a subsidy from the tax budget.

His impression of the electric railway situation in cities of the size of Omaha and larger is that because of the ever-increasing traffic problem, the use of the privately-owned automobile, is approaching the saturation point. Where, under a cost-of-service contract or other broadminded municipal policies, a compensatory rate of fare is being received, the industry is on a sound footing. In Omaha revenue passengers for the last calendar year decreased 2.75 per cent. Railway gross revenues during the same time decreased 3.66 per cent and railway net revenue 5.84 per cent.

HOUSTON—Very satisfactory was the year 1928 compared with 1927 for the Houston Electric Company, Houston, Tex. Passengers carried show an increase, with a corresponding increase in gross and net revenue. During the year Houston has enjoyed a steady growth and normal business conditions, which undoubtedly are in a large measure responsible for the showing of the company. New equipment, consisting of both street cars and buses purchased during the latter part of 1927 and the early part of 1928, have made the company's service more attractive to the riding public, and Jeff Alexander, the manager, feels that this accounts for a portion of the increases. During 1929 the company expects to continue to go forward.

DALLAS—With the very rapid increase in the number of automobiles in use, the management of the Dallas Railway & Terminal Company, Dallas, Tex., feels that if it can realize figures which it has set out in an estimate made for 1929 the showing will be all that can be hoped. To the end that the matter may be better understood Richard Meriwether, vice-president and general manager, has recapitulated the number of passengers carried, gross revenue and net revenue for 1928, compared with 1927, and the budget estimate for 1929. The estimate of passengers for 1929 is 58,275,000 compared with 58,282,307 for 1928 and 58,604,913 for 1927; gross revenue for 1929 $3,072,335 compared with $3,072,873 for 1928 and $3,065,931; net revenue, $866,375 for 1929; $826,116 for 1928 and $866,082.

The reduction in net revenue for 1928 as compared with 1927 was due to abnormal maintenance and accident charges. As the figures indicate, the company expects to earn net revenue in 1929 amounting approximately to that earned in 1927.

DENVER—Despite a further decline in travel during the year 1928 and indications that the trend in this respect will continue during the coming year, H. S. Robertson, president of the Denver Tramway, is not unduly disturbed by the outlook. As he sees it, the percentage of passenger decrease, at least so far as his company is concerned, is growing smaller every year. This would indicate that the Denver company may be reaching the low point of travel recession. During the year the litigation over franchises and rates at Denver was satisfactorily determined, and this has helped the feeling of optimism concerning the new year. The company is hopeful that it will witness the readjustment of its relations with the city and that a constructive program will be worked out which will be beneficial to both the community and the company.

SALT LAKE CITY—Measures which have been suggested in the past throughout the industry as perhaps being most efficacious in compensating for decreased riding are being tried under local conditions at Salt Lake. These are the substitution of bus for street car service on outlying routes, reducing service on outlying routes, even to discontinuing such service when the loss therefrom becomes too great to be absorbed; abandoning city lines paralleled in walking distance by other lines, thereby permitting the concentration of more frequent service made more attractive to the car user, and efforts to lessen automobile pick-ups, substitution of a cheaper means of transportation than the street car on rails, scientific

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studies of car routings and route requirements, and merchandising of the transportation product.

Mr. West is in agreement with the theory that there is and will continue to be a need for mass transportation in cities of any considerable size. If this theory is true and the railways perform a service essential to the community, they will survive despite the fact that the methods may vary from what is used now, but because the very need for the service rendered will, with increasing congestion and population, be realized generally by the public at large and public officials, who will not be able to escape the only remaining alternative of aiding in every way possible the supplying of the community's transportation needs on a basis that is fair and equitable to all concerned. In so far as the Utah Light & Traction Company, Salt Lake City, is concerned, riding is decreasing at present and Edward A. West, general manager, is not oversanguine about the outlook for 1929. On his own system the approximate decrease in per cent in 1928 over 1927 shows revenue passengers carried 1.3, gross revenue 5.5, and net revenue 1.7.

The manager of one fairly large property in the Far West, who prefers not to be quoted says that the increasing use of the privately owned auto, the development of neighboring shopping centers and the extensive use of the radio continue to cause a marked decline in the riding habits of the company's patrons. This is substantiated by the comparative income statement of the company.

It is the opinion of this official that in cities of the size of the one in which his company operates this decline will continue for some time in the future. He says relief from some source or sources must be obtained if the company is to continue to supply universal mass transportation of a character suited to the growth and prosperity of the city. Cognizant of the trend of things, he is not without hope, since he has indicated that his company has not yet exhausted all the avenues of approach to the possible answer to the question, but indicates confidentially that plans are in the making which it is only reasonable to expect will help the situation materially.

LOS ANGELES—The trend of electric railway business as it relates to the Pacific Electric Railway indicates a gradual increase of patronage in the more heavily populated centers due to the increase of auto congestion, loss of time by owners and drivers of private cars and the difficulty of finding convenient parking spaces. These factors, together with the improvements made in the railway service in car seating and in other car comforts, with the bus as auxiliaries, have resulted in an increase in the number of riders. Trial interurban fares, established April 19, 1928, representing a considerable reduction over the rates previously in effect, have increased traffic, but have not yet been sufficiently stimulative to offset the reduction in revenue which followed the change in rates. The status of these trial fares is uncertain. It appears that they probably will be increased. Constant attention to such matters as speeding up of traffic, elimination of unnecessary stops, separation of grades and the increase in rider comforts, has been followed by an unmistakable trend toward a gradual increase in both passengers and revenue. This statement reflects the situation on the Pacific Electric Railway as D. W. Pontius, vice-president and general manager sees it.

Canadian Companies Reap Reward of Intensive Merchandising

LEVIS—Transportation will continue to be sold intensively by the Levis Tramways, but the management does not expect to be able to increase revenue and traffic materially until industrial conditions at Levis improve. During the year 1928 the increase in passenger revenue was 7.2 per cent over the previous year. Revenue passengers carried during the year increased 9.6 per cent. Despite increased expense for snow removal, the net for the year 1928 will equal that of 1927. H. E. Weyman, the manager, regards the consistent increase in revenue and traffic for the last three years with the exception of 1928 as due to the progressive campaign by the railway to increase its revenue through various methods of selling transportation.

TORONTO—Traffic on the system of the Toronto Transportation Commission, Toronto, Ont., in 1928 has been quite satisfactory, approximately 5,900,000 more passengers being carried on the street railway and motor bus lines than in 1927. This represents an increase of 3.15 per cent in revenue passengers, which at the average fare of 6.18 cents indicates improvement of about $365,000 in gross revenue. Motor coach operations, at separate fares, and not in competition with the street railway, totaled $850,000, or 50 per cent more than last year. The operating ratio for the railway was reduced from 60.8 to 57.7 per cent in 1928. About 16 per cent of the car mileage on this system is one-man operation. During the past year two major double-track extensions were made to the city system, one of 10.78 miles and the other of 2.92 miles of single track. These extensions are of standard track construction and replaced old open track on parallel right-of-way. According to D. W. Harvey, general manager for the commission, business conditions appear favorable for 1929, and he looks forward to continued improvement in traffic.

WINNIPEG—Figures of net earnings of the railway lines of the Winnipeg Electric Company, Winnipeg, Man., are not available at this time, but the year 1928 showed an increase of $16,000 in passenger revenue and an increase of 177,400 in revenue passengers over 1927. The mild weather in November and December, 1928, contributed to a decrease in riding against that of the comparable months of the previous year, but all other months showed a substantial gain in riding. D. J. Graham, manager of the railway, feels that the prospects for 1929 are favorable to a substantial growth in riding, as the community is experiencing a marked increase in population.

FROM all sections of the country come optimistic statements from leaders in the industry as to its business in the coming year. The industry is still confronted with plenty of serious problems. Its personnel brings to the solution of these problems extended experience, abundant successful precedent and renewed vigor obtained from the solution of similar problems in the past. The progress of the industry is surely accelerating upward and onward.

—JAMES P. BARNES

President American Electric Railway Association

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Too Young for One Generati for the

Rigmarole: A review as ro(a)m antic as a traffic tangle in which old leaves, recording current events if not history, are turned over. A case of "In one (y)ear and out of the other"

By G. J. MacMurray
News Editor *Electric Railway Journal*

HISTORY is a suspender button, according to a popular commentator. It ties up the past with the future. Its right to exist depends entirely upon its ability to hold up the past to the present. If the record covers the facts, posterity is content. But facts are the dead things of chronology. Alone they impose severe limitations. I have made no promise to be too closely bound by facts. If I did, this article would not appear over my signature since I'd be like Sam, who when asked solemnly to swear to tell the truth, the whole truth and nothing but the truth answered: "Jedge, wif all dem limitations you jes put on me, Ah don't believe Ah have anything to say."

Still I may say nothing in six pages. It wouldn't be the first time. I've already written more than a hundred words and I haven't said a thing about street cars or buses, but I will. In fact, if I hadn't had to write this article I'd have entered the New York Talking Marathon and taken the railway situation for my text. No matter how much one says about the railways there's always something left over. The problem of the railways in trying to hold their audience is as difficult as was that of the playwright who, in creating a new show, needed for a particular part a young man who looked like Lindbergh; who was tall, blue-eyed, with a sense of humor and an air of distinction; and who had sex appeal.

These are popular specifications. It would almost seem that they had fallen into the hands of car and bus manufacturers, judging by the exhibit at the convention last fall in Cleveland. One look and I said to myself:

Tell me, tell me, little car
Are you all they say you are?
Are you car or are you bus,
And if you are, why all the fuss?

Come now, speak up, tell the truth,
Do you run on gas or juice?
With your lines so smart and trim,
Are you her or are you him?

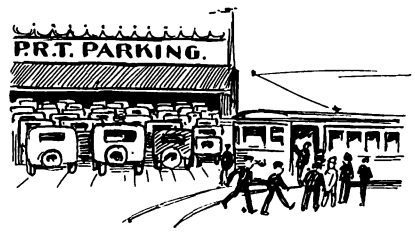
Come now, 'fess up, don't hold back—
Built for road or, mayhap, track?
Who'd be sure, who could say,
Standing there in that mute way

You look like a bus, and perhaps it's so
But I'm not certain you're meant to go.
Come now, tell me, little car,
Are you all they say you are?

And I'm still waiting for the answer. Now if the railways will only buy some of these cars or buses, or car-buses, it will be great. Apparently that's how Wickwire felt about it.

Again old Bill Wise
Opened the convention's eyes.
With his sallies and his wit
He made his usual hit.
His remarks he titled rare
"Only the brave deserve the fare;"
And his words they could but mean
"Only game fish swim up stream."

Of course there's been a lot of trial and tribulation. Life's like that. But there has also been much evidence



Philadelphia may be two hours away from New York, but it's not so slow

that things are not so bad. Like the fellow who sold everything in typewriter supplies except chewing gum, the electric railways certainly are trying to meet the public demand. But if the number of private automobiles continues to increase we shall get into a state where the theory of Malthus will begin to work, since there won't be street space sufficient to care for the traffic. Now that is not so ridiculous as it sounds. Chicago was one of the first places to tumble to that fact. It was a case of

Hi, diddle, diddle,
The street traffic riddle,
The trolley car stuck in the jam.
The public it tumbled
And did more than grumbled—
Parked autos it put under ban.

The whole thing has been gone into before at great length, but it is interesting to note that after approximately a year of enforcement of the nonparking ordinance in the Chicago Loop district there have been considerable increases in customers in stores in that district compared with the number arriving before the regulations went into effect, and merchants who bitterly opposed the ordinance have been completely won over to its support. This, of course, is like the fact that Henry Ford's plant is running again. It's rattling good news.

During the year there has been a lot of good advice on this traffic subject, which if taken, may be expected to be the forerunner of more good news on congestion relief. The Detroit traffic survey diagnosed that city's case of acute traffic congestion and prescribed $30,000 worth of remedy. But though the patient may pay the bill he must take the medicine, as well, if he expects relief. Hawley S. Simpson, traffic engineer, talked before the New York Association about increasing the capacity of the streets. Mr. Mitten offered to make a traffic survey in Philadelphia and to report the findings to an impartial body. Dr. Miller McClintock in his report on San Francisco condemned the jitney, suggested measures for street traffic control and made suggestions on electric railway service.

In New York it has been found that traffic delays cost $540,000,000 and form a staggering record of ineffi-

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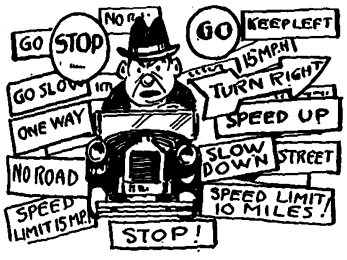
ner on; Too Old
or the Other

It's a jumble, and that's what it will be until traffic is co-ordinated

ciency in the methods of handling one of the nation's most pressing problems. In Boston the Erskine Bureau urged a reduction in street parking. In New Jersey John L. O'Toole of the Public Service elucidated a plan for relieving congestion in Newark. In Milwaukee McClellan & Junkersfeld stressed the need of early action by the city to reduce street congestion. On its part the American Electric Railway Association organized a committee on street traffic economies and this year has undertaken a broad study of transportation economies that promises to point the way toward organization of transportation facilities as the remedy for confusion, waste and congestion.

The changing aspects of transportation certainly were reflected in the avowed intention of the Transportation and Survey Commission at St. Louis to conduct the broadest kind of inquiry into the transportation needs of that community. A model municipal traffic ordinance certainly is needed. To that end the committee



The motorist certainly gets some bad breaks

of the National Conference on Street and Highway Safety has been at work, many provisions of the proposed model ordinance affecting the operation of street cars and buses being included in the tentative draft. As the Philadelphia *Ledger* pointed out editorially, the idea appears finally to be taking hold that the streets were made for moving traffic. *Liberty* even retained William Strum to tell the story of the traffic tangle in popular language.

Yet most of the reports seem to meet the same fate as did the suggestions the youth made to the editor for improving his paper. Following the matter up the youth had the temerity to ask: "Have you carried out any of my ideas." To which the editor said: "Did you meet the office boy with the wastepaper basket as you came up stairs." "Yes," said the youth, "I did." "Well," said the editor, "he was carrying out your ideas." We wouldn't say that the traffic reports have gone into the wastebaskets, but far too few of the ideas advanced have received the consideration they deserve.

It's like this:

When omnibus and trolley car
  Are licensed to a street
It seems a shame to thinking folks
  That autos park six deep.
If they were only cleared away
  It would, indeed, be neat.

Though try and try again
  Do operators with a will;
Not much comes of all they say
  The autos park there still
Because the selfish choose they shall
  And merchants say they will.

But some sweet day, not now, perhaps,
  The thing will be made right
Then out will go the parked auto
  In very hasty flight
Because the public willed it so
  And backed its right with fight.

Though Not Well Fed the Horse is Needed

As the industry's statistical Boswell, Edmund J. Murphy, has proved by a most imposing array of figures the total of passengers carried by the electric railways, including their buses, stays about the same from year to year, but there is a tendency toward a decrease in the proportion of passengers carried by rail and an increase of the proportion carried by bus. As Mr. Bradlee said, the fact that the electric railways have surmounted two tremendous obstacles in the past five years—inadequate fares caused by the reduced purchasing power of money, and loss of revenue through the greater use of the private auto—is conclusive proof of the fun-

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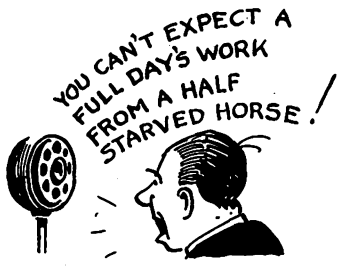
damental soundness of the business; and substantiates the contention that the service rendered is an addition to the social and economic life of our communities. The evils that attended the era of increased wages and advances in the price of materials were



But some are so unreasonable that they do expect it

largely overcome by economies secured through the development of labor-saving devices, lighter car equipment, one-man car operation and improved maintenance methods. Still, as Owen D. Young said in his excellent address in Cleveland, "You can't expect a full day's work from a half-starved horse."

Companies like the Coffin prize contestants and others have done much to drive home the lesson of the inherent stability of public transportation because it is a public necessity. In fact, the fare question seems to have become quite secondary where satisfactory service is rendered. There has been much evidence that there is little public resistance to higher fares when they are made a part of a general program of service improvement. But there seems still to be plenty of room to increase gross earnings through operation of more attractive equipment, and decrease of costs through more scientific operation and maintenance. There is, of course, need for a cut in taxes and for a reduction of the paving burden borne by many companies. These matters need to be corrected because they are unfair.

During the year there has been much evidence that transportation, the product of the electric railways, can be sold only as the car and the bus and the service they give, are made attractive to the prospective customer. Pittsburgh joined the pioneers with its new cars, just as did the Cleveland Railway with its new articulated units. It is the avowed idea of President Alexander at Cleveland to try to furnish a seat for every passenger. To the same end of bettering its service the Boston Elevated Railway announced that it had retired the last of its wooden cars. Wilmington blossomed forth with new cars, Houston met the public's de luxe urge, Kansas City rebuilt all of its equipment, and car improvement occupied the spotlight at the Cleveland convention. Frank Fageol and Charley Birney drew a big hand with their new sample four-wheel cars and there have been persistent rumors that other builders are on their trail. In Salt Lake City, Ed West is trying out the trackless trolley with considerable success. Among the models of the year was the sample car of the Osgood-Bradley Company designed to meet 1929 transportation conditions. Here special attention was given to the proportions and the appearance of the body. Not only in the matter of new cars, but also in keeping the cars now in service in good condition are the electric railways trying to do their part.

But the bus has not been neglected. In fact, the railways have made great progress in co-ordinating the two services. Public Service Co-ordinated Transport continues to carry on aggressively in New Jersey. That company is now operating buses in interstate service between New Jersey and New York. Even while the versatile Frank R. Fageol was putting the time of the replacement of the street car by the bus twenty years away, he was busily engaged in producing a metamorphosis in the street car itself. Mr. Fageol actually proved himself to be an able publicist and a skillful diplomat. At the round-table discussion of the bus at the Cleveland convention, many had their say, but nobody seemed to go away saddened by what transpired. As Dick Graham so ably said, fact, not fancy, must guide in the use of the bus. Tom Noonan and others have set out deliberately to attract the auto rider to the bus and they have succeeded. That is just what the Department of Street Railways at Detroit has sought to do in replacing the ousted jitneys with buses of small capacity operated at high speed. The idea is so different from that which has come generally to be accepted that many have found it difficult to get the philosophy behind the move. But alert manufacturers seems to be on their toes, as evidenced by the new Yellow model W bus and the new Dodge, brought out to handle this class of business.

Nearly everywhere among the railways the idea of the chartered bus is spreading. In Oklahoma, a short interurban has been made the backbone of an extensive bus system. As part of the march of progress, the Morris County Traction Company has passed out of the picture as a railway operating between Newark and Lake Hopatcong, N. J., but the bus has taken its place, just as the bus has taken the place of a considerable part of the former Hudson Valley Railway. Instances of this kind used to send a shudder down the medulla oblongata of railway men, but now they have come to accept them as the inevitable working of the law of economic change. Despite all the talk about additional bus routes in New York City, the Equitable Coach matter is still in a state of suspense, although bus rights have been awarded in the Borough of the Bronx for lines which are operated by the Third Avenue Railway System. There appears now, however, to be every prospect that both the Boroughs of Brooklyn and Queens will see additional bus routes in service during 1929, more than likely under auspices that will make for their co-ordination with the present systems of transport rather than under an arrangement that might contemplate competition.

Competitive bus routes were awarded in Chicago, but the matter is by no means settled. A great deal yet remains to be learned about the bus. D. E. Druen, superintendent of bus maintenance of the Kansas City Railways, feels that bus operators will undoubtedly encounter some difficulty in establishing a proper and adequate fare until such time as the existing street car fare is raised to a point where it properly belongs. So far as the Virginia Electric & Power Company is concerned, attention to local requirements and excellent upkeep

Place the services so there is some system to them

made for success with the bus in Richmond and Norfolk. Feeder bus service has stimulated riding in Atlantic City just as it has in the other Jersey shore towns farther north in which the Coast Cities Railway operates. In Indianapolis unification of the bus and the railway lines was finally brought about, but not until the residents of the city had had

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ocular demonstration of the futility of the operation of the two systems independently. Kansas City put through a new ordinance under which the bus service of the Kansas City Railways was rearranged, so that five trunk lines, one mid-city crosstown line and six feeder lines operate under the grant. Interstate legislation failed, but the Ohio commission ruled against an interstate carrier which persistently abused its operating rights by carrying passengers in local service under subterfuge.

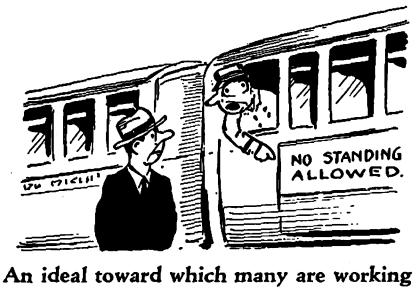
Gossip Is the Remark of Some One Else

Comment is our own erudite remark about some one else. Gossip is the remark of some one else about us. Thus we are left just a little bit out in the cold on the matter when E. J. McIlraith, staff engineer of the Chicago Surface Lines, asks whether we are merely running cars. Money may talk, but in the railway business Mr. McIlraith has noticed how hard of hearing it is when it is called. In the railway world money used to talk but now it only whispers. Bill Bryan once said that wealth was a disease, but as usual the Great Commoner was not very specific. He didn't tell how to catch it.

Mr. McIlraith says that modern methods of public transportation must be created to meet the relentless pressure for improved facilities. The famous Darwin and Russell incident was thus re-enacted by the parallel in the remarks by the man from Chicago and those of President Stevens, who held in his Southwestern speech that the outstanding problem of the public transportation companies was that of keeping abreast of the times. E. G. Buckland, vice-president of the New York, New Haven & Hartford Railroad, also said that the only thing to do is to produce transportation of the kind that the people will buy at a price they will pay. And that is what the companies with which each of these men is identified have done. The same idea was expressed by Lucius Storrs when he said that the electric railways are not looking for charity. Walter A. Draper, president of the Cincinnati Street Railway, was another who said that the street railway systems are best fitted to provide transportation for a community. He was speaking before the United States Chamber of Commerce. It is the obligation of the street railways to provide the transportation and the people's to make this possible.

Ideas on service really were prolific. Dining car service was established on Jan. 16 on the interurban line between Milwaukee and Watertown. The Philadelphia Rapid Transit Company has kept incessantly at its campaign in the interest of the 80 per cent who patronize the street cars, demanding a square deal for them. The company at Fort Worth showed that good service can be given at low cost.

Buffalo went to 100 per cent one-man car operation, so also the Kansas City Railway went to all one-man operation. The St. Louis Public Service went over to skip stops on the Olive Street line. Service improvements occupied the attention of Southwestern transportation men at their meeting in the spring. Again Mr. McIlraith, speaking before the meeting of the Illinois Electric Railway Association last March, showed clearly that fast schedules are within



An ideal toward which many are working

the ability of almost any electric railway to achieve without expenditures or complications. In Atlanta, druggists were enlisted in the sale of street car tickets, and this in the home of Coca-Cola. Salt Lake was proclaimed as a city without strap hangers, thus beating both Mr. Mitten in Philadelphia and Colonel Alexander of Cleveland to it. Moreover, Charlie Gordon found that service first is the slogan of T.M.E.R. & L. company at Milwaukee, Wis. That service can be made more salable through better maintenance was a thought brought out in a new way by J. H. Walsh, superintendent of rolling stock and shops of the Middlesex & Boston Street Railway. Notable, of course, along this line was the article "Smoothing the Way for the Ride Prospect" in the JOURNAL for Sept. 8. And so the list might be expanded almost indefinitely.

That electric railway men are convinced of the value of the electric railway as a freight carrier is instanced in the elaborate plans of the Illinois Traction for improvements in and about St. Louis and the fact that the North Shore Line has increased its freight business 25 per cent; that the South Shore line is pushing the improvements on its line designed to add to the freight business; that $1,225,000 was appropriated for the construction of an electrified belt line at Oklahoma City to help increase the freight revenues of the electric railways there and that the Texas Electric Railways has recently developed plans for going after freight business more intensively and of tying in its lines for the interchange of freight with the steam carriers. Out in the Central West the Electric Railways Freight Company has been organized to take over the freight business of a number of the interurbans, the idea being that economies can be worked by this means which will redound to the benefit of both the companies and the shippers.

The Scissors Grinder Invariably Finds Things Dull

Submission of 3,600 ads in the public utility advertising contest, in which the successful contestants were the railways in Atlanta, Portland, Ore., and the Twin Cities offers convincing proof that the electric railways are awake to the possibilities of advertising. The Company at Birmingham also did some notable work in advertising its railway service. Novel color advertising was featured by the Pittsburgh Railways in its safety work. Window displays drew big crowds to the demonstrations of service staged by the Little Rock Railway & Electric Company and the Chicago, North Shore & Milwaukee. As Hudson R. Biery, of the Cincinnati Street Railway, said, publicity in modern business and industry is almost as vital as capital and labor. Successful selling requires a constant search for buyers. The qualities of the Gold Dust Twins or Palmolive Soap are well known only because they have been far more than twice-told tales.

After all Samson had the right idea about advertising. He took two columns and brought down the house. As Walter A. Draper said and as Labert St. Clair reiterated, a friendly public is the railway's principal asset and the chief executive must play his part in this development. A whole issue of the JOURNAL was dedicated to the doctrine of "Selling Better Transportation Better." Outstanding advertising and public relations work has also been done by the systems in Cleveland, Kansas City and San Francisco; the Kansas City Public Service Company especially, with its series "The Men Behind Your Trans-

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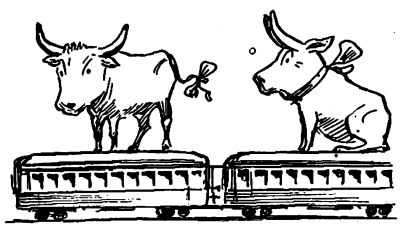
portation Service." Best of all, nearly all of this work has reflected the disposition on the part of the companies to capitalize the opportunities for improving public relations through employee-customer contact. A wealth of ideas on this subject is contained in the article published in the JOURNAL, based on the report of the committee on employee-customer contact of the American Association. In short, the only man who invariably finds things dull is the scissors grinder.

Raymond S. Tompkins, of the United Railways & Electric Company, carried the message of the troubled trolley to the intelligentsia in the *American Mercury* for April and Mr. Mencken, the *Mercury's* editor, who does a great deal more straight thinking than is credited to him, asked the very question of the people of Baltimore, about starving the transportation horse and then expecting it to draw the load, that Mr. Young did at



The South Shore bull was served in the tangible form of steaks

Cleveland. Moreover, Mr. Mencken later took a hot fling in the Baltimore *Sun* at the parkers.

When Mencken bold wrote in the *Sun*
He sought to have some traffic fun.
He tilted here, he tilted there
And pranks he cut both rich and rare.

If left to him he'd short shrift make
Of those who most the street space take
Some petty whim to satisfy
And selfish interests gratify.

To Mencken bold, the *Mercury's* wizard
The hog that parks is a lazy lizard.
This wielder of words if he had his say
Would give the trolleys their right of way.

According to Captain Williams of the United Electric Railways, Providence, speaking at Cleveland, the street railway man of yesterday presents a striking resemblance to Rip Van Winkle. "Cap's" own paper, *Contact,* says that he threw a thunderbolt into the convention. Perhaps that's the way it impressed some of the old timers—and some of those not so old—when he queried: "Are we justified in lolling about in our lethargy while the rest of the world goes by and we are trodden under foot, smiling the while, sickishly, as we mutter 'The song is ended and not even the melody lingers on?'" As the Captain said, the public today has inhaled the delightful perfume of luxury. Only a modernized executive can cope with the situation. Whether or not you believe it, business has become the civilizer, as Ernest Elmo Calkins says in his books reviewed in the JOURNAL for the benefit of an industry that still has much to learn about merchandising. The day has passed when the thing to do was to put sand in the sugar, water the milk, wet the tobacco and then go upstairs for family prayers.

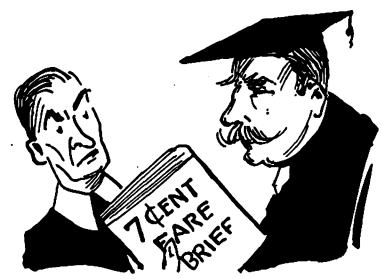
STAGE A REVIVAL; DON'T HOLD A WAKE

That this statement is true will be quickly realized if the reader will call to mind what the Chicago, North Shore & Milwaukee, the Cincinnati, Hamilton & Dayton, the Chicago, South Shore & South Bend, the Texas Electric Railway and other interurbans, the roads hardest hit by the competition of the private auto, have done. He will realize that platitudes put into practice certainly pay profits. The South Shore even went so far as to secure prize beef for slaughter so that the cuts could be served to the patrons of its diners. And remember that business on each of these properties was at one time on the mourner's bench. But the owners didn't hold a wake. They staged a revival. The landscape still belongs to the man who looks at it. If you don't believe that, read "A philosopher on the Interurban" in the JOURNAL for May 26. Not only that but remember the Book "Popularizing Public Transportation," a digest of the presentation made by the electric railways to the Charles A. Coffin Foundation. Street railway men should be encouraged by James Whitcomb Riley's lines:

I've allus noticed great success
Is mixed with troubles, more or less,

And it's the man who does the best
That gets more kicks than all the rest.

In speaking before the Association of Equipment Men, Southern Properties, E. P. Waller said that the electric railways can not hope to succeed in the effort to win back lost patronage unless they keep pace with the rapid development of the automobile. Similarly, J. P. Barnes, the new president of the American Electric Railway Association, said in his first speech in that capacity that expedients have no place in the relief of the modern transportation problem. Electric railways must do more than supply transportation service was the point emphasized by President Stevens, when in March he epitomized the principles which should guide participation of the utilities in civic activity. As Owen D. Young said, the present is the age of a combination of imagination and knowledge. Railway men have both. The words of their spokesmen prove the first and the deeds of the operatives show that they are in no sense behind on the latter. To quote Mr. McIlraith again, skill and foresight will meet the pressure of competition. As Mr. Storrs put the case at the meeting of the New York Electric Railway Association last winter, "we must keep on the move or die." That certainly is the doctrine to which J. N. Shannahan, president of the Omaha & Council Bluffs Street Railway and the new head of the advisory council of the American Association, sub-



One can be too serious even for the Supreme Court

scribes—and he didn't take long in Omaha to make it work. Let us not forget that progress should be imputed very largely to the builders of castles in Spain. Without vision the people perish.

On the whole, the industry's most important fare case is that in New York City. Down to Washington went New York's tailor-made Mayor, the modern but male Cassandra of little old Bagdad-on-the-subway, to support Mr. Craig in his effort before the Supreme Court to preserve the 5-cent fare for New York City. For all their pains the lawyers for the city and the company had their "briefs" returned to them for shortening. Frank Sullivan was right when in the New York *World* he said that a brief on the subway rate increase by Ring Lardner would be far more fun than one on the same subject by Charlie Craig or Sam Untermyer and the New York *Times* irreverently pointed out in this connection that last year the city paid $14,000,0000 to meet the deficit on the old subways alone, and that nearly $40,000,000 goes for various rapid transit charges in the budget, to say

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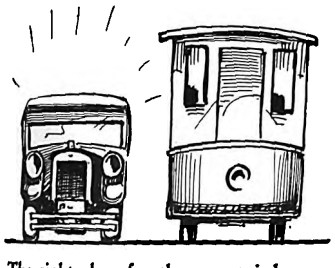
nothing of the hundreds of millions expended in the normal cost of construction out of bond issue money. Then Mr. Wallstein translated the city's $40,000,000 into nickels; 800,000,000 of them paid by the taxpayers for phantom rides they never took. It was all unkind, extremely unkind. The Mayor should not take too seriously the criticism that the people of New York are cumbered serfs of a pestilence of peanut politics. Such are the illiberality and slander to which enlightened rulers ever are subject.

Incidentally it should be mentioned that Frank Hedley, president of the Interborough, was the subject of a profile in the *New Yorker*; that more than 600 attended the dinner to Tom McCarter, president of the Public Service of New Jersey, culminating the celebration of the 25th anniversary of that company's founding;



The right place for them certainly was the Ford Museum of Antiques

that Joe Sullivan, of the Chicago Surface Lines, has been appointed World's Fair chairman for the public utility industry in furthering the enrollment campaign.

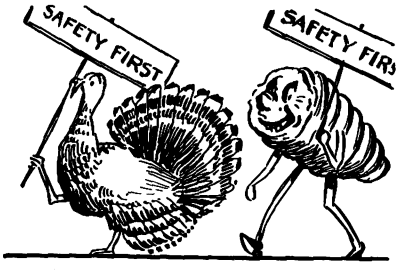
A man imposes on himself who taxes his memory. So if I overlook any of the things of human interest that have occurred during the year, it is because I am opposed to overburdening myself. Reception being good on March 31 last, I listened in while a group of railway men attained the unusual distinction of furnishing music to the entire world in a joint good-will program furnished by the employees of the Cleveland Railway and of the Pittsburgh Railways from station KDKA. Henry Ford also figured in the news in an unusual way. In Brooklyn he spotted among the historical relics of the Brooklyn City Railroad, a model of an old street car which he thought was a fitting representative of its day and generation among transportation vehicles for a place alongside of the Model T in the museum in Dearborn. There the car now rests, a contribution from the railway to the Ford collection. There are some old cars in Baltimore. One of them came in handy for use in the parade of progress which the company there staged last spring when 400 members of the local Chamber of Commerce inspected the railway plant and witnessed progress in car design, with the old horse car in the vanguard of an interesting procession. Again over the radio the Nashville Railway & Light Company entertained with a series of two-hour programs in which the purposes of the educational methods of the company in safety work were explained. On the other hand, the Third Avenue Railway voluntarily went off the air so as to help clear the channels in and around New York. Gene Tunney rode the trolley while he was in Grand Rapids. Nobody got hurt, not even the trolley. The indorsement which the bookish prizefighter gave to the local cars was done after the faultless manner of Professor William Lyon Phelps of Yale. But relics are in demand. Somebody else wants a horse car of former days, as evidenced by an ad that appeared in the JOURNAL, specifying a car with or without running gear but with carpet and stove if possible.

DITCHES GOING AT A PREMIUM

The new Broad Street rapid transit line in Philadelphia was placed in service on Nov. 2 under a temporary arrangement with the Philadelphia Rapid Transit Company. In October the Pennsylvania Railroad opened its Philadelphia, Chester and Wilmington service over the route equipped for electric operation. In midsummer the Brooklyn-Manhattan Transit opened the 14th street subway line. Also during the year the New York State Railways placed in service the subway at Rochester constructed in the bed of the canal there. The results of more than three months of experience with Detroit's surface rapid transit operation were reviewed in the JOURNAL. Of the somewhat similar projects in the making, the most important, perhaps, are proposals for the construction of the new terminal in Newark, N. J., to be used jointly by the Public Service Corporation and the Pennsylvania Railroad, with a high-speed local line into Newark in the bed of the Morris Canal; the subway proposal for Pittsburgh; the similar subway proposals for St. Louis and Detroit and agitation elsewhere of proposals along these lines but not quite so ambitious.

Negotiations for a new franchise in Chicago didn't get very far, but the Louisville Railway secured a twenty-year bus grant with an initial fare of 10 cents. At the election in Omaha in November the voters expressed their choice overwhelmingly for the new grant of the Omaha & Council Bluffs Street Railway. The new franchise in Toledo also has gone into effect, and the Community Traction Company, one of the hardest hit of the city properties, appears to be staging a successful comeback. The Market Street Railway in San Francisco failed to obtain the passage of revocable permits, pending a decision on the part of the city as to whether or not it will proceed to take over the company's property.

Nothing came of the attempt to legislate on the matter of the continuation of the plan of private ownership of the Boston Elevated Railway with public control. On the other hand, a bill of this kind was put



Awards for safety records were unusual

through in the interest of the Eastern Massachusetts Street Railway. A terminable permit bill was signed by Governor Smith of New York. In Illinois the home rule bill, intended to afford a measure of relief to the Chicago companies, was lost. The House Committee of the District of Columbia voted favorably on the resolution to authorize the merger of the railway and bus corporations operating in the District of Columbia, but the measure did not go through and the matter is now before the legislators for settlement.

The year was replete with plans for heavy electrification. The most important project of this kind to be announced was the proposal to electrify the Pennsylvania Railroad from New York to Wilmington, the proposals to electrify the Reading Railroad out of Philadelphia and the announcement of the decision to use 3,000 volts d.c. on the line of the Delaware, Lackawanna & Western on its route to Scranton. Work of converting the so-called narrow-gage railroad at Boston from steam to electricity was completed in the late fall, and this was followed by the

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rumor that the New York Central had in mind the electrification of its road from Croton-on-the-Hudson to Buffalo.

The Year's Prize Winners

What a big inning last year was for a lot of people! Mr. Wood down in Virginia won the Coffin award, Mr. Barnes in Louisville won the Brady safety medal, the Electric Railway Journal won the national

Detroit jitneys get a belated spanking

award among trade papers for outstanding service to its industry, James H. McGraw, the publisher of the Electric Railway Journal, got the 1927 medal for distinguished personal service rendered American commerce and industry through raising the standards of advertising, and we were picked again to write this review. But that is only part of the story. The Chicago, North Shore & Milwaukee R. R. won the *Electric Traction* speed trophy for the second time. In Chicago, also, there was a fitting banquet to celebrate the fact that 5,441 men of the Chicago Surface Lines had guided cars through the maze of traffic that is Chicago's without the semblance of an accident. There were many individual prize winners among the railway men of Brooklyn and other cities for their work in accident prevention. And just as this issue was in preparation, anouncement was made that the Penn-Ohio System has won the Brady medal for 1927—the third award of merit won by this property; i.e., the Coffin prize, the Forbes prize and now the Brady medal.

The Girl Who Received the Gift of Flowers

On the municipal ownership matter the people of Detroit were at first in raptures, like the girl when she received his gift of flowers. "Oh, they are perfectly lovely!" she exclaimed. "And there's even a little dew on them still." "Er-y-e-s," he stammered, "there is a little, but I intend to pay it on Saturday night." Detroit got the municipal ownership flowers, but there is still quite a little due on them. And the process of paying will go on for a long time. Ralph Stone, chairman of the board of the Detroit Trust Company, stated in a report made public last June that an increase in fare on the Detroit Municipal Railway was necessary, barring the possibility that the problem of the railway could be met by rearranging the annual debt maturity. Superintendent Boeken of the San Francisco Municipal Railway wants that system taken out of politics, and the sponsors for the Seattle Municipal Railway are still casting around for the magic expedient that will make it possible for that system to carry on successfully. If the Department of Street Railways at Detroit did something unusual in replacing the jitneys with buses of small capacity, it also has done something unusual in its combined electric railway and bus service, in which electric cars, operating as express cars, receive and discharge passengers to

Twenty-eight countries were represented at the Rome conference

buses, which run local. This form of service really was begun on Jefferson Avenue in Detroit on Sept. 18, 1927, but has since been extended.

While Green You're Growing; When Ripe, You're Rotting

It was a very good idea on the part of the convention at Cleveland to get the benefit of the ideas of outsiders. There are some subjects on which the members of the industry are green and they are not afraid to admit it. They are like the man who hesitatingly interrupted one of Fred Mann's speeches at Dayton to ask a question. "Good," said Mann, "there's hope for you. While you're green you're growing; when you're ripe you're rotting." Mr. Kettering told how the automobile industry was still young. He certainly made a stimulating talk, as did Mr. Cochran, Mr. Young and the others.

But speaking of conventions it is well not to forget that the convention held by the Canadian Electric Railway Association last June at Toronto exceeded in attendance and in number and size of exhibits any ever held before by that body. At its mid-year meeting, the Central Electric Railway Association took stock of the present and the future. At the International conference in Rome, 28 countries were represented. Perusal of the proceedings at Rome shows the striking similarity between the problems of the manager abroad and those of the man at home. Moreover, it will be recalled that it was at the Southwest Association meeting in the spring that Mr. Stevens made his speech on the future of the electric railway. He then said that mass transportation would continue to be handled by the electric railways until some other form of transportation not now known is invented to take its place. He said: "We have the brains, the will, the energy and the desire to keep our industry abreast of the exacting requirements of the public and to do so at a profit. Let's go." It certainly was a great year for conventions in the United States, in Canada and abroad.

Too Old for One Generation; too Young for the Other

From all that has been said one might almost think that the electric railways were in the embarrassing position of being between two generations—too old for one and too young for the other. It is difficult to tell whether or not some of them are progressive or conservative. Some of the things they do make it seem one way and some another. In that respect they are like the girl who wears last year's hat, drives a this year's car and lives on next year's income. Just as there are a million and one reasons why modern women dress as they do, and every one of them is a

Buyers and sellers should fraternize, not fight

man, there are 120,000,000 reasons why the electric railways should keep up to date, and every one of them is a passenger.

And now I'm done.
The song I've sung
Time will soon efface
A piece *most* commonplace.
But this of you I ask,
In pity for my task
Forgive the limping rhymes;
The joke you've heard a thousand times.

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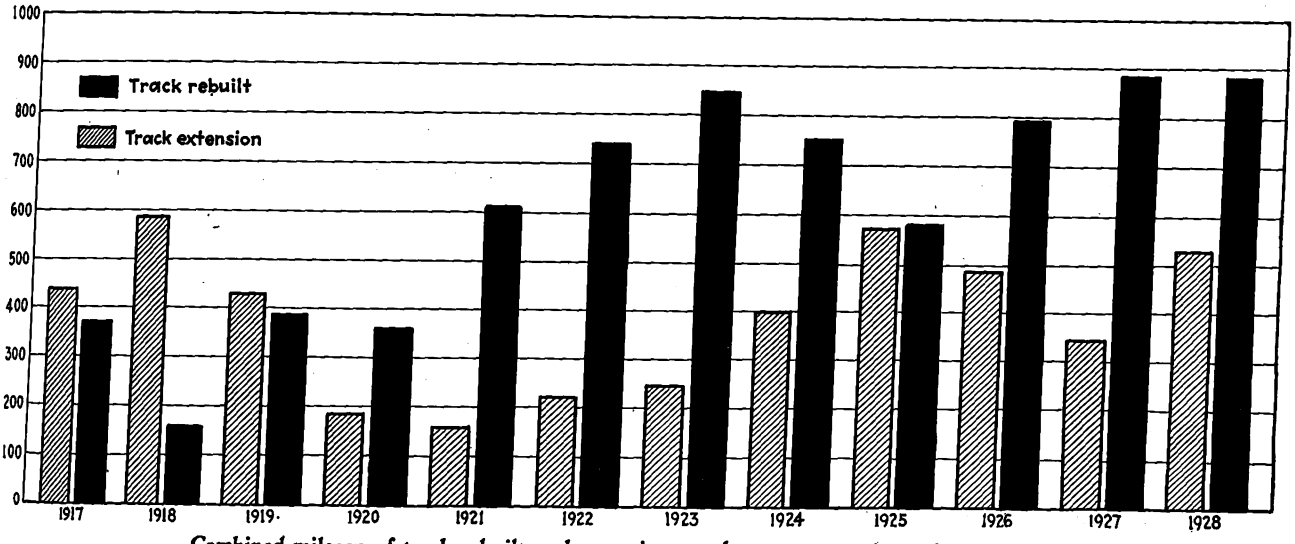
Track Construction Greater

Mileages of new construction and reconstruction during 1928 exceed figures for previous year. Electrification of steam roads extended



Combined mileage of track rebuilt and extensions made was greatest in twelve years

ELECTRIC railway track construction activity during the past year was substantially greater than in the preceding twelve months. The mileage of extensions made in 1928 exceeded those of 1927 by more than 54 per cent, and the mileage of track rebuilt also was greater. At present the total of city and interurban electric trackage in the United States and Canada is about 43,400 miles. This is a decline of approximately 8 per cent since 1917 when the track mileage reached a peak of 47,370. Service on the track abandoned has been replaced in most instances by bus service.

The mileage of both city and interurban extensions last year was considerably more than that of the year previous. The extensions of city track totaled 184.15 miles, compared with 152.99 in 1927 and 193.20 in 1926. Interurban track extensions totaled 54.79 as compared with 39.42 miles in 1927.

The number of companies making extensions to city tracks in 1928 was 74 as compared with 80 in 1927, 75 in 1926 and 80 in 1925. The number of companies reporting interurban extensions was considerably more than in 1927, being 40 as compared with 34 in 1927, 38 in 1926 and 35 in 1925.

The largest city extension was constructed by the Board of Transportation, New York City. The total single-track miles, including the lines turned over to the Brooklyn-Manhattan Transit Corporation and the Interborough Rapid Transit Company for operation and the actual track constructed in the city's new subway, is 36.84 miles. Following this extension was that of the Division of Transportation of the city of Philadelphia, which completed 20.86 miles of track during the year. The city of Detroit, Department of Street Railways, constructed 16.49 miles of this track and the Toronto Transportation Commission built 14.59 miles of extension. The largest mileage of interurban track extensions during the year was made by the Milwaukee Electric Railway & Light Company, totaling 15.68 miles. The second largest interurban extensions were made by the Chicago, South Shore & South Bend Railroad, which installed 7.60 miles of new lines during the year.

Comparison of Track Construction by Years

Year	No. of Companies	Track Extensions—Miles—City	Track Extensions—Miles—Interurban	Track Extensions—Miles—Total	Track Rebuilt—Miles—City	Track Rebuilt—Miles—Interurban	Track Rebuilt—Miles—Total	Electrified Steam Lines, Miles
1908	157	(a)	(a)	1,174.5	(a)	(a)	(a)	84.00
1909	160	(a)	(a)	774.7	(a)	(a)	(a)	112.40
1910	217	(a)	(a)	1,204.8	(a)	(a)	(a)	192.40
1911	223	(a)	(a)	1,105.0	(a)	(a)	(a)	86.50
1912	171	(a)	(a)	869.4	(a)	(a)	(a)	80.80
1913	181	(a)	(a)	974.9	(a)	(a)	(a)	119.00
1914	163	(a)	(a)	716.5	(a)	(a)	(a)	229.00
1915	136	(a)	(a)	596.0	(a)	(a)	(a)	448.20
1916	104	115.40	240.90	356.30	(a)	(a)	(a)	388.00
1917	121	251.10	125.60	376.70	(a)	(a)	375.40	66.00
1918	80	216.41	97.41	313.82	(a)	(a)	155.43	275.70
1919	73	110.90	29.67	140.57	307.06	82.82	389.89	287.60
1920	87	145.69	30.87	176.56	246.21	115.56	361.77	8.92
1921	78	108.15	38.95	147.10	488.96	126.25	615.21	8.08
1922	104	126.27	85.11	211.38	584.75	154.95	739.70	12.35
1923	272	169.61	63.54	233.15	559.77	294.86	854.63	26.12
1924	243	218.09	93.99	312.08	585.51	178.82	764.33	83.39
1925	207	227.31	112.48	339.79	485.75	93.15	578.90	236.36
1926	236	193.20	124.76	317.96	594.35	208.17	802.52	169.52
1927	235	152.99	39.42	192.41	691.34	196.60	887.94	140.70
1928	231	184.15	54.79	238.94	674.00	220.73	894.73	276.14

(a) Information not available.

The total electrified track rebuilt during 1928 was 894.00 single-track miles, which was an increase over 1927 of 6 miles and was 91 miles more than 1926. The number of companies reporting tracks rebuilt during the past year was 205. This is a slight change from 1927 when 217 companies reported track rebuilt, 1926 when 181 companies made such reports and 1925 when the number was only 160. Similar to the previous year, ap-

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Table I—Track Extension and Reconstruction in 1928

Name of Company	Extension, Miles City	Extension, Miles Inter-urban	Rebuilt, Miles City	Rebuilt, Miles Inter-urban
Alabama				
Birmingham Electric Co.	....	....	10.82	....
Mobile Light & R.R. Co.	....	....	.86	....
Arizona				
Phoenix Street Ry.	....	....	17.96	....
Arkansas				
Texarkana St. Ry.	....	....	0.06	....
California				
Key System Transit Co.	....	0.03	2.55	1.33
Los Angeles Ry.	0.29	....	6.66	....
Market Street Ry.	....	....	1.02	....
Municipal Ry. of San Francisco	9.48	....	0.75	....
Pacific Electric Ry.	....	3.63	2.45	33.87
San Diego Electric Ry.	0.37	....	2.85	....
Southern Pacific Co. (Elec. Div.)	....	1.12	....	....
Colorado				
Denver & Intermountain R.R.	0.02	....	0.06	....
Denver Tramway	0.51	....	5.31	....
Connecticut				
Connecticut Co.	0.58	0.01	14.77	3.08
Delaware				
Delaware Electric Power Co.	0.09	....	1.24	....
District of Columbia				
Capital Traction Co.	....	....	1.65	....
Washington Railway & Electric Co.	....	....	2.34	....
Florida				
Gulf Power Co.	....	....	1.15	....
Jacksonville Traction Co.	....	....	3.25	....
Miami Beach Ry.	....	....	0.17	....
Municipal Rys. City of St. Petersburg	....	....	0.75	....
Georgia				
Georgia Power Co.	0.89	....	7.44	0.06
Macon Ry. & Light Co.	....	....	0.10	....
Illinois				
Aurora, Elgin & Fox River Electric Co.	....	....	0.23	0.85
Chicago & Joliet Electric Ry.	....	....	0.63	....
Chicago, North Shore & Milwaukee R.R.	0.48	0.55	....	....
Chicago Surface Lines	0.51	....	34.88	....
Chicago & West Towns Ry.	....	....	....	1.75
Illinois Northern Utilities Co.	....	....	0.75	....
Illinois Terminal R.R. System	....	2.53	....	8.19
Illinois Power Co.	....	....	2.77	....
Illinois Traction System	....	....	....	16.00
Kewanee Public Service Co.	....	0.21	....	0.25
Tri-City Ry. of Illinois	....	....	2.20	....
Indiana				
Beech Grove Traction Corp.	0.10	....	....	....
Chicago, SouthBend & Northern Indiana Ry	....	....	4.06	....
Chicago, South Shore & South Bend R.R.	....	7.60	....	13.20
Gary Rys.	0.79	....	3.03	....
Hammond, Whiting & East Chicago Ry.	....	....	1.30	....
Indiana Service Corp.	2.98	0.09	....	5.00
Indianapolis Street Ry.	0.40	....	2.58	....
Interstate Public Service Co.	....	....	2.10	....
Lafayette Street Ry.	0.23	....	0.57	....
Southern Indiana Gas & Electric Co.	....	....	3.00	....
Southern Michigan Ry.	....	....	....	0.10
Terre Haute, Indianapolis & Eastern Traction Co.	....	....	0.39	....
Union Traction Co. of Indiana	0.06	0.41	0.37	1.22
Iowa				
Charles City Western Ry.	0.40	....	....	....
Clinton, Davenport & Muscatine Ry.	....	....	0.40	....
Tri-City Ry. of Iowa	....	....	0.60	....
Waterloo, Cedar Falls & Northern Ry.	....	2.10	....	1.83
Kansas				
Arkansas Valley Interurban Ry.	....	1.00	....	....
Joplin & Pittsburg Ry.	....	2.25	....	....
Kansas City, Leavenworth & Western Ry.	....	0.33	....	0.67
Kansas City, Merriam & Shawnee R.R.	....	....	....	7.09
Union Traction Co.	....	....	....	1.50
Kentucky				
Kentucky Traction & Terminal Co.	....	....	0.25	0.72
Louisville & Interurban R.R.	....	....	0.17	....
Louisville Ry.	0.56	....	4.37	....
Louisiana				
Louisiana Power & Light Co.	....	....	0.80	....
New Orleans Public Service Inc.	....	....	7.94	....
Maine				
Androscoggin & Kennebec Ry.	....	....	0.20	....
Bangor Hydro-Electric Co.	....	....	0.88	4.30
Biddeford & Saco R.R.	....	....	0.10	....
Central Maine Power Co.	....	....	0.50	....
Cumberland County Power & Light Co.	0.36	....	3.32	....
Waterville, Fairfield & Oakland Ry.	....	....	1.50	....
York Utilities Co.	....	....	1.50	....
Maryland				
Potomac Edison Co.	....	....	0.34	....
United Railways & Electric Co.	1.30	....	7.16	....
Massachusetts				
Berkshire Street Ry.	0.68	0.37	2.44	....
Boston Elevated Ry.	0.32	....	12.80	....
Boston, Worcester & New York Street Ry.	....	....	....	6.00
Eastern Massachusetts Street Ry.	0.72	....	5.79	2.75
Fitchburg & Leominster Street Ry.	....	....	....	3.00
Holyoke Street Ry.	....	....	0.88	....
Mass. Northeastern Street Ry.	....	....	0.50	3.00
Springfield Street Ry.	....	....	7.11	2.15
Union Street Ry.	....	....	1.28	....
Worcester Consolidated Street Ry.	0.46	....	2.56	....
Michigan				
City of Detroit—Department of Street Rys.	16.49	....	15.85	....
Eastern Michigan Rys.	2.34	....	6.24	....
Grand Rapids R.R.	0.04	....	1.91	....
Michigan Electric Ry.	....	....	1.70	....
Muskegon Traction & Lighting Co.	....	....	0.40	....
Twin City Ry. (Benton Harbor)	....	....	0.60	....
Minnesota				
Duluth Street Ry.	0.74	....	1.94	....
Northern States Power Co., St. Cloud	....	....	0.07	....
Twin City Rapid Transit	4.00	....	16.00	....
Mississippi				
Mississippi Power & Light Co.	....	....	0.10	....
Missouri				
East St. Louis Ry.	....	....	1.06	....
Kansas City Public Service Co.	....	....	20.02	....
Springfield Traction Co.	....	....	0.25	....
St. Joseph Ry., Light, Heat & Power Co.	....	....	2.00	....
St. Louis Public Service Co.	2.85	....	10.72	2.35
Montana				
Butte, Anaconda & Pacific Ry.	0.28	....	....	....
Great Falls Street Ry.	1.00	....	1.51	....
Nebraska				
Omaha & Council Bluffs Street Ry.	0.19	....	3.20	....
New Hampshire				
Manchester Street Ry.	....	....	6.19	....
New Jersey				
Atlantic City & Shore R.R.	....	....	0.33	....
Five Mile Beach Ry.	....	....	4.20	....
Public Service Coordinated Transport	3.54	....	35.13	....
New York				
Binghamton Ry.	....	....	1.24	....
Black River Traction Co.	....	....	0.27	....
Brooklyn City R.R.	0.02	....	7.58	....
Brooklyn-Manhattan Transit Corp.	....	....	18.94	....
City of New York—Board of Transportation	36.84	....	....	....
Eastern New York Utilities Corp.	....	....	0.11	....
Elmira Water, Light & R.R. Co.	....	....	3.15	....
Fishkill Electric R.R.	....	....	....	7.23
Fonda, Johnstown & Gloversville R.R.	....	....	0.66	....
International Ry.	....	....	6.71	....
Jamaica Cnetral Rys.	....	....	2.94	....
Jamestown Street Ry.	....	....	1.89	....
Jamestown, Westfield & Northwestern R.R.	....	....	....	32.50
New York & Queens County Ry.	0.37	....	1.75	....
New York Rys.	....	....	2.65	....
New York State Rys. (Rochester)	....	....	2.07	....
New York State Rys. (Syracuse)	....	....	1.27	....
New York State Rys. (Utica)	....	....	2.30	....
New York, Westchester & Boston Ry.	....	3.68	....	....
Niagara Junction Ry.	0.90	....	....	....
Richmond Rys.	....	....	0.20	....
Rochester, Lockport & Buffalo Railroad Corp.	....	....	....	0.20
Schenectady Ry.	0.24	....	0.18	....
Southern New York Ry.	....	0.20	....	....
Third Avenue Ry.	....	....	14.50	....
United Traction Co.	....	....	1.18	....
North Carolina				
Tide Water Power Co.	....	0.14	....	....
Ohio				
Cincinnati, Hamilton & Dayton Ry.	....	0.66	....	3.00
Cincinnati, Newport & Covington Ry.	0.23	....	1.14	....
Cincinnati Street Ry.	2.62	....	20.77	....
City of Ashtabula Div. of St. Ry.	....	....	2.00	....
Cleveland Ry.	3.80	0.60	10.33	....
Cleveland Southwestern Ry. & Light Co.	....	....	....	7.20
Community Traction Co.	0.08	....	4.36	....
Indiana, Columbus & Eastern Traction Co.	....	....	....	1.00
Northern Ohio Power & Light Co.	0.36	0.03	2.11	2.44
Stark Electric R.R.	....	0.70	1.00	....
Steubenville, East Liverpool & Beaver Valley Traction Co.	....	....	1.50	....
Toledo, Bowling Green & Southern Traction Co.	....	....	....	2.50
Toledo & Western Ry.	....	0.20	....	1.00
West End Traction Co.	....	....	0.65	....
Youngstown Municipal Ry.	....	....	0.17	....

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Table I—Track Extension and Reconstruction in 1928—(Continued)

Name of Company	Extension, Miles City	Extension, Miles Interurban	Rebuilt, Miles City	Rebuilt, Miles Interurban
Oklahoma				
Muskogee Electric Traction Co.	....	0.24	....	....
Northeast Oklahoma R.R.	....	0.35	....	....
Oklahoma Ry.	....	....	10.77	....
Pittsburgh County Ry.	....	0.09	....	....
Tulsa Street Ry.	....	....	1.20	....
Oregon				
Portland Electric Power Co.	0.55	0.31	0.63	0.41
Pennsylvania				
Altoona & Logan Valley Electric Ry.	....	....	1.70	....
City of Philadelphia Division of Transportation	20.86	....	....	....
Philadelphia Rapid Transit Company	4.78	....	19.93	0.48
Conestoga Traction Company	....	....	0.43	1.41
East Penn Traction Co.	....	....	2.00	....
Erie Rys.	0.20	....	0.40	....
Harrisburg Rys.	....	....	2.20	....
Hershey Transit Co.	....	....	....	1.53
Lehigh Valley Transit Co.	....	0.78	2.08	0.02
New Castle Electric Street Ry.	1.80	....	0.60	....
Philadelphia & West Chester Traction Co.	....	....	....	8.00
Pittsburgh Rys.	2.76	0.75	34.48	5.16
Pottstown Transit Co.	....	....	....	1.25
Reading Transit Co.	0.25	....	2.60	....
Scranton Ry.	0.21	....	2.22	....
Shamokin & Mt. Carmel Transit Co.	....	....	14.00	....
Shenango Valley Traction Co.	0.19	....	....	....
Tarentum, Brackenridge & Butler Street Ry.	....	....	0.33	....
West Penn Rys.	....	0.32	1.91	3.97
Wilkes-Barre Ry.	0.50	....	0.56	0.50
Williamsport Rys.	....	....	0.59	....
York Rys.	....	....	0.98	1.10
Rhode Island				
United Electric Rys.	0.70	....	7.42	....
South Carolina				
South Carolina Power Co.	....	....	2.34	....
Tennessee				
Knoxville Power & Light Co.	....	....	2.38	....
Memphis St. Ry.	2.72	....	4.70	....
Nashville Ry. & Light Co.	....	....	3.70	....
Tennessee Electric Power Co.	....	....	0.50	....
Texas				
Dallas Railway & Terminal Co.	0.19	....	5.86	....
Eastern Texas Electric Co.	....	....	6.73	....
Galveston Electric Co.	....	....	2.47	....
Houston Electric Co.	0.20	....	0.87	....
Houston North Shore Ry.	....	1.38	....	....
Laredo Electric & Ry. Co.	0.43	....	0.43	....
Northern Texas Traction Co.	0.70	....	5.49	0.04
San Antonio Public Service Co.	....	....	1.22	....
Texas Electric Ry.	....	3.50	....	....
Utah				
Utah Light & Traction Co.	1.66	....	6.95	....
Virginia				
Danville Traction & Power Co.	....	....	0.84	....
Roanoke Railway & Electric Co.	....	....	2.40	....
Virginia Electric & Power Co.	6.88	....	9.17	....
Virginia Public Service Co.	....	....	0.23	....
Virginia Ry., Norfolk	....	1.44	....	....
Washington				
Gray's Harbor Ry.	....	....	0.08	....
Seattle Municipal Street Ry.	1.35	....	3.42	....
Spokane United Rys.	0.41	....	2.21	....
Tacoma Ry. & Power Co.	....	....	0.91	....
Yakima Valley Transportation Co.	....	....	1.01	....
West Virginia				
Charleston Interurban R.R.	....	0.57	0.76	....
Monongahela, West Penn Public Service Co.	0.04	....	1.62	....
Wheeling Public Service Co.	....	....	0.33	....
Wheeling Traction System	....	....	....	8.50
Wisconsin				
Madison Rys.	....	....	0.75	....
Milwaukee Electric Ry. & Light Co.	5.54	15.68	10.47	4.67
Northern States Power Co.	....	....	1.86	....
Wisconsin Power & Light Co.	....	....	....	2.00
Wisconsin Valley Electric Co.	....	....	0.19	....
Canada				
Brandon, Municipal & Electric Street Ry.	....	....	5.00	....
British Columbia Electric Ry.	....	0.62	2.35	....
Calgary Municipal Ry.	0.57	....	0.28	....
Cape Breton Electric Co.	....	....	2.00	....
Edmonton Street Ry.	....	....	1.04	....
Fort William Electric Ry.	0.08	....	....	....
Hydro Electric Rys. Toronto	3.41	....	1.57	....
Levis Tramways Co.	....	....	....	1.00
London & Port Stanley Ry.	....	2.00	....	....
Montreal & Southern Counties Ry.	....	0.11	0.09	....
Montreal Tramways Co.	8.82	....	12.92	2.03
Moose Jaw Electric Ry.	....	....	1.37	....
New Brunswock Power Co.	....	....	0.60	....
Niagara, St. Catherine & Toronto Ry.	....	0.13	....	0.32
Oshawa Ry.	....	....	0.28	....
Ottawa Electric Ry.	....	....	1.57	....
Quebec Ry., Light & Power Co.	....	....	1.44	....
Regina Municipal Ry.	0.15	....	....	....
Saskatoon Municipal Ry.	1.00	....	....	....
Three Rivers Traction Co.	....	....	0.66	....
Toronto Transportation Commission	14.59	0.08	3.91	....
Winnipeg Electric Co.	1.21	....	1.60	....
Porto Rico				
Porto Rico Ry., Light & Power Co.	....	....	....	1.00
Hawaii				
Honolulu Rapid Transit Co.	....	....	0.95	....

proximately 700 miles of city track was rebuilt. About 220 miles of interurban track was reconstructed, which is approximately the same as reported for the two preceding years. Fifty-three companies rebuilt interurban track last year as compared with 67 in 1927 and 63 in 1926.

In track rebuilt during the year, the largest construction by any single company was that by the Chicago Surface Lines, as this company rebuilt 34.88 miles of track during the year. It was closely followed, however, by the Pittsburgh Railways which reconstructed 34.48 miles during the year. The Cincinnati Street Railway was third with 20.77 miles of track rebuilt, and closely following this was the Kansas City Public Service Company with 20.02 miles of track rebuilt and the Philadelphia Rapid Transit Company with 19.93 miles of track rebuilt. Other comparatively large track rebuilding programs were conducted by the Brooklyn-Manhattan Transit Company, the Phoenix Street Railway, the Twin-City Rapid Transit Company and the Detroit Department of Street Railways, all of which constructed over 15 miles of track. Among interurban track rebuilt the Pacific Electric was considerably in advance of all other railways in that it rebuilt 33.87 miles of track in 1928.

Electrification of steam railroads continued steadily during the past year. The mileage of new electrification projects exceeded by a substantial margin the figures for any other recent year. This subject is discussed in another article appearing elsewhere in this issue.

Entire abandonments were numerous during 1928. Twenty-seven companies completely abandoned 585.72 miles of track. The large increase in entire abandonments is apparently due to a general housecleaning of railways, which have for the last several years been on the verge of abandoning their systems. A glance at the

Entire Electric Railway Properties Abandoned in 1928

Name of Company	Miles of Track
Bangor & Portland Transit Co., E. Bangor, Pa.	8.75
Boise Valley Traction Company, Boise, Idaho	83.20
* Citizens Traction Company, Oil City, Pa.	28.68
* City Electric Company, Albuquerque, N. M.	7.25
Duquesne & Dravosburg Street Railway, Duquesne, Pa.	4.00
Fairchance & Smithfield Traction Co., Uniontown, Pa.	2.75
* Grand Rapids, Gr. Haven & Muskegon Ry., Grand Rapids, Mich.	44.37
* Groton & Stonington Traction Co., Norwich, Conn.	21.77
* Hudson Valley Railway, Glens Falls, N. Y.	114.00
Las Vegas Transit Co., E. Las Vegas, N. M.	3.70
Lebanon-Thorntown Traction Co., Lebanon, Ind.	10.00
* Lewisburg, Milton & Watsontown Pass. Ry., Milton, Pa.	20.00
Lincoln Water & Light Company, Lincoln, Ill.	5.10
Lookout Mountain Railway, Chattanooga, Tenn.	10.80
Memphis & Lake View Ry., Memphis, Tenn.	11.13
* Menominee & Marinette Light & Traction Co., Menominee, Mich.	19.12
Murphysboro & Southern Ill. Ry., Murphysboro, Ill.	8.64
* New York & Stamford Ry., Port Chester, N. Y.	35.49
Northwestern Elec. Service Co. of Pa., Erie, Pa.	56.05
Norton, Taunton & Attleboro St. Ry., Norton, Mass.	21.20
* Plymouth & Brockton Street Railway, Plymouth, Mass.	9.30
* Point Shirley Street Railway, Winthrop, Mass.	1.20
St. Paul Southern Electric Ry., St. Paul, Minn.	17.54
Sandusky, Milan & Norwalk Electric Railway, Sandusky, Ohio	12.50
Somerset Traction Co., Skowhegan, Maine	12.68
* Stroudsburg Traction Co., Stroudsburg, Pa.	12.50
Westmoreland Railroad, Houston, Tex.	4.00
	585.72

* Now operating buses.

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Table II—Partial Track Abandonments in 1928

	Miles of Track Abandoned	Type of Service
Alabama		
Birmingham Electric Co	1.47	Interurban
Arizona		
Warren Co	3.25	City
	3.25	Interurban
Arkansas		
Fort Smith Light & Traction Co	10.00	City
California		
Key System Transit Co	6.43	City
Market St. Ry	0.61	City
Pacific Electric Ry	11.92	City
	0.09	Interurban
San Diego Electric Ry	0.92	City
Canada		
Montreal Tramways	2.70	City
Moose Jaw Electric Rys	0.38	City
Toronto Transportation Commission	9.03	City
	0.87	Interurb
Colorado		
Denver Tramway	0.54	City
Connecticut		
Connecticut Co	2.85	City
	10.10	Interurban
New Haven & Shore Line Ry	18.00	Interurban
New York and Stamford Ry	33.83	Interurban
Delaware		
Delaware Electric Power Co	0.33	City
	6.11	Interurban
Florida		
Gulf Power Co	0.25	City
Georgia		
Georgia Power Co. (Atlanta)	0.91	City
Illinois		
East St. Louis & Suburban Ry	21.57	Interurban
Illinois Power Co	1.12	City
Kewanee Public Service Co	1.10	City
St. Louis & Alton Ry	0.06	Interurban
Indiana		
Evansville & Ohio Valley Ry	32.00	City
Iowa		
Cedar Rapids & Iowa City Ry	1.00	City
	17.00	Interurban
Interstate Power Co	2.70	City
Iowa Ry. & Light Co	7.00	City
Iowa Southern Utilities Co. (Burlington)	4.00	City
Keokuk Electric Co	5.40	City
	6.90	Interurban
Waterloo, Cedar Falls & Northern Ry	0.63	Interurban
Kansas		
Joplin & Pittsburg Ry	2.25	City
	6.22	Interurban
Kentucky		
Kentucky Utilities Co	1.00	City
Louisville & Interurban R.R	0.78	Interurban
Louisville Ry	1.08	City
Louisiana		
New Orleans Public Service Inc	0.72	City
Maryland		
Potomac Edison Co	3.30	City
	10.50	Interurban
United Rys. & Electric Co	0.51	City
Massachusetts		
Boston Elevated Ry	4.50	City
Eastern Massachusetts Ry	2.74	Interurban
Mass. Northeastern Ry	6.59	Interurban
Middlesex & Boston Street Ry	7.01	Interurban
Milford, Framingham, Hopedale & Uxbridge Street Railway	28.00	Interurban
Springfield Street Ry	1.55	City
	13.19	Interurban
Worcester Consolidated Street Ry	4.40	Interurban
Maine		
Androscoggin & Kennebec Ry	0.74	City
	13.81	Interurban
Central Maine Power Co	0.50	City
Michigan		
City of Detroit (Dept. of Street Rys.)	1.97	City
Minnesota		
Twin City Rapid Transit	0.30	City
Missouri		
St. Joseph Ry., Lt., Ht. & Pr. Co	1.33	City
St. Louis Public Service Co	2.93	City
Montana		
Butte, Anaconda & Pacific Ry	0.60	City
Nebraska		
Omaha, Lincoln & Beatrice Ry	7.12	City
New Jersey		
Coast Cities Ry	8.00	City
New York		
Binghamton Ry	0.41	City
Brooklyn-Manhattan Transit Corp	2.36	City
Empire State R.R	5.70	City
Fonda, Johnstown & Gloversville R.R	2.08	City
Interborough Rapid Transit	0.10	City
International Ry	0.29	City
New York & Queens County Ry	1.16	City
New York Rys	0.22	City
New York State Rys. (Syracuse)	0.22	City
Niagara Junction Ry	0.27	City
Poughkeepsie & Wappingers Falls Ry	3.98	City
	7.60	Interurban
Syracuse & Eastern R.R	0.09	City
United Traction Co	0.15	City
Ohio		
Cincinnati, Newport & Covington Ry	0.20	City
Cleveland Ry	4.20	City
	1.77	Interurban
Cleveland Southwestern Ry. & Light Co	6.10	City
Community Traction Co	7.20	City
East End Traction Co	0.19	Interurban
Indiana, Columbus & Eastern Traction Co	8.00	Interurban
Northern Ohio Power & Light Co	2.44	Interurban
Shenango Valley Traction Co	0.01	City
West End Traction Co	0.01	City
Oklahoma		
Northeast Oklahoma R.R	0.31	Interurban
Oklahoma Union Ry	10.00	Interburan
Oregon		
Oregon Electric Ry	2.31	Interurban
Pennsylvania		
Conestoga Traction Company	0.31	Interurban
East Penn Traction Co	1.70	Interurban
Erie Rys	3.39	City
Lehigh Valley Transit Co	0.81	City
Monongahela, West Penn Public Service Co	3.00	City
Philadelphia Rapid Transit Co	7.76	City
Pittsburgh Rys	1.28	City
Scranton Ry. Co	0.06	City
West Penn Rys	1.71	City
	2.03	Interurban
Rhode Island		
United Electric Rys	2.13	City
	32.98	Interurban
Tennessee		
Chattanooga Traction Co	4.50	Interurban
Memphis St. Ry	0.05	City
Tennessee Electric Power Co	2.25	City
Texas		
Eastern Texas Electric Co	0.66	City
Houston Electric Co	3.27	City
Northern Texas Traction Co	1.00	City
San Antonio Public Service Co	5.96	City
Wichita Falls Traction Co	0.34	City
Utah		
Utah Light & Traction Co	14.05	City
Virginia		
Virginia Electric & Power Co	6.49	City
Washington		
Seattle Municipal Street Ry	1.12	City
West Virginia		
Wheeling Traction System	0.24	Interurban
Wisconsin		
Milwaukee Electric Ry. & Electric Co	0.66	City
	0.26	Interurban
Wisconsin, Michigan Power Co	15.92	Interurban
Wisconsin Power & Light Co	5.25	City
Wisconsin Public Service Corp	23.83	City
	24.71	Interurban

accompanying table of abandonments will show that a number of these companies were operating through sparsely settled and non-profitable territories. It will be noted that ten of the companies are substituting buses for their former rail service. Partial abandonments for the year totaled 591.07 miles as compared with 432.19 miles of partial abandonments in 1927. The interurban abandonments were approximately 330 miles and the city abandonments about 260 miles. This makes a total of about 1,175 miles abandoned during the year 1928. However, bus route extensions made by electric railways during the year were more than 5,000 miles, making the combined bus and track mileage show a substantial increase for the year.

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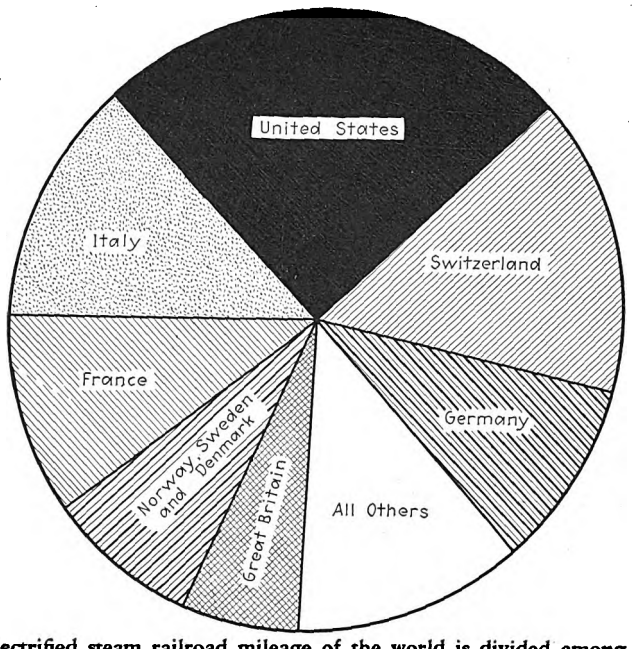
Notable Progress in

Heavy Electric Traction

United States now has more than 20 per cent of electrified steam railroad mileage of the world. Electrification of more than 1,500 additional miles of track planned by Pennsylvania, Reading and Lackawanna Railroads



Electrified steam railroad mileage of the world is divided among the various countries in the following order: First, United States; second, Switzerland; third, Italy; fourth, France; fifth, Germany; sixth, Norway and Sweden; seventh, Great Britain

RECENT announcement of three large electrification projects involving more than 1,500 miles of track, as well as the actual completion of several similar though smaller projects during the past twelve months, made 1928 a banner year in heavy electric traction progress. Even now the United States, with well over 4,000 miles, leads the world in the extent of this development. Switzerland comes second with approximately 3,280 miles, Italy third with 2,238 miles and France fourth with 2,058 miles. Other countries having extensive electrified systems are Germany 1,500 miles, Norway and Sweden 1,284 miles, and Great Britain 1,019 miles. The total electrified trackage of the world is approximately 19,000 miles, of which about 20 per cent is in this country. Several large projects are contemplated abroad. However, these are hardly comparable in scope with the plans being developed here, and the future undoubtedly will see the United States having an even larger percentage of the world's electrified steam trackage than at present.

The three companies which announced programs for the extensive electrical equipments of important sections of their tracks during 1928 were the Pennsylvania Railroad, Reading Railroad and Delaware, Lackawanna & Western Railroad. Early this year it developed that the New York Central Railroad had recently been conducting power surveys in its territory to determine possible future power needs, but after this fact was published the company declared it had not reached any conclusion yet as to further electrification of its lines between Croton and Buffalo.

Of the three proposed electrifications mentioned, that of the Pennsylvania Railroad is first in importance, when measured by miles of track and investment involved. As outlined by the statement of President Atterbury on Nov. 1, the company is planning to equip for electrical service 325 miles of route and 1,300 miles of track. The authorization by the board of directors includes the lines between New York and North Philadelphia, where the new electric line will connect with an electrical division of the system from Philadelphia to Wilmington, nearly completed, and the main line to the west, which is electrified westward as far as Paoli. The proposed electrification also includes the grades between the Susquehanna, Schuylkill and Delaware River valleys. According to the present plans, the first section to be electrically equipped is the one between North Philadelphia and Trenton. The next section will be between Newark and New Brunswick, and the final section between New Brunswick and Trenton. The section between Newark and New York has been operated electrically since 1910.

No less important than the plan itself is the announcement of the electrical system to be used. The single-phase system at 11,000 volts, similar to that now used on the Philadelphia suburban service, will be employed. The estimated cost to complete the program is $100,000,000, and the time from six to seven years. While nothing has been said in regard to the plans of the company after this installation has been completed, it is obvious that after the electrification of the New York-Washington line as far as Wilmington, its extension to Baltimore and Washington would be an early logical step, especially in view of the uncomfortable conditions for passengers in the tunnels used to pass through Baltimore.

It is also obvious that with the equipment of the main line westward from Paoli, 20 miles west of Philadelphia, to Harrisburg, which is the next logical step, economy of operation would necessitate before long the extension of the electrical division as far as Pittsburgh, since this section includes the Horseshoe curve near Altoona, the limiting point of the line so far as capacity is concerned. Hence the present plans of the Pennsylvania Railroad as

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Table I—Installations of Electrical Operation of Steam Railroads in the United States

United States	Electric Mileage		System of Electrification Installed	Number of	
	Route	Track		Locomotives	Motor Cars
Baltimore & Ohio Railroad: Baltimore Tunnel	3.60	7.96	675 volts d.c., third rail	8	.....
Staten Island Rapid Transit Lines	28.00	50.00	600 volts d.c., third rail	.....	90
Boston & Maine Railroad: Hoosac Tunnel, Mass	7.92	21.38	11,000 volts a.c., 1 phase, overhead	7	.....
Boston, Revere Beach & Lynn: East Boston and Lynn, Mass.	13.12	34.48	600 volts d.c., overhead	.....	60
Butte, Anaconda & Pacific Railway: Butte, Anaconda, Rocker, Mont.	37.38	122.75	2,400 volts d.c., overhead	28	.....
Chicago, Milwaukee, St. Paul & Pacific: Harlowton-Avery, Othello-Tacoma and Seattle	658.77	878.47	3,000 volts d.c., overhead		
Great Falls Yard	0.00	6.20	1,500 volts d.c., overhead	57	.....
Gallatin Valley Branch	18.80	25.38	600 volts d.c., overhead		
Detroit, Toledo & Ironton R.R.: Fordson, Flat Rock, Mich.	16.58	50.05	22,000 volts a.c., 1 phase, 25 cycle over'd.	2	.....
Erie Railroad: Rochester, Mt. Morris, N. Y.	33.76	36.23	11,000 volts a.c., 1 phase, 23 cycle, over'd	.....	8
Ft. Dodge, Des Moines & Southern: Ft. Dodge, Des Moines, Rockwell, Iowa	147.12	193.95	1,200 volts d.c., overhead	12	13
Great Northern Railway: Cascade Tunnel—Skykomish, Wash.	25.50	31.70	11,000 volts a.c., 1 phase, 25 cycle, over'd	4	.....
Illinois Central R.R.: Chicago, Richton, Ill.	37.80	127.10	1,500 volts d.c., overhead	.....	130
Long Island R.R.: New York to Brooklyn, to western part of Long Island	138.08	424.40	650 volts d.c., third rail	15	742
Michigan Central R.R.; Detroit, Michigan-Windsor, Ontario	4.60	28.55	650 volts d.c., third rail	12	.....
New York Central R.R.: Grand Central Station, Croton, White Plains, N. Y.	63.10	326.24	650 volts d.c., third rail	92	325
N. Y. N. H. & H. R.R.: Nantasket Jc. to Pemberton, Mass.	6.87	16.61	650 volts d.c., third rail & overhead	.....	8
Providence, Warren, Bristol, Fall River	23.91	48.50	650 volts d.c., overhead	.....	24
New York to Woodlawn (a)	.....	.....	650 volts d.c., third rail	b	b
Woodlawn N. Y. to New Haven, Conn. including Harlem River Branch	75.22	509.88	11,000 volts a.c., 1 phase, 25 cycle, over'd	141	63
Stamford to New Canaan, Conn	7.92	9.78	11,000 volts a.c., 1 phase, 25 cycle, over'd	b	b
South Norwalk to Danbury, Conn	23.72	31.01	11,000 volts a.c., 1 phase, 25 cycle, over'd	b	b
Port Morris to Fresh Pond & Sunnyside Yards, New York	9.00	23.80	11,000 volts a.c., 1 phase, 25 cycle, over'd	b	b
N. Y. Westchester & Boston Ry.: Bronx, Harrison, White Plains, New York	26.62	83.10	11,000 volts a.c., 1 phase, 25 cycle, over'd	1	70
Norfolk Southern R.R.: Nerfolk, Virginia Beach	44.5	54.3	575 volts, d.c. overhead	2	19
Norfolk & Western Ry.: Bluefield, Iager, W. Va. and Branches	63.70	209.54	11,000 volts a.c., 1 phase, 25 cycle, over'd	16	.....
Northwestern Pacific R.R.: Corte Madera, Sa salito, Cal	20.60	40.4	600 volts, d.c., third rail	.....	44
Pennsylvania R.R.: Camden-Atlantic City, N. J.	75.00	150.38	650 volts d.c., third rail	.....	107
New York, N. Y., Manhattan Transfer, N. J.	13.41	110.08	675 volts d.c., third rail	50	.....
Philadelphia, Paoli, Chestnut Hill, Pa.	36.16	124.65	11,000 volts a.c., 1 phase, 25 cycle, over'd	4	158
Southern Pacific R.R.: Oakland, Alameda, Berkeley, Cal.	50.03	118.28	1,200 volts, d.c. overhead	.....	87
Virginian Railway: Mullens, W. Va.-Roanoke, Va.	134.00	231.00	11,000 volts a.c., 1 phase, 25 cycle, over'd	14	.....
	1,844.79	4,126.15		507	1911

(a) Operates on track of New York Central.
(b) Included in Woodlawn to New Haven.

regards electrification would seem to be the precursor of still more orders for electrical equipment before very long.

Shortly after the announcement of the proposal for the electrical equipment of the lines of the Pennsylvania Railroad, the Reading Railroad declared that it was preparing to expend about $20,000,000 for electrical equipment on all of its lines in the Philadelphia metropolitan district. The route distance to be converted is 42.9 miles, which will include 110 miles of track. As with the Pennsylvania system, single-phase at 11,000 volts with overhead construction will be used. The coaches are to be of the multiple-unit type, and the program is to be completed within three years.

The program of the Delaware, Lackawanna & Western Railroad is small only in comparison with that of the Pennsylvania Railroad. This decision was announced by the president of the company on April 25. It declared that electrical equipment would be used on the Morris & Essex branch and adjoining lines, comprising a total of 78 miles of road, or 173 miles of track. The principal feature in which this undertaking differs from that of the other two plans is that high-voltage direct current will be used. The cost is put at about $18,000,000.

Earlier in 1928 orders for the electrical equipment of the new Cleveland Union Terminal were announced. This installation will involve 16 route miles and will require twenty-five 204-ton passenger locomotives. Direct current at 3,000 volts from an overhead trolley will be used.

Existing Roads Have Extended

The past year has not been one of proposals only. Most of the existing properties have extended their electrified track and increased their electrical equipment. Thus, the Pennsylvania Railroad, during the year, has completed 142 additional miles of electrified track, consisting largely of its line from Wilmington to Philadelphia. The Chicago, Milwaukee, St. Paul & Pacific Railway has opened a 10-mile extension to Seattle, which makes it the longest electrified railroad in the world. The total length of its electrified division is 655 miles. The Great Northern Railway has substituted single-phase for three-phase locomotives for operation in its original Cascade Tunnel and has expanded its electrified section, which now includes 74 miles of main line. The new tunnel which it has constructed through the Cascade range is electrically equipped and is scheduled to go into service today. The Boston, Revere Beach & Lynn Railroad, 34.48 (single track) miles in length, and operating a suburban service between Lynn and Boston, was changed from steam to electrical operation in 1928.

Reports from roads put in operation within the last few years are most encouraging. One of the most instructive, as showing the advantages of electrical operation, is that of the Illinois Central Railroad, relating to its suburban lines extending south from Chicago. Service was begun on this electrification on Aug. 1, 1926, and in a statement given out during the latter part of 1927, President Downs declared that under electrification the Chicago suburban passenger service, which for many years had been operated at a loss, has at last been made to pay its own way. In addition, a byproduct of elec-

Note—The accompanying tables are based on data compiled by the committee on electrification of steam railroads of the National Electric Light Association and the committee on electric rolling stock of the American Railway Association, with data from original sources.

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Table II—Installations of Electrical Operation of Steam Railroads Outside the United States

Outside of United States	Electric Route	Mileage Track	System of Electrification Installed	D.C. Locomotives		A.C. Locomotives	
				Number	Aggregate Weight in 1,000 Lb.	Number	Aggregate Weight in 1,000 lb.
Argentina (*a*)	60.55	132.07	800 volts d.c.	2	295	.....	.....
Australia (*a*)	*233.00*d*	548.10	1,500 volts d.c.	3	325	.....	.....
Austria	355.33	*425.00*d*	Mostly 15,000 volts a.c. Suburban lines use 750 volts and 550 volts d.c.	.....	.....	154	25,255
Brasil	128.90	*162.00*d*	3,000 volts and 1,500 volts d.c.	43	8,421	.....	.....
Canada (*b*)	54.70	137.00	3,300 volts single phase, 2,400 volts d.c., and 600 volts d.c.	20	3,356	.....	.....
Chile	263.04	*388.00*d*	Mostly 3,000 volts d.c. Some lower d.c. voltage	56	10,586	.....	.....
China (*c*)	25.00	43.00	1,200 volts d.c.	.....	.....	.....	.....
Cuba (*b*)	163.00	237.50	1,200 volts and 600 volts d.c.	.....	.....	.....	.....
Czechoslovakia (*b*)	30.50	*45.00*d*	1,500 volts and 700 volts d.c.	17	2,459	.....	.....
Dutch East Indies (*b*)	31.00	75.00	1,500 volts d.c.	7	1,089	.....	.....
France (*b*)	769.10	*2,058.00*d*	Mostly 1,500 volts d.c. Suburban line uses 650 volts d.c.	369	63,492	.....	.....
Germany (*b*)	793.00	*1,500.00*d*	Mostly 15,000 volts single phase, one line 10,000 volts single phase. Berlin and Hamburg suburban lines 800 volts d.c.	.....	.....	409	90,346
Great Britain (*a*)	395.37	1,019.12	Mostly 1,500 volts, 1,200 volts and 600 volts d.c. Two installations of 6,600 volts, single phase	20	2,510	.....	.....
Holland (*a*)	84.52	169.04	1,500 volts d.c.	.....	.....	.....	.....
India (*a*)	67.80	170.60	1,500 volts d.c.	43	11,483	.....	.....
Italy (*b*)	*1,483.00*d*	*2,238.00*d*	10,000 volts, 3,700 volts, 3,300 volts, 3,000 volts, three phase, 4,000 volts, 3,000 volts, 1,200 volts, 650 volts d.c.	27	4,889	524	82,194
Japan (*b*)	198.20	*328.00*d*	1,500 volts, 1,200 volts, 650 volts, 600 volts d.c.	60	8,742	.....	.....
Mexico	79.54	91.11	3,000 volts d.c. and 600 volts d.c.	10	3,080	.....	.....
Morocco (*b*)	86.50	*170.00*d*	3,000 volts d.c.	10	1,606	.....	.....
New Zealand	8.40	13.40	1,500 volts d.c.	5	550	.....	.....
Norway-Sweden	855.95	*1,284.00*d*	Mostly 15,000 or 16,000 volts single phase, three lines 10,000 single phase, one line 6,000 volts single phase	34	6,590	163	30,223
Spain	38.53	49.72	3,000 volts d.c.	.....	.....	.....	.....
Switzerland (*b*)	*2,000.00*d*	*3,280.00*d*	Mostly 15,000 volts single phase, some lower a.c. and d.c.	.....	.....	388	81,210
Union of South Africa	171.00	287.00	3,000 volts d.c.	95	14,265	.....	.....
Venezuela	22.70	30.00	1,500 volts d.c.	.....	.....	.....	.....
Total	8,398.63	*14,880.66		821	143,738	1,638	309,228

a—Principally motor car operation. *b*—Also considerable motor car operation. *c*—Colliery line. *—Partly estimated.

trification—air rights—may eventually provide a substantial income. Continuing, he said:

"Our suburban patronage is one-third greater than immediately prior to electrification in 1926. This gain has not come so much from other systems of transportation as from the development of the territory served. Large hotels and great apartment buildings have sprung up along the route. Reduction of the smoke and noise of steam operation has made this possible and has helped to enhance residential values. Moreover, the running time of the trains has been reduced by from 11 to 28 per cent, thus bringing the outlying districts closer to the central business district."

Railway Electrification Bound to Expand

There seems to be every reason to expect that railway electrification will expand greatly during the next few years. The primary reason for this is the need for greater carrying capacity on our main trunk lines, and the adoption of electric power is the most economical way of securing this increased capacity.

Electrification has sometimes been thought of as primarily adapted to passenger traffic, perhaps because of its extensive use for commuter service out of New York, Philadelphia and Chicago. For such purpose its smokelessness and rapid rate of acceleration, and hence the high speed possible, make it most attractive. However, it is probable that the limit for speed with main-line steam trains also has not been reached. But it is in the ability with electric power to put more freight over a given track in a given time and thus increase the carrying capacity of an overloaded trunk line that constitutes its greatest advantage to many railroads. Undoubtedly this was one of the principal reasons leading to the decision of the Pennsylvania Railroad, because the official statement declares that with electric power "it is expected eventually to reduce the number of freight trains 50 per cent for a given car movement and to increase the speed to any reasonable degree required. This of itself provides for a 100 per cent increase in capacity in so far as freight movement is concerned."

Of the total miles of line of steam railroad companies in the United States, about 250,000, 10 per cent of this mileage handles 50 per cent of all the traffic, and 50 per cent of the mileage handles 90 per cent of all the traffic. While this statement shows that some lines are lightly loaded, others are very heavily loaded, and on these latter lines the traffic is growing constantly. In spite of the competition of the motor truck, the public is constantly increasing its demands upon the railroads for transportation. Between 1896 and 1906 the ton-miles of the steam railroads doubled from about 1,000,000,000 to 2,000,000,000 and by 1920 they had doubled again to more than 4,000,000,,000. It is not too much to expect that they will shortly double again, and that in the somewhat more distant future they will double again.

Such a situation means that far-seeing railroad managers must think now about ways of providing for the increased carrying capacity that will surely be needed before long on the trunk lines. Some of this increased capacity has been secured in recent years with steam equipment through higher train speeds and greater train lengths, but the limits in these directions with steam seem about to have been attained.

Electrification Gives Large Increase In Track Capacity

An attempt to increase the track capacity by adding to the number of tracks would be almost prohibitive, because of the high cost of real estate and other space limitations in the well-developed areas of the country where most of the increased capacity is needed. Further extension of electrification seems, therefore, almost a foregone conclusion, and the present favorable financial condition of the railroads resulting from a better knowledge by the public of the essential nature of the duties

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which they perform should make it more easy for the companies to raise capital for this necessary improvement than it has been in the past.

In certain countries abroad there has been special stimulus for electrical operation which has not been present in this country. Thus in Europe, Italy, Switzerland and Austria are practically devoid of coal yet have plenty of water power. Much the same condition prevails on the northern coast of Africa, particularly in Morocco. This sets a premium on the application of electric power, especially when much of the equipment can be supplied by home manufacture. An additional advantage is that electrification helps the balance of trade by cutting down the imports of coal and supplies work for home electrical industries rather than for foreign coal mines.

Steam Railroad Electrifications During 1928

	Single-Track Miles
Pennsylvania Railroad	142.00
Great Northern Railroad	74.00
Boston, Revere Beach & Lynn Railroad	34.48
Chicago, Milwaukee, St. Paul & Pacific Railroad	10.00
Long Island Railroad	9.00
New York, New Haven & Hartford Railroad	6.66
	267.14

The accompanying Table I shows the electrically operated steam railroad lines in the United States, based on one issued in September, 1928, by the committee on electrification of steam railroads of the National Electric Light Association, with material added from original sources brought up to date. The table is confined to railways formerly operated by steam, except where lines built originally for electric power are integral parts of electrified railroads, as with the New York, Westchester & Boston Railway. Steam railroads, now operated by electricity which are primarily rapid transit lines or are used partly for city transportation, such as the Manhattan Elevated Railway of New York and the electrified division of the West Shore Railroad between Syracuse and Utica, have been omitted.

Table II gives data on electrified steam railroads in foreign countries. The mileage given is based on statistics in the report of the National Electric Light Association, already mentioned, and the figures on locomotives from a recent report of the committee on electric rolling stock of the American Railway Association (Mechanical Division). Where the complete mileage is not given in the N.E.L.A. report it has been obtained from outside sources or has been estimated. The class of roads included in general is the same as that in the American table, except that electrified roads which do both a suburban and a rapid transit business and also serve to carry through trains to their terminii, like Stadt and Vorortbahnen in Berlin and Hamburg, have been included. There are no roads of this kind in the United States.

The difficulties of getting statistics up to a certain date in any industry growing so rapidly as that of railroad electrification are great enough when confined to one country. These difficulties are greatly enhanced when data must be obtained for the entire world. However, Table II gives approximately the data, so far as they are available, up to about the middle of 1928.

As will be noticed, the data on rolling stock in Table II are confined to the number of locomotives and their aggregate tonnage. Only an indication is given as to whether the electrification is principally with locomotives or includes a considerable amount of motor-car operation.

Subway Mileage Increasing

MORE than 284 miles of subway route with 672 miles of track are now in operation in fifteen large cities of the world. Of these New York leads with 261 miles of underground rapid transit track, Paris is second with 117, and London third with 115. No other city is in the same class, the nearest being Berlin with only 43 miles of subway.

Statistics of the underground mileage of electric transit lines in the world, as recently compiled by the Board of Transportation, New York, are given in an accompanying table. This table lists the underground sections of purely rapid transit railways, when within the confines of a city. Where a rapid transit subway is used both by special rapid transit cars or trains and by trolley cars it has been included. An example is the western part of the Market Street subway in Philadelphia. Where a subway is used only by surface cars, like the Tremont Street subway in Boston, or by trunk line trains, though they may do some local business, it has been omitted.

Lines not included but rather closely allied thereto, are:

Hudson & Manhattan Railroad connecting Jersey City, Hoboken, and New York: underground mileage in New York City, 3.147 of route; 7.091 of track; in Jersey City and Hoboken 5.332 of route; 11.017 of track. Tremont Street subway, Boston: 1.698 miles of route; approximately 3.4 miles of track.

Other lines which are a little further differentiated from the type included are as follows: Naples, subway from the main railroad station under the city, and then a trolley extension to Pozzuoli. This line is part of the Government railway system but has local stations in Naples and does quite a little local business; the Park Avenue tunnel of the New York Central Railroad and the East River tunnels used by the Long Island Railroad. The underground mileage of the Metropolitan and Metropolitan District subways in London, over which some suburban as well as subway trains run, is included because their rapid transit business constitutes the greater part of their entire business. Short tunnels which are incidental to trolley car operation, as in Rochester, N. Y., the Park Avenue tunnel used by the surface cars of the New York & Harlem Railroad between 34th Street and 40th Street in New York, and under the Quirinal Hill in Rome, have also been omitted.

UNDERGROUND MILEAGE OF ELECTRIC RAPID TRANSIT LINES OF THE WORLD

	Route-Miles	Tracks	Track-Miles
Barcelona	4.80	2	9.60
Berlin	21.90	2	*43.80
Boston	8.08	2	*16.16
Budapest	2.30	2	*4.60
Buenos Aires	4.50	2	9.00
Glasgow	6.56	2	13.12
Hamburg	5.96	2	*12.00
Liverpool	4.75	2	*9.50
London	56.89	2	*115.00
Madrid	9.13	2	18.26
Paris	58.85	2	*117.70
Philadelphia	8.68	2 & 4	31.74
Sydney	2.88	2	*5.76
Tokio	2.50	2	*5.00
Total for cities other than New York	197.78		411.24
New York			
Elevated Division	†.29	†2	†.58
Contract Nos. 1 and 2	19.56	2, 3, 4	57.74
Contract No. 3	24.73	2, 3, 4	79.80
Total I. R. T.	44.58		138.12
Contract No. 4 (N. Y. R. T.)	41.66	2, 3, 4	123.48
Total New York City	86.24		261.60
Grand total	284.02		672.84

*Approximate.
†Extension of Ninth Ave. Elevated between Jerome and Sedgwick Aves., Bronx.

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Substantial Growth in BUS OPERATIONS

Nearly 11,200 buses now in use by electric railways. Approximately 25 per cent were added during past year. Route extensions, including intercity lines, total more than 5,000 miles

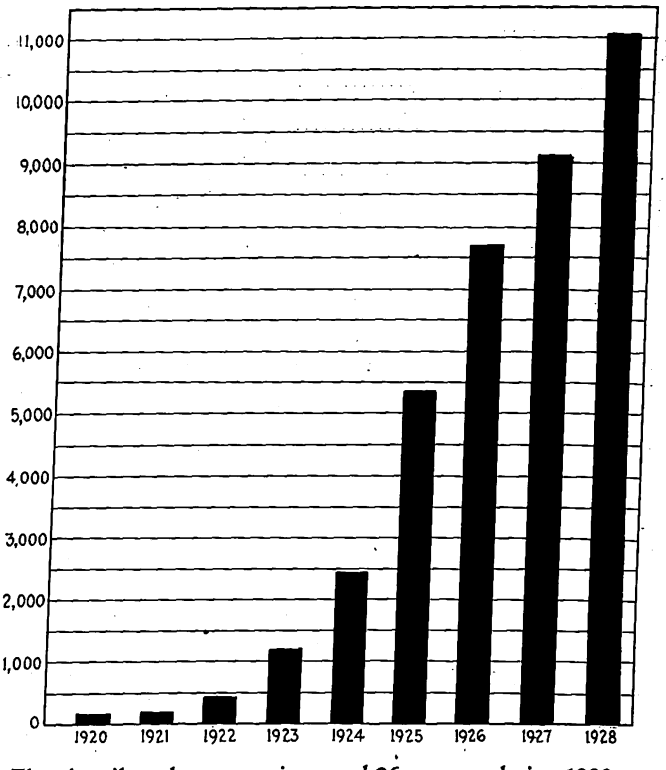
EXPERIENCE extending over a period of several years having demonstrated the value of the bus as an ally, the electric railways of this country and Canada gave evidence of their faith in motor transportation by the purchase during the year just closed of more than 2,450 buses, thereby increasing their equipment by over 25 per cent. The total number of buses now owned by electric railways is nearly 11,200, as compared with 9,229 at the beginning of 1928. Within the past three years the number of buses owned by the industry has more than doubled.

While a number of units taken over with the purchase of former independent lines are included in the additions last year approximately 2,120 of the total represents new vehicles purchased direct from the manufacturer. Companies report that approximately 500 buses were sold, scrapped or otherwise disposed of during the year. Similar surveys conducted by ELECTRIC RAILWAY JOURNAL for 1927 and 1926 showed total purchases of 1,801 and 2,203 buses respectively during those years, the figure in each instance including equipment purchased second hand.

Extensions to bus routes were made in 1928 to an aggregate of some 5,140 miles, of which 1,200 miles were city and 3,940 miles intercity operations. Included in this latter figure are 2,388 miles of intercity service added by the Southern Pacific Company, through its subsidiary, Southern Pacific Motor Transport Company. All told, the electric railways are now operating buses over approximately 23,000 miles of route.

Among the longest intercity extensions were those of the Waterloo, Cedar Falls & Northern, amounting to 157 miles; the Michigan Electric Railway, 132 miles; and the Cedar Rapids & Iowa City Railway 129 miles. Generally speaking, the city extensions were for short distances, but with some of the larger properties the aggregate was considerable. The Public Service Co-ordinated Transport extended its city service for a total of approximately 300 miles, with operations extending over many of the New Jersey cities served by that company. The Illinois Traction System added 105 miles of city service and the Northern Ohio Power & Light Company, 40.4 miles.

There was an abandonment of approximately 1,200 miles of electric railway trackage, city and interurban, during the year, on which the companies suspending service provided bus service over 346 miles of intercity and 112 miles of city route. In certain other instances the abandoned trolley service was replaced by bus service supplied by independent operators. The New York & Stamford Railway, through its subsidiary the County Transportation Company, substituted bus service for trolley service over 33.8 miles of intercity route. The United Electric Railways of Providence, R. I., abandoned some 33 miles of suburban track and substituted bus service. The East St. Louis & Suburban Railway abandoned trolley service on 21.6 miles of interurban route and supplied bus service through its subsidiary, the Blue Goose Motor Coach Company. The Cedar Rapids & Iowa City Railway abandoned trolley service between Cedar Rapids and Lisbon, a distance of 17 miles, and substituted bus service. The Groton & Stonington Railway abandoned trolley service entirely, due to the fact that the trackage and equipment had deteriorated to a point where it was deemed impracticable to replace it, and placed buses in service over 20.77 miles of line between New London, Conn., and Westerly, R. I.



Electric railway buses were increased 26 per cent during 1928

Of the 27 electric railway properties which are listed as having suspended operations entirely during the year, ten have continued as operating organizations, supplying service with buses over some or all of the routes pre-

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Table I—Bus Operation by Electric Railways and Subsidiary Companies

	No. Buses Jan. 1, 1929
Alabama	
Birmingham Electric Co.	8
Selma Electric Ry.	5
Arizona	
Tuscon Rapid Transit Co.	4
Warren Co.	6
Arkansas	
Arkansas Power & Light Co.	9
Intercity Terminal Railway	7
California	
Bakersfield & Kern Electric Ry.	5
Eureka Street Ry.	1
Key System Transit Co.	86
Los Angeles Ry.	169
Los Angeles Motor Coach Co.	
Market Street Ry.	6
Municipal Ry. of San Francisco	18
Pacific Electric Ry.	193
Los Angeles Motor Coach Co.	
Pacific Gas & Electric Co.	7
Peninsular Ry.	4
San Diego Electric Ry.	24
San Francisco Napa & Calistoga R.R.	2
Napa Valley Bus Co.	
San Francisco-Sacramento R.R.	1
San Jose Railroads	3
Santa Barbara & Suburban Ry.	7
Southern Pacific Co. (Electric Division)	106
Union Traction Co., Santa Cruz	5
Colorado	
Colorado Springs & Interurban Ry.	5
*Denver & Interurban Motor Co.	11
*Denver & South Platte Transportation Co.	2
Denver Tramway	9
Bus Transportation Co.	
Grand River Valley Ry.	2
Connecticut	
Connecticut Co.	138
*Danbury Power & Transportation Co.	16
*Groton & Stonington Traction Co.	14
*Hartford & Springfield Coach Co.	22
*Lordship Ry.	8
New Haven & Shore Line Ry.	15
Delaware	
Delaware Electric Power Co.	54
Delaware Bus Co.	
District of Columbia	
Capital Traction Co.	34
Washington Ry. & Electric Co.	90
Washington & Old Dominion Ry.	1
Florida	
Jacksonville Traction Co.	4
*Key West Electric Co.	10
Miami Beach Ry.	50
Municipal Ry. of St. Petersburg	8
Tampa Electric Co.	12
Georgia	
Augusta-Aiken Ry. & Electric Co.	1
Columbus Electric & Power Co.	22
Columbus Transportation Co.	
Georgia Power Co.	32
Atlanta Coach Co.	
Savannah Electric & Power Co.	4
Idaho	
*Boise Street Car Co.	6
Illinois	
Aurora, Elgin & Fox River Electric Co.	5
Central Illinois Public Service Co.	9
Chicago, Aurora & Elgin R.R.	10
Chicago & Joliet Electric Ry.	15
Chicago & Joliet Transportation Co.	
Chicago, North Shore & Milwaukee R.R.	64
Metropolitan Motor Coach Co.	
Chicago Surface Lines	8
Chicago & West Towns Ry.	35
East St. Louis & Suburban Ry.	5
Blue Goose Line	27
Red Line	3
East St. Louis Ry. Co.	13
Alton Ry.	5
Evanston Ry.	17
Evanston Bus Co.	
Illinois Power Co.	16
Illinois Power & Light Corp.	135
Illinois Traction System	18
*Joilet, Plainfield & Aurora Transp. Co.	5
Kewanee Public Service Co.	2
Rockford City Traction Co.	27
Rockford & Interurban Ry.	6
Tri-City Ry. of Ill.	6
Indiana	
Beech Grove Traction Corp.	1
Chicago, South Bend & Northern Indiana Ry.	26
Chicago, South Shore & South Bend R.R.	112
Evansville & Ohio Valley Ry.	10
Gary Railways	6
Indianapolis Street Ry.	71
Indianapolis & Southeastern R.R.	4
Indiana Service Corp.	23
Interstate Public Service Co.	32
Northern Indiana Power Co.	3
Southern Indiana Gas & Electric Co.	10
Southern Michigan Ry.	3
Terre Haute, Indianapolis & Eastern Trac. Co.	38
Indiana Motor Transit Co.	
Terre Haute Traction & Light Co.	16
Union Traction Co. of Indiana	51
Iowa	
Cedar Rapids & Iowa City R.R.	14
Clinton, Davenport & Muscatine Ry.	1
Des Moines & Central Iowa R.R.	3
Des Moines City Ry.	8
Des Moines Electric Light Co.	6
Fort Dodge, Des Moines & Southern R.R.	33
Ft. Dodge, Des Moines & South. Transp. Co.	
Interstate Power Co.	10
Iowa Power & Light Co.	4
Iowa Railway & Light Co.	9
Iowa Southern Utilities Co.	
Burlington	20
Centerville	3
Ottumwa	6
Mississippi Valley Electric Co.	4
Waterloo, Cedar Falls & Northern Ry.	11
Tri-City Ry.	9
Kansas	
Arkansas Valley Interurban Ry.	12
Arkansas Valley Transportation Co.	
Kansas City, Leavenworth & Western Ry.	13
Leavenworth Transportation Co.	
Kansas Electric Power Co.	9
Kansas Public Service Co.	2
*Salina Street Ry.	1
Topeka Ry.	35
United Power & Light Corp.	3
Wichita Railroad & Light Co.	50
Wichita Motor Bus Co.	
Kentucky	
Kentucky Traction & Terminal Co.	21
Kentucky Coach Co.	
Kentucky Utilities Co.	10
Louisville Ry.	40
Kentucky Carriers Inc.	
Louisiana	
*Alexandria Municipal Ry.	12
Baton Rouge Electric Co.	3
*Louisiana Elec. Co.	9
New Orleans Public Service, Inc.	37
Maine	
York Utilities Co.	6
Maryland	
Cumberland & Westernport Electric Ry.	10
Cumberland & Westernport Transit Co.	
Potomac Edison Co.	63
Blue Ridge Transportation Co.	
United Rys. & Electric Co.	111
Baltimore Coach Co.	
Washington, Baltimore & Annapolis Elec. R.R.	3
Massachusetts	
Boston Elevated Ry.	303
Boston, Revere Beach & Lynn R.R.	2
Point Shirley St. Ry. Co.	
Boston, Worcester & New York Street Ry.	24
Eastern Massachusetts Street Ry.	82
Fitchburg & Leominster Street Ry.	4
*Gardner-Templeton Street Ry.	7
Holyoke Street Ry.	3
Interstate Street Ry.	10
Middlesex & Boston Street Ry.	82
*Milford, Framingham, Hopedale & Uxbridge Street Ry.	4
Milford, Framingham & Uxbridge Coach Co.	
Northampton Street Ry.	1
*Plymouth & Brockton Street Ry.	9
Springfield Street Ry.	50
Union Street Ry.	14
Worcester Consolidated Street Ry.	62
Michigan	
City of Detroit, Department of Street Rys.	529
Eastern Michigan Railways	266
Peoples' Motor Coach Co.	
Wolverine Transit Co.	
*Grand Rapids, Grand Haven & Muskegon Ry.	6
Grand Rapids R.R.	11
Michigan Electric Ry.	44
Southern Michigan Transportation Co.	
Michigan R.R.	15
*Menominee & Marinette Light & Traction Co.	14
Muskegon Traction & Lighting Co.	2
Saginaw Transit Co.	33
Minnesota	
Duluth-Superior Traction Co.	14
Duluth Superior Coach Co.	
Twin City Rapid Transit Co.	102
Twin City Motor Bus Co.	
Mississippi	
Mississippi Power Co.	
(Gulfport Division)	19
(Hattiesburg Division)	7
*(Meridian Division)	7
Mississippi Power & Light Co.	
(Jackson Division)	1
*(Vicksburg Division)	9
Missouri	
Kansas City, Clay County & St. Joseph Ry.	12
Kansas City, Clay County & St. Joseph Auto Transit Co.	
Kansas City Public Service Co.	76
Missouri Power & Light Co.	2
Springfield Traction Co.	14
St. Joseph Ry., Lt., Ht. & Pwr. Co.	6
St. Louis Electric Terminal Ry.	6
St. Louis Public Service Co.	52
*West Missouri Power Co.	2
Montana	
Butte Electric Ry.	5
Nebraska	
Lincoln Traction Co.	19
Omaha & Council Bluffs Street Ry.	8
New Hampshire	
*Dover, Somersworth & Rochester St. Ry.	6
*Keene Electric Ry.	7
*Laconia Street Ry.	11
Laconia Transit Co.	
Nashua Street Ry.	3
Portsmouth Electric Ry.	12
New Jersey	
Atlantic City & Shore R.R. / Central Passenger Ry. Atlantic City	11
Coast Cities Ry.	29
*New Jersey Inter-Urban Co.	8
Ocean City Electric R.R.	1
Public Service Co-Ordinated Transport	1781
Trenton & Mercer County Traction Corp.	29
Central Transportation Company.	
New Mexico	
City Electric Co., Albuquerque	1
New York	
Auburn & Syracuse Electric R.R.	8
Mid-State Coach Lines.	
Binghamton Ry.	18
Binghamton Ry. Bus Lines, Inc.	
Black River Traction Co.	15
Watertown Transportation Co.	
Brooklyn City R.R.	4
Buffalo & Erie Ry.	4
Buffalo & Erie Coach Company.	
Cortland County Traction Co.	3
Cortland County Bus Lines.	
Eastern New York Utilities Corp.	3
Eastern New York Transportation Co.	
Empire State Rys.	6
Mid-State Coach Lines	
Fonda, Johnstown & Gloversville R.R.	1
Sacandaga Valley Transit Co.	
*Geneva, Seneca Falls & Auburn R.R.	3
Hamburg Railway	5
*Hudson Valley Ry.	24
Hudson Transportation Co.	
Huntington Traction Co.	4
International Ry.	90
International Bus Corp.	
Jamestown Street Ry.	21
Jamestown Motor Bus Transportation Co.	
Kingston Consolidated R.R.	6
Kingston City Transportation Co.	
*Newburgh Public Service Co.	22
*New York & Stamford Ry.	62
County Transportation Co.	
New York, Westchester & Boston Ry.	8
Soundview Transportation Co.	
New York State Rys. (Rochester)	64
Rochester Interurban Bus Co.	
Rochester Rys. Co-Ord. Bus Lines.	
East Ave. Bus Co.	
Darling Bus Line.	

*No rail operation.

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Table I—Bus Operation by Electric Railways and Subsidiary Companies—(Concluded)

	No. Buses Jan. 1, 1929
New York State Rys. (Syracuse) *Syracuse Rys. Co-Ord. Bus Line.*	17
New York State Rys. (Utica) *Utica Rys. Co-Ord. Bus Line.*	9
Niagara Gorge R.R. *Niagara Gorge Bus Line*	6
*Peekskill Lighting & R.R. Corp. *Peekskill Motor Bus Corp.*	29
*Port Jervis Transit Co.	2
Poughkeepsie & Wappingers Falls Ry.	3
Rochester & Syracuse R.R. *Mid-State Coach Lines.*	1
Syracuse & Eastern R.R. *Syracuse & Eastern Bus Lines.*	5
Southern New York Ry. *Manson Transportation Co.*	4
Third Ave. Ry. *Surface Transp. Co.*	170
United Traction Co. *Capitol District Transp. Co.*	87
*Walkill Transit Co.	8
North Carolina	
Carolina Power & Light Co.	1
Durham Public Service Co.	18
North Carolina Public Service Co. *Greensboro Bus Co.*	10
Southern Public Utilities Co.	25
Tidewater Power Co. *Coast City Transit Co.*	2
North Dakota	
Northern States Power Co. *Northern Transit Co.*	4
Ohio	
City of Ashtabula—Division of Street Rys.	3
Cincinnati, Lawrenceburg & Aurora Electric Street Ry.	7
Cincinnati Street Ry.	87
Cleveland Ry.	187
Cleveland, Southwestern Ry. & Light Co. *Southwestern Bus Co.*	14
Coumbus, Delaware & Marion Elec. Co.	2
Columbus Railway, Power & Light Co.	3
Community Traction Co.	124
Dayton Street Ry.	3
Dayton & Xenia Ry.	2
Indiana, Columbus & Eastern Traction Co. *Dayton & Columbus Transportation Co.*	24
Lake Shore Electric Ry.	10
Maumee Valley Co. *Maumee Valley Transp. Co.*	13
Nelsonville-Athens Electric Ry. *Nelsonville Transp. Co.*	1
Northern Ohio Power & Light Co.	261
Ohio Public Service Co.	5
Penn-Ohio Public Service Corp.	115
Portsmouth Public Service Co.	9
Southern Ohio Public Service Co. *Columbus & Zanesville Transp. Co.*	33
Springfield Ry.	1
Steubenville, East Liverpool & Beaver Valley Traction Co.	1
Youngstown Municipal Ry. (see Penn-Ohio System).	
Youngstown & Ohio River R.R. *Modern Transit Co.*	2
Youngstown & Suburban Ry. *Youngstown & Suburban Transportation Co.* *Columbiana Bus Co.* *Youngstown Suburban Tourist Lines.*	13
Oklahoma	
Northeast Oklahoma R.R.	2
Oklahoma Ry.	30
Oklahoma Union Ry. *Union Transportation.*	88
Okmulgee Traction Co.	3
*Shawnee Tecumseh Traction Co.	7
Tulsa Street Ry.	5
Oregon	
Portland Electric Power Co.	42
Pennsylvania	
Altoona & Logan Valley Electric Ry. *Logan Valley Bus Co.*	18
Beaver Valley Traction Co. *Beaver Valley Motor Coach Co.*	9
*Berwick & Nescopeck Street Ry.	2
*Chambersburg & Shippensburg Ry. *Cumberland Valley Transp. Co.*	6
*Citizens Traction Co. *Citizens Transit Co.*	24
Conestoga Traction Co. *Conestoga Transp. Co.*	4
East Penn Traction Co. *East Penn Transportation Co.*	8
Erie Ry. *Erie Coach Co.*	17
Johnstown & Somerset Ry.	1
Johnstown Traction Co. *Traction Bus Co.* *Cambria Bus Co.* *Beaverdale Bus Co.*	17
Lackawanna & Wyoming Valley R.R. *Laurel Line Bus Co.*	5
Lehigh Traction Co. *Hazleton Auto Bus Co.*	11
Lehigh Valley Transit Co. *Lehigh Valley Transportation Co.*	21
Lewiston & Reedsville Electric Ry. *Lewiston Transportation Co.*	9
*Lewisburg, Milton & Watsonville Pass. Ry. Co.	3
*North Branch Bus Co.	9
Northwestern Electric Service Co. *Penn Public Motor Transp. Co.*	13
Philadelphia & Westchester Traction Co. *Aaronimink Transportation Co.*	27
Philadelphia Rapid Transit. *Philadelphia Rural Transit Co.* *Penn-Jersey Rapid Transit Co.*	574
Pittsburgh Rys. *Pittsburgh Motor Coach Co.*	61
Pittsburgh, Mars & Butler Ry. Pittsburgh, Harmony, Butler & New Castle Ry. *Harmony Short Line Motor Transport Co.*	8
Reading Transit Co.	8
Schuylkill Ry.	11
Scranton, Montrose & Binghamton Ry.	2
Scranton Ry. *Scranton Bus Co.*	15
Shamokin & Edgewood Elec. Ry. *Shamokin & Treverton Bus Line.*	9
Shamokin & Mt. Carmel Transportation Co. *Ashland & Centralia Auto Bus Co.*	3
Southern Cambria Ry. *Southern Cambria Bus Co.*	7
*Stroudsburg Traction Co. *East Stroudsburg Bus Co.*	3
*United Traction Street Ry. *Dubois Transit Co.*	2
West Chester Street Ry. *Peoples Transp. Co.*	65
Westmoreland County Ry. *Chestnut Ridge Transp. Co.*	7
West Penn Rys. *Penn Bus Lines.*	26
Westside Electric Rys. *Westside Motor Transit Co.*	3
Wilkes-Barre Ry. *Wyoming Valley Autobus Co.*	32
Williamsport Railways. *Williamsport Transportation Co.*	3
Rhode Island	
*Newport & Providence Ry.	30
United Electric Rys.	88
South Carolina	
South Carolina Gas & Electric Co. *Spartanburg Bus Co.*	8
South Dakota	
Sioux Falls Traction System.	20
Tennessee	
Nashville Interurban Ry. *Interurban Bus Co.*	9
Nashville Railway & Light Co.	13
Tennessee Electric Power Co.	11
Union Traction Co.	1
Texas	
Abilene Traction Co.	3
Austin Street Ry.	2
Dallas Ry. & Terminal Co.	11
Eastern Texas Electric Co. *J. G. Holtzclaw Bus Line.*	20
El Paso Electric Co.	6
Houston Electric Co.	67
Marshall Traction Co.	3
Northern Texas Traction Co.	10
Nueces Ry.	5
*Rio Grande Valley Traction Co.	5
San Antonio Public Service Co.	74
*Southwestern Transit Co.	4
Texas Electric Ry.	6
Wichita Falls Traction Co.	8
Utah	
Bamberger Electric R.R. *Bamberger Transportation.*	2
Utah Light & Traction Co.	9
Vermont	
Burlington Traction Co.	3
*Twin State Gas & Electric Co.	3
Virginia	
Lynchburg Traction & Light Co.	2
Norfolk Southern R.R.	4
City of Radford	2
Roanoke Railway & Electric Co.	10
Virginia Electric & Power Co.	231
Virginia Public Service Co. *Citizen's Rapid Transit Corp.*	5
Washington	
Grays Harbor Ry. & Light Co. *Twin City Transit Co.*	10
Lewiston-Clarkson Transit Co.	3
Puget Sound Power & Light Co. *North Coast Trans. Co.* *Portland-Seattle Stage Co.*	107
Pacific Northwest Traction Co. (See Puget Sound Power & Light Co.)	
Puget Sound International Ry. & Power Co. (see Puget Sound Power & Light Co.)	
Seattle Municipal St. Ry.	50
Seattle & Rainier Valley Ry.	2
Tacoma Municipal Belt Line.	1
Yakima Valley Transportation Co.	3
West Virginia	
Charleston Interurban R.R. *Blue & Gray Transit Co.*	55
Monongahela-West Penn Public Service Co. *Monongahela Transport Co.*	51
Ohio Valley Electric Ry. *Ohio Valley Bus Co.*	32
Tyler Traction Co. *Wheeling & Parkersburg Bus Co.*	1
Wheeling Public Service Co. *Bus Transportation Co.*	4
Wheeling Traction System. *Ohio Valley Transit Co.*	13
Wisconsin	
Madison Rys.	9
Milwaukee Electric Ry. & Light Co. *Wisconsin Motor Bus Lines.*	161
Wisconsin Gas & Electric Co.	10
Wisconsin Michigan Power Co. *Intercity Bus Company.*	20
Wisconsin Power & Light Co.	62
Wisconsin Public Service Corp.	34
Wisconsin Valley Electric Co. *Valley Transit Co.*	8
Wyoming	
*Cheyenne Motor Bus Co.	9
Canada	
British Columbia Electric Ry. *British Columbia Transit Co.*	22
Dominion Power & Transmission Co.	40
Grand River Ry. *Canadian Pacific Transport Co.*	3
Hydro-Electric Rys.	18
Levis Tramways.	1
London Street Ry.	8
Montreal Tramways.	100
Moose Jaw Electric Ry.	3
New Brunswick Power Co.	1
Ottawa Electric Ry.	12
Pictou County Electric Co.	4
Quebec Railway Light & Power Co.	12
Sherbrooke Ry. & Power Co.	2
Toronto Transportation Commission. *Gray Coach Lines.*	166
Winnipeg Electric Ry.	48
*Woodstock, Thames Valley & Ingersoll Electric Ry.	3
Hawaii	
Honolulu Rapid Transit Co.	9
Panama	
Panama Electric Co.	2
Porto Rico	
Ponce Electric Co.	4
Total	11,189

*No rail operation.

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Table II—Buses Bought by Railways During 1928

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Arizona					
Warren Co.	6	4	Studebaker	Superior	21
		2	Twin Coach	.....	40
Arkansas					
Arkansas Power & Light Co.	4	4	White	Bender	17
California					
Bakersfield & Kern Elec. Ry. Co.	1	1	Graham	Graham	21
Key System Transit Co.	41	40	Twin Coach	Twin Coach	40
		1	A. C. F.	A. C. F.	37
Los Angeles Railway	27	9	White	Bender	29
		3	Fageol	Fageol	29
		11	Twin Coach	Twin Coach	40
		2	Fageol	Fageol	58
		2	Yellow	Yellow	63
Pacific Electric Ry.	30	13	Fageol	Fageol	58
		5	Twin Coach	Twin Coach	40
		6	Yellow	Yellow	63
		*3	Moreland	Moreland	59
		3	Fageol	Fageol	19
Pacific Gas & Elec. Co.	1	1	Yellow	Yellow	21
San Diego Electric Ry.	4	4	Twin Coach	Twin Coach	40
Southern Pacific Co.	61	17	.....	.....	29
		2	.....	.....	28
		2	.....	.....	27
		9	.....	.....	26
		1	.....	.....	25
		11	.....	.....	22
		8	.....	.....	21
		5	.....	.....	17
		2	.....	.....	16
		3	.....	.....	14
		1	.....	.....	11
Colorado					
Denver Tramway	2	2	Mack	Mack	25
Connecticut					
Connecticut Co.	14	5	Mack	Farnham-Nelson	29
		9	Yellow	.....	29
Groton & Stonington Traction Co.	10	10	Twin Coach	Twin Coach	37
Lordship Railway	2	2	Mack	Mack	29
New Haven & Shore Line Ry.	3	*3	A. C. F.	A. C. F.	29
Delaware					
Delaware Electric Power Co.	7	2	Yellow	Yellow	29
		*5	Yellow	Yellow	29
District of Columbia					
Capital Traction Co.	5	3	Yellow	Yellow	21
		2	Yellow	Yellow	29
Washington Railway & Electric Co.	23	6	Yellow	Yellow	21
		8	Yellow	Yellow	29
		5	Yellow	Yellow	21
		*3	Graham	Graham	20
		*1	Yellow	Yellow	21
Florida					
Jacksonville Traction Co.	4	4	Twin Coach	.....	40
Georgia					
Savannah Electric & Power Co.	1	1	Mack	Mack	29
Idaho					
Boise Street Car Co.	2	2	Graham	Graham	21
Illinois					
Alton Ry.	5	*2	Reo	.....	18
		*3	Yellow	.....	21
Blue Goose Motor Coach Co.	5	3	Twin Coach	.....	40
		*2	Yellow	Yellow	21
Chicago & Joliet Electric Ry.	6	5	Yellow	Yellow	29
		1	Mack	Mack	..
Chicago & West Towns Ry.	6	1	Cummings Car & Coach Co.	Cummings Car & Coach Co.	30
		5	Mack	Cummings Car & Coach Co.	29
Chicago Surface Lines	3	3	Twin Coach	Twin Coach	40
Evanston Railway	7	7	Yellow	.....	33
Illinois Power & Light Corp.	32	1	Mack	Mack	29
		5	A.C.F.	A.C.F.	30
		4	A.C.F.	A.C.F.	21
		1	A.C.F.	A.C.F.	27
		11	Yellow	Yellow	21
		6	Yellow	Yellow	29
		4	Yellow	Yellow	17
Illinois Traction System.	10	4	Studebaker	.....	21
		4	A.C.F.	.....	21
		1	A.C.F.	.....	29
		1	Yellow	.....	29
Kewanee Public Service Co.	2	2	Yellow	.....	21
Tri-City Ry. of Illinois.	6	*3	Yellow	Yellow	21
		*1	Mack	Mack	29
		2	Mack	Mack	29
Indiana					
Beech Grove Traction Corp.	1	1	International	Bender	15
Chicago, South Bend & Northern Indiana Ry.	3	3	Studebaker	Superior	21
Chicago, South Shore & South Bend R.R.	2	*2	International	.....	..
Evansville & Ohio Valley Railway	8	8	Yellow	Yellow	17–21
Gary Railways	1	*1	Yellow	Yellow	30
Indiana Service Corp.	7	*4	A.C.F.	.....	31
		*3	Yellow	Yellow	29
Indianapolis & Southeastern R.R.	4	4	Studebaker	.....	22
Interstate Public Service Co.	3	2	Fageol	Fageol	30
		1	A.C.F.	A.C.F.	30
Northern Indiana Power Co.	1	1	International	.....	14
Southern Michigan Ry.	3	3	Studebaker	Superior	21
Union Traction Co. of Indiana	11	9	White	Brown	29
		2	Mack	Mack	29
Iowa					
Cedar Rapids & Iowa City Ry.	9	5	Yellow	Yellow	26
		*2	Yellow	.....	21
		*2	Yellow	Fitzjohn	21
Clinton, Davenport & Muscatine Ry.	1	1	Yellow	Yellow	19
Fort Dodge, Des Moines & Southern R.R.	3	3	Yellow	Yellow	25
Interstate Power Co.	3	3	Mack	Mack	25
Iowa Ry. & Light Co. Marshalltown Div.	7	7	Yellow	Yellow	21
Iowa Southern Utilities Co. (Burlington)	4	4	Mack	Mack	25
Mississippi Valley Electric Co.	2	2	White	.....	25
Tri-City Ry. of Iowa	4	3	Mack	Mack	29
		*1	Yellow	Yellow	29
Waterloo, Cedar Falls & Northern Ry.	3	3	Yellow	Yellow	21
Kansas					
Arkansas Valley Interurban Ry.	1	1	White	White	15
Kansas Public Service Co.	3	3	Graham	Graham	21
United Power & Light Corp.	3	3	Graham	Graham	21
Kentucky					
Kentucky Traction & Terminal Co.	2	2	Yellow	Yellow	21
Louisville Ry.	21	2	Mack	Mack	29
		2	White	Bender	26
		1	White	Bender	29
		14	Studebaker	Superior	21
		2	Studebaker	Superior	14
Louisiana					
New Orleans Public Service, Inc.	7	7	Yellow	St. Louis Car Co.	34
Maine					
York Utilities Co.	1	1	Yellow	.....	..
Maryland					
Cumberland & Western-port Transit Co.	7	4	White	Bender	29
		3	Yellow	Yellow	29
Potomac Edison Co.	12	*1	International	Lang	30
		5	International	Lang	29
		4	Yellow	Yellow	21
		2	White	Lang	25
Massachusetts					
Boston Elevated Ry.	61	1	Safeway	Safeway	29
		1	Mack	International	29
		2	White	Farnham-Nelson	25
		1	White	Brown	29
		11	Twin Coach	Twin Coach	37
		†15	Twin Coach	Twin Coach	35
		†14	Versare	Versare	36
		†16	A.C.F.	A.C.F.	..
Boston, Revere Beach & Lynn R.R.	2	2	A.C.F.	.....	23
Boston, Worcester & N. Y. St. Ry.	2	2	Mack	.....	29
Eastern Massachusetts Street Ry.	15	*4	Mack	Mack	29
		5	Brockway	Brown	21
		6	A.C.F.	A.C.F.	29
Fitchburg & Leominster St. Ry.	4	4	Studebaker	.....	21
Interstate Street Ry.	7	1	A.C.F.	A.C.F.	29
		2	A.C.F.	A.C.F.	27
		*1	Mack	Lang	25
		*3	A.C.F.	Fageol	29
Middlesex & Boston St. Ry.	12	12	White	Bender	29
Milford & Uxbridge Street Ry.	4	4	Mack	Mack	29
Northampton St. Ry.	1	1	Mack	.....	29
Plymouth & Brockton St. Ry.	6	5	Mack	Mack	29
		*1	Reo	.....	20
Springfield Street Ry.	11	3	Yellow	Yellow	29
		2	Yellow	Farnum-Nelson	29
		6	Yellow	Yellow	33
Union Street Ry.	1	1	Yellow	Yellow	29
Worcester Consolidated Street Ry.	24	14	Yellow	Farnham-Nelson	29
		10	Yellow	Yellow	33
Michigan					
City of Detroit—Dept. of Street Rys.	218	1	Graham	Graham	16
		16	Twin Coach	Twin Coach	40
		16	A.C.F.	A.C.F.	40
		†25	A.C.F.	A.C.F.	15
		120	Graham	Graham	16
		40	Yellow	Yellow	29
Eastern Michigan Rys.	48	14	A.C.F.	A.C.F.	29
		4	Yellow	Yellow	17
		20	Yellow	Yellow	40
		10	Twin Coach	Twin Coach	

*Second-hand. †Gas-electric.

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Table II—Buses Bought by Railways During 1928—(Continued)

Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Menominee & Marinette Light & Traction Co.	14	10	Reo	Fitzjohn	21
		4	Yellow	Yellow	29
Michigan Electric Ry.	1	1	A.C.F.	A.C.F.	29
Saginaw Transit Co.	5	5	Yellow	Yellow	23
Minnesota					
Twin City Rapid Transit Co.	15	6	Mack	Eckland	29
		7	White	Eckland	29
		2	Wills	Eckland	29
Missouri					
Kansas City Public Service Co.	7	6	Yellow	Yellow	21
		1	Twin Coach	Twin Coach	40
Springfield Traction Co.	1	1	Yellow	Yellow	23
St. Joseph Ry. Lt., Ht., & Pwr. Co.	6	6	Yellow		21
St. Louis Public Service Co.	10	10	Twin Coach	Twin Coach	40
Nebraska					
Lincoln Traction Co.	5	5	Mack	Mack	29
New Hampshire					
Keene Electric Ry.	1	1	Graham	Graham	20
New Jersey					
Atlantic City & Shore R.R.	4	4	Yellow		21
Coast Cities Ry. Co.	4	2	Yellow	Yellow	21
		2	Yellow	Yellow	29
Public Service Co-ordinated Transport.	517	5	White	Bender	21
		†1	White	Bender	29
		†1	Mack	Mack	29
		4	Mack	Mack	29
		†331	Yellow	Public Service	31
		1	Yellow	Yellow	33
		1	Yellow	Yellow	29
		20	Yellow	Yellow	21
		*152	Miscellaneous	Miscellaneous	
		1	Yellow	Public Service	26
Trenton & Mercer County Traction Co.	2	2	Twin Coach	Twin Coach	40
New York					
Black River Traction Co.	2	2	Reo	Fitzjohn	21
Brooklyn City R.R.	4	4	White	Bender	29
Hudson Valley Ry.	24	†24	Mack	Weiner	29
International Ry.	10	†10	Yellow		33
Jamestown Street Ry.	4	4	Reo	Fitzjohn	21
Kingston Consolidated Railroad	1	1	Yellow	Lang	
Newburgh Public Service	16	16	White	Bender	29
New York & Stamford Ry.	12	12	Mack	Mack	21
Niagara Gorge R.R.	4	4	Pierce Arrow	Buffalo Body Corp.	29
Poughkeepsie & Wappingers Falls Ry.	3	1	A.C.F.	A.C.F.	29
		2	A.C.F.	A.C.F.	23
Syracuse & Eastern Railroad					29
Third Ave. Ry. System.	136	1	Reo	Fitzjohn	25
		26	Six Wheel	Fitzgibbon	56
		56	Safeway	Fitzgibbon	29
		40	Versare	Versare	37
		14	A. C. F.	A. C. F.	23
United Traction Co. Albany	7	7	Versare	Versare	37
North Carolina					
Durham Pub. Serv. Co.	2	2	Yellow	Yellow	21
North Carolina Public Service Co.	7	2	Graham	Graham	21
		5	Yellow	Yellow	23
Southern Public Utilities Co.	6	3	Graham	Graham	21
		3	Yellow	Yellow	21
North Dakota					
Northern States Power Co.	1	1	Reo	Fitzjohn	21
Ohio					
Cincinnati Street Ry.	12	8	Twin Coach	Twin Coach	40
		4	Yellow	Yellow	29
Cleveland Ry.	21	20	White	Lang	29
		1	Twin Coach	Twin Coach	37
Community Traction Co.	88	3	Mack	Mack	29
		3	White	Bender	29
		3	White	Bender	33
		12	White	Lang	33
		12	Yellow	Yellow	29
		14	Yellow	Yellow	33
		12	Yellow	Lang	33
		10	Twin Coach	Twin Coach	40
		*9	Union	Union	21
		*5	Studebaker	Gibraltar	21
		*5	Reo	Fitzjohn	21
Indiana, Columbus & Eastern Traction Co.	3	3	White	Bender	24
Lake Shore Elec. Ry.	3	3	White	Bender	25
Northern Ohio Power & Light Co.	64	39	Twin Coach	Twin Coach	40
		10	Yellow	Lang	30
		*6	White	Bender	29
		*1	Pierce Arrow	Brown	29
		*2	Mack	Mack	29
		*1	Yellow	Yellow	29
		*1	Fageol	Fageol	29
		*3	Garford	Garford	17
		*1	Stoughton	Stoughton	20
Ohio Public Service Co.	2	2	Yellow	Yellow	21
Oklahoma					
Oklahoma Ry.	7	3	Graham	Graham	21
		4	Yellow	Yellow	21
Oklahoma Union Ry.	4	3	Mack	Lang	25
		1	Buick		14
Tulsa Street Ry.	1	1	Yellow	Yellow	21
Oregon					
Portland Electric Power Co.	3	3	Twin Coach	Twin Coach	40
Pennsylvania					
Citizens Traction Co.	10	10	A.C.F.	A.C.F.	23
Conestoga Traction Co.	2	2	International	York	25
East Penn Traction Co.	4	3	Mack	Mack	29
		1	Hahn	Hahn	23
Erie Rys.	9	7	Yellow	Yellow	21
		2	Yellow	Yellow	23
Johnstown Traction Co.	7	7	Yellow	Yellow	29
Lehigh Traction Co.	1	1	Mack	Mack	29
Lehigh Valley Transit Co.	1	1	Mack	Mack	29
Lewistown & Reedsville Electric Ry.	4	4	White	Bender	29
Philadelphia & West Chester Traction Co.	6	3	White	Bender	29
		3	White	Bender	21
Pittsburgh Railways.	24	17	Twin Coach	Twin Coach	35
		4	Yellow	Yellow	29
Reading Transit Co.	2	3	Yellow	Yellow	17
		1	White	Bender	21
West Penn Rys.	34	1	Mack	Mack	29
		7	Graham		
		2	Yellow	Lang	21
Wilkes-Barre Ry.	16	*25	Miscellaneous		
		7	Yellow	Yellow	29
Williamsport Rys.	3	*5	Reo	Reo	21
		*4	Mack	Local	18
		1	Reo	Reo	16
		1	Reo	Reo	18
		1	Reo	Reo	21
Woodlawn & Southern St. Ry.	1	1	Mack	Mack	29
Rhode Island					
Newport & Providence Ry.	28	*20	Fageol		29
		*1	White		29
		3	White	Bender	29
		4	Twin Coach		34
United Elec. Rys.	30	†2	Twin Coach	Twin Coach	40
		28	Twin Coach	Twin Coach	40
South Dakota					
Sioux Falls Traction System	2	1	White	Eckland	21
		1	White	Eckland	25
Tennessee					
Tennessee Electric Power Co.	6	3	Yellow	Yellow	29
		3	Twin Coach	Twin Coach	40
Texas					
Dallas Railway & Terminal Co.	2	1	Graham	Graham	21
		1	Graham	Graham	16
Eastern Texas Electric Co.	11	3	Reo	Fitzjohn	21
		*1	Yellow	Yellow	21
		3	Yellow	Yellow	21
		4	Graham	Graham	21
Houston Electric Co.	23	23	Twin Coach	Twin Coach	40
Northern Texas Traction Co.	1	1	Reo	Reo	21
Nueces Ry.	3	*2	Reo		22
		*1	Studebaker		22
San Antonio Public Service Co.	29	15	White	Bender	34
		12	Reo	Fitzjohn	22
		1	Yellow	Yellow	22
		1	Studebaker	Superior	22
Wichita Falls Traction Co.	4	2	Mack	Mack	25
		2	Mack	Mack	29
Vermont					
Burlington Traction Co.	1	1	Twin Coach	Twin Coach	40
Virginia					
City of Radford, Dept. of Public Utilities	2	2	Graham	Graham	21
Roanoke Railway & Electric Co.	3	3	Yellow	Yellow	21
Virginia Electric & Power Co.	15	15	Twin Coach	Twin Coach	40
Virginia Public Service Co.	1	1	White	Lang	21
Washington					
Grays Harbor Ry. & Light Co.	2	2	White		29
Lewiston-Clarkston Transit Co.	2	2	Graham	Graham	21
Puget Sound Power & Light Co.	19	6	A.C.F.	A.C.F.	29
		6	Yellow	Yellow	29
		2	Yellow	Lang	32
		2	White	Bender	33
		2	Twin Coach	Twin Coach	37
		1	Twin Coach	Twin Coach	40
Seattle Municipal Street Ry.	17	10	Studebaker		21
		5	Mack		29
		*1	White		29
		*1	White		25
West Virginia					
Charleston Interurban R.R.	12	6	Yellow	Bender	21
		4	Yellow	Yellow	16
		2	Yellow	Yellow	27

*Second-hand. †Gas-electric.

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Table II—Buses Bought by Railways During 1928—(Concluded)

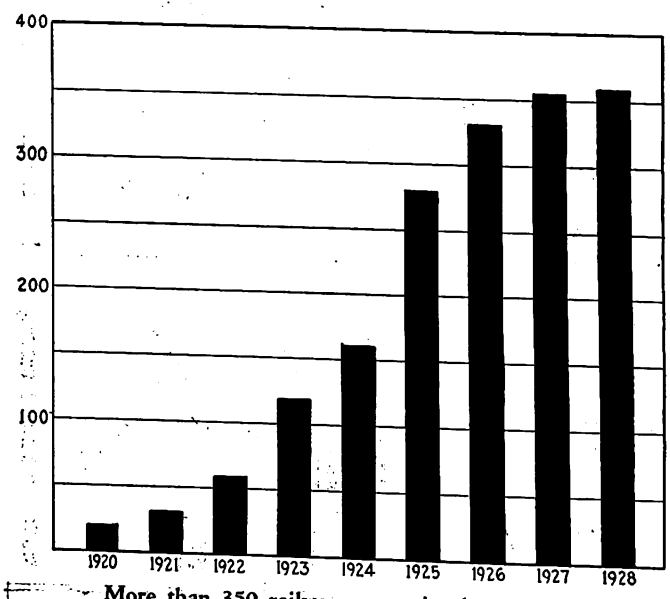
Name of Company	Total	Total Type	Type Chassis	Body Builder	Seating Capacity
Monongahela West Penn Public Service Co.	14	2	Yellow	Yellow	21
		1	Yellow	Yellow	31
		6	Yellow	Lang	21
		4	Graham	Graham	21
		1	Graham	Graham	16
Ohio Valley Electric Ry.	15	5	Yellow	Yellow	21
		10	White	Bender	25
Tyler Traction Co.	1	1	Yellow	Yellow	29
Wheeling Traction Sys.	5	2	Graham	.....	16
		3	Graham	.....	21
Wisconsin					
Milwaukee Electric Ry. & Light Co.	18	1	Twin Coach	Twin Coach	40
		6	Yellow	Yellow	29
		4	Twin Coach	Twin Coach	40
		*2	Packard	Monday	30
		*1	Sterling	Monday	30
		*1	Stegman	Monday	18
		*1	Stoddard	Monday	18
		*1	Studebaker	Monday	18
		*1	Ford	Monday	18
Wisconsin Gas & Electric Co.	2	*2	5th Ave. Coach	.....	29
Wisconsin, Michigan Power Co.	6	4	Twin Coach	Twin Coach	34
		*2	White	.....	26
Wisconsin Power & Light Co.	15	10	A.C.F.	A.C.F.	29
		5	A.C.F.	A.C.F.	22
Wisconsin Public Service Corp.	20	10	Reo	Fitzjohn	21
		5	White	.....	29
		*5	Yellow	.....	29
Wisconsin Valley Electric Co.	1	1	Reo	Fitzjohn	21
Wyoming					
Cheyenne Motor Bus Co.	4	1	Reo	Fitzjohn	21
		3	Studebaker	.....	..
Canada					
British Columbia Electric Ry.	5	4	Yellow	Yellow	29
		1	Yellow	Yellow	23
Dominion Power & Transmission Co.	17	5	Yellow	Yellow	21
		7	Reo	National Steel Car	21
		5	White	Bender	29
Montreal Tramways	12	†2	Versare	Versare	35
		2	Yellow	Yellow	21
		8	Yellow	Yellow	33
Moose Jaw Electric Ry.	3	3	Graham	Graham	21
Pictou County Electric Co.	2	2	International	Local	25
Sherbrooke Railway & Power Co.	2	2	Yellow	Yellow	21
Toronto Transportation Commission	34	2	Mack	Mack	29
		6	Yellow	Yellow	23
		10	Mack	Bender	29
		*1	Reo	.....	18
		*2	Reo	.....	21
		*1	Studebaker	.....	21
		*8	Gotfredson	.....	21-25
		*4	Mack	Mack	25
Winnipeg Electric Co.	17	7	G.M.C.	Local	25
		5	Mack	Local	25
		5	Twin Coach	Cummings Car	40
Honolulu, Hawaii					
Honolulu Rapid Transit Co.	2	2	A.C.F.	A.C.F.	23
Total	2,455				

*Second-hand.
†Gas-electric.

viously served by trolleys. In the majority of instances where abandonments were effected the reasons were purely economic, due to falling off in traffic and revenue or inability to meet heavy paving charges or the expenses of grade separations, highway improvement, or the like.

Thirteen electric railways not previously engaged in bus operation established bus service during 1928. These were all comparatively small installations. The principal extensions of route and purchases of new equipment were made by railways with long-established records as operators of automotive equipment. Several properties which had been providing bus service suspended operation during the year. Several others were absorbed in corporate combinations. Thus by the close of 1928 there were approximately 350 electric railways operating buses.

The largest purchaser during the year was the Public Service Co-ordinated Transport of Newark, N. J., which added a total of 517 buses to its fleet, already the largest in the country. Of the buses purchased 365 were new and 152 were second hand, taken over in the purchase of various independent lines throughout the state of New Jersey. This company scrapped or retired 177 buses from service, leaving a total of 1,781 buses in service at the close of the year.



More than 350 railways now give bus service

The bus of large seating capacity, which was developed during the latter part of 1927, established its position in the industry to the extent that approximately 17 per cent of the new equipment purchased during the year was of this type.

The trend toward the larger type of buses was further emphasized by the fact that of the total number purchased, nearly 1,000 were of the type seating from 29 to 33 passengers, and more than 100 others were of the type seating 25 passengers. A conspicuous order of small capacity buses was that of the Detroit Department of Street Railways, which added to its fleet 161 buses of the type seating 15-16 passengers. These buses are used in a specialized service that has been developed in that city in connection with a co-ordinated express trolley, local bus operation on certain of the long trunk lines.

Nearly 450 gas-electric buses were sold to trolley companies during the year, but the purchases were confined to comparatively few properties. Public Service Co-ordinated Transport bought 333 and the International Railway of Buffalo bought 10, all of the single-deck 29-passenger type. The City of Detroit Department of Street Railways bought 40 large-capacity gas-electrics, and the Boston Elevated Railway 45. The Capitol District Transportation Company of Albany, N. Y., was a purchaser of 7 buses with gas-electric drive. The total number of gas-electric buses sold closely approximates the figure for 1927, which was reported as 438.

It is estimated that there are now approximately 1,900 gas-electric buses in service in this country, of which Public Service Co-ordinated Transport has 900, the Philadelphia Rural Transit, subsidiary of the Philadelphia Rapid Transit, has 560, the Detroit Department of

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Table III—Bus Route Extensions During 1928

	City	Intercity
Arizona		
Tucson Rapid Transit	1.50	.....
Warren Co.	.....	6.50
California		
Key System Transit Co.	10.63	.....
Los Angeles Ry.	7.85	.....
Pacific Electric Ry.	6.85	6.50
San Diego Electric Ry.	1.18	.....
Southern Pacific Co. (Elec. Div.)	1.80	2,388.20
Colorado		
Denver Tramway	7.56	.....
Connecticut		
Connecticut Co.	33.38	14.61
Groton & Stonington Traction Co.	.....	20.77
Delaware		
Delaware Electric Power Co.	.....	9.60
District of Columbia		
Capital Traction Co.	0.57	.....
Washington Railway & Elec. Co.	8.88	29.30
Florida		
Jacksonville Traction Co.	5.75	.....
Georgia		
Savannah Electric & Power Co.	5.25	.....
Illinois		
Alton Ry. Co.	25.00	24.10
Blue Goose Motor Coach Co.	.....	43.80
Chicago & Joilet Electric Ry.	.....	40.00
Evanston Ry.	4.00	.....
Illinois Power Co.	2.73	.....
Illinois Traction System	105.50	.....
Kewanee Public Service Co.	2.00	.....
Tri-City Ry. of Illinois	.....	4.25
Indiana		
Beech Grove Traction Co.	2.00	.....
Gary Rys.	1.00	.....
Evansville & Ohio Valley Ry.	.....	66.50
Indianapolis & Southeastern R. R.	.....	60.00
Indiana Service Corp.	1.50	.....
Iowa		
Cedar Rapids & Iowa City Ry.	.....	129.00
Clinton, Davenport & Muscatine Ry.	.....	38.22
Interstate Power Co.	2.70	.....
Iowa Ry. & Light Co.	9.00	.....
Iowa Southern Utilities Co. (Burlington)	2.00	.....
Waterloo, Cedar Falls & Northern Ry.	.....	157.00
Kansas		
United Power & Light Corp.	8.00	.....
Kentucky		
Kentucky Utilities	2.00	.....
Louisville Ry.	8.00	.....
Maryland		
Cumberland & Westernport Transit Co.	.....	10.50
Potomac Edison Co.	8.40	57.70
Massachusetts		
Boston Revere Beach & Lynn R. R.	1.20	.....
Boston, Worcester & New York Street Ry.	11.00	.....
Eastern Massachusetts Street Ry.	9.30	7.00
Interstate Street Ry.	2.30	.....
Middlesex & Boston Street Ry.	10.15	.....
Milford, Framingham & Uxbridge Coach Co.	.....	21.00
Plymouth & Brockton St. Ry.	9.00	10.00
Springfield Street Ry.	2.55	19.20
Worcester Consolidated St. Ry.	9.00	.....
Michigan		
Grand Rapids R. R.	0.25	.....
Michigan Electric Ry.	23.65	132.20
Menominee & Marinette Light & Traction Co.	13.30	.....
Saginaw Transit Co.	22.10	.....
Minnesota		
Duluth Street Ry.	5.43	.....
Twin City Rapid Transit Co.	1.10	.....
Missouri		
Kansas City Public Service Co.	9.60	.....
St. Joseph Ry., Lt., Ht., & Power Co.	1.62	.....
St. Louis Public Service Co.	5.44	.....
Nebraska		
Lincoln Traction Co.	2.00	.....
New Hampshire		
Keene Electric Ry.	2.00	.....
New Jersey		
Atlantic City & Shore R. R.	14.00	.....
Coast Cities Ry.	5.20	.....
Public Service Coordinated Transport	300.59	.....
New York		
Brooklyn City R. R.	1.40	.....
Buffalo & Erie Ry.	30.00	.....
Hudson Valley Ry.	21.00	19.00
Jamestown Street Ry.	9.50	.....
Newburgh Public Service Co.	3.50	.....
Poughkeepsie & Wappinger's Falls Ry.	3.98	7.60
Syracuse & Eastern R. R.	2.50	.....
North Carolina		
North Carolina Public Service Co.	11.80	.....
Southern Public Utilities Co.	2.75	.....
Oklahoma		
Oklahoma Union Ry.	.....	74.00
Ohio		
Cincinnati, Lawrenceburg & Aurora Electric Street R. R.	7.50	.....
Cincinnati Street Ry.	2.50	5.80
Cleveland Ry.	12.10	.....
Community Traction Co.	38.18	.....
Northern Ohio Power & Light Co.	40.40	19.40
Ohio Public Service Co.	2.50	.....
Pennsylvania-Ohio Public Service Corp.	2.10	.....
Oregon		
Portland Electric Power Co.	3.08	.....
Pennsylvania		
Citizens Traction Co.	16.00	.....
East Penn. Transp. Co.	.....	32.00
Erie Rys.	6.00	.....
Lewistown & Reedsville Electric Ry.	13.70	.....
Monongahela West Penn Public Service Co.	3.10	.....
Philadelphia & Westchester Traction Co.	.....	43.50
Pittsburgh Rys.	8.00	30.00
Reading Transit Co.	2.60	.....
Scranton Railway	0.80	.....
West Penn. Rys.	.....	45.00
Wilkes-Barre Ry.	3.00	11.00
Rhode Island		
United Electric Rys.	7.26	47.50
Tennessee		
Tennessee Electric Power Co.	25.77	.....
Texas		
Eastern Texas Electric Co.	12.94	20.10
Houston Electric Co.	21.70	.....
Northern Texas Traction Co.	3.07	.....
Nueces Ry.	5.00	.....
San Antonio Public Service Co.	37.57	.....
Utah		
Utah Light & Traction Co.	1.10	.....
Virginia		
City of Radford Dept. of Public Utilities	6.00	6.00
Roanoke Railway & Electric Co.	1.20	.....
Virginia Electric & Power Co.	8.71	.....
Washington		
Lewiston-Clarkston Transit Co.	10.00	.....
Seattle Municipal Street Ry.	5.80	.....
West Virginia		
Charleston Interurban R.R.	.....	2.33
Ohio Valley Electric Ry.	12.00	35.00
Wheeling Traction System	3.50	.....
Wisconsin		
Milwaukee Elec. Ry. & Light Co.	2.90	.....
Wisconsin Public Service Corp.	12.25	12.20
Wisconsin Power & Light Co.	7.55	86.90
Wyoming		
Cheyenne Motor Bus Co.	8.00	.....
Canada		
Hydro-Electric Rys.	6.00	.....
Montreal Tramways	1.90	.....
Moose Jaw Electric Ry.	4.95	.....
Sherbrooke Railway & Power Co., Ltd.	2.70	.....
Toronto Transp. Commission	9.10	144.80
Total	1,200.77	3,938.08
Grand Total		5,138.85

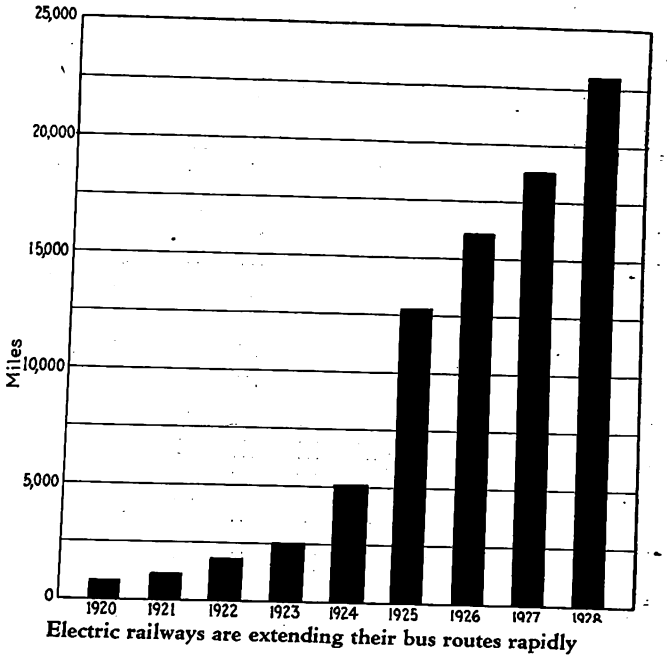
Street Railways, 75, International Railway of Buffalo, 65, and the Boston Elevated, 50.

Twenty-six double-deck buses, seating 56 passengers, were purchased by the Surface Transportation Corporation, subsidiary of the Third Avenue Railway system, New York City. The Los Angeles Railway bought two 58-passenger and two 63-passenger double-deck buses, and the Pacific Electric Company bought six 63-passenger and three 59-passenger double-deck buses, all for local service in the city of Los Angeles.

Canadian companies bought 92 buses during the year, increasing the total number of their vehicles to 443. During the previous year these same properties had purchased 138 buses.

Of the buses acquired by the electric railways some 330 were second-hand vehicles, for the most part taken over in the purchase of independent lines. The majority of these buses are reported to have been junked and replaced by new equipment, but a few were retained in service. All told, the electric railways report having scrapped, traded in, converted or otherwise disposed of nearly 500 buses. In a few cases entire operations were sold outright, as for example, the case wherein the Puget Sound Power & Light Company disposed of 26 of its fleet to an independent operator, but acquired nineteen new buses for service on its remaining lines.

Several electric railway properties have embarked extensively in the sightseeing and charter bus business, among them being the International Railway, of Buffalo; the Louisville Railway, United Railways of Baltimore; Philadelphia Rapid Transit Company, Public Service Co-ordinated Transport, and the Toronto Transportation Commission. This has increased the demand for buses of the de luxe, parlor car type, of which the purchase of a number are recorded.



Electric railways are extending their bus routes rapidly

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Passenger Car Purchases in 1928 at Low Level

During last year 601 electric railway passenger cars were ordered for city service; 93 passenger cars for interurban service, and 171 freight and miscellaneous cars. Also, 32 electric locomotives were ordered

ORDERS for electric railway cars and locomotives during 1928 totaled 897. This is the smallest figure for any year since 1907, when ELECTRIC RAILWAY JOURNAL began compiling these statistics. The previous minimum was for 1921, when 1,276 cars and electric locomotives were ordered. Purchases during 1925, 1926 and 1927 also were extremely low, there being less than 2,000 cars ordered each of those years. Although the actual number of cars purchased was comparatively small there have been a number of significant developments in design. Among these has been a decided trend toward de luxe appearance and comfortable interiors for passenger cars. Never before in the history of the industry has so much attention been devoted to improving car appearance and attractiveness as has been evident during the last two years. The various car manufacturers have spent large sums of money in developing improved types of cars and trucks, and several have built experimental cars without orders.

Table I—Number and Types of Cars Purchased During 1928

	United States	Canada	Total
Number of companies reporting purchase of new cars	37	9	46
CITY SERVICE			
One-man cars bodies longer than 28 ft.			
Single truck	6	....	6
Double truck	27	81	108
One-man, two-man cars	232	36	268
Two-man cars (surface)	131	88	219
Service and miscellaneous cars	32	19	51
Total cars for city service	428	224	652
INTERURBAN SERVICE			
One-man, double-truck cars	17	....	17
One-man, two-man cars	....	....	....
Two-man cars	41	....	41
Passenger trailers	20	....	20
Motor cars for train service	15	....	15
Express and freight cars	104	....	104
Miscellaneous cars	16	....	16
Total cars for interurban service	213	....	213
Electric locomotives	31	1	32
Total cars and electric locomotives	672	225	897

A large number of trucks with worm drives and with double reduction drives have been placed in service on various railways during the year to give these a thorough trial to determine if additional improvements are necessary. Two experimental types of four-wheel cars with extremely long wheelbase have been brought out by manufacturers. Experiments with these cars in service are going forward to determine if they meet the needs for city railways. Equipment manufacturers have shown eagerness to provide improved equipment to meet the requirements of operators. Particular attention has been given to increasing rates of acceleration and braking and making equipment more accessible.

Buying of rolling stock last year was confined to 46 railways sending in returns. Of these 37 were in the United States and 9 in Canada. The number of railways reporting the purchase of new cars during the last five years was 119 in 1924, 94 in 1925, 108 in 1926, 61 in 1927, and 46 in 1928.

Table II—Special Comparison by New Rolling Stock Ordered by Years

	1928	1927	1926	1925	1924	1923	1922	1921	1920	1919	1918	1917	1916
Number of railways reporting new cars	46	61	108	94	119	167	145	94	172	160	140	182	250
CITY SERVICE													
Number of one-man cars (28-ft. body S. T.)	....	....	66	55	103	312	772	565	1,699	1,383	644	280	187
Number of one-man cars other than 28-ft. body	114	212	144	74	96	183	227	....	....	....	....	....	....
Number of one-man, two-man cars	268	198	574	512	1,224	1,076	471	....	....	....	....	....	....
Number of two-man passenger motor cars*	219	414	456	405	537	1,097	1,290	383	847	635	1,068	1,316	2,731
Number of passenger trailers	....	....	9	8	25	247	150	111	343	111	130	402	128
Service cars	51	68	52	70	44	121	103	47	104	31	(a)	(a)	(a)
Total cars city service	652	892	1,301	1,124	2,029	3,036	3,013	1,106	2,993	2,160	1,842	1,998	3,046
INTERURBAN SERVICE													
Number of one-man cars	17	31	43	3	61	56	40	....	....	....	....	....	....
Number of one-man, two-man cars	....	8	45	70	38	38	9	....	....	....	....	....	....
Number of two-man motor cars*	56	69	172	207	435	330	122	103	195	96	200	158	303
Number of passenger trailers	20	13	49	40	4	3	16	26	32	32	55	27	71
Number of freight, express and miscellaneous cars	120	295	212	168	1,494	474	302	34	361	141	(a)	(a)	(a)
Total cars interurban service	213	416	521	488	2,032	901	489	163	588	269	255	185	374
Total number of cars	865	1,308	1,822	1,612	4,061	3,937	3,502	1,269	3,581	2,429	2,375	2,406	3,911
Number of electric locomotives	32	40	60	47	31	92	34	7	17	18	44	49	31

* Includes motor and trail cars for subway, elevated and train service. (a) Not available.

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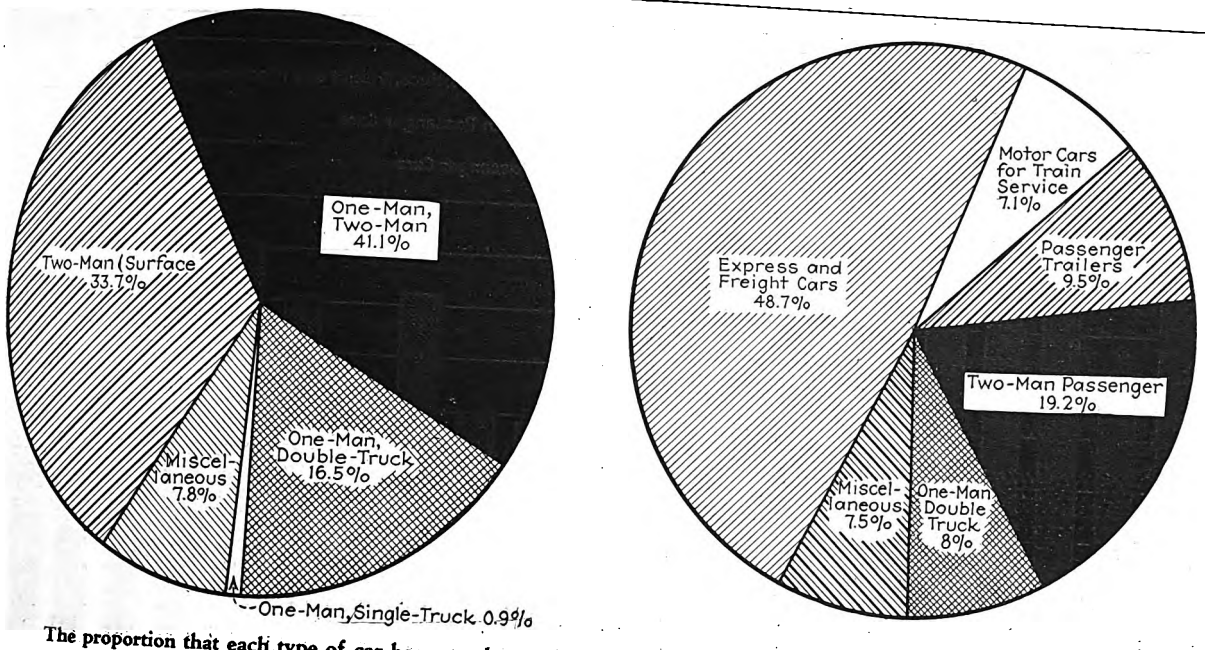

The proportion that each type of car bears to the total purchased during 1928 is shown in the above diagrams. The diagram at the left is for city cars and that at the right for interurban cars

Eight railways reported purchases of twenty or more passenger cars, six of which are city properties and two interurbans. These eight railways purchased a total of 556 cars or nearly 65 per cent of all the cars purchased. The largest order placed during 1928 was that of the Montreal Tramways, which included 86 double-truck, two-man cars, 65 double-truck, one-man cars, 2 articulated passenger cars, 2 snow plows, 4 sweepers, 4 dump cars and 1 work car. In the United States two railways purchased 100 or more cars each. The Cincinnati Street Railway bought 104 double-truck, one-man, two-man cars, and the Department of Street Railways, Detroit, Mich., 100 double-truck, one-man, two-man cars. The Cleveland Railway was the next largest purchaser, this company having bought 50 double-truck, two-man cars, 28 articulated units, and 18 dump cars. Of the other railways reporting purchases of more than 20 cars, Market Street Railway built 26 double-truck, two-man cars; the Quebec Railway, Light & Power Company bought 20 double-truck, one-man, two-man cars, 2 snow plows, 1 sprinkler car and 1 work car; the Chicago, South Shore & South Bend Railway, 15 two-man cars for interurban service, 5 trailers and 2 cabooses; and the Illinois Central Railroad, 10 motor cars and 10 trailers for interurban service.

It will be noted that two of the large orders for cars to be used in city service included articulated units. The Cleveland Railway's type of articulated car is 101 ft. long, weighs 38 tons and seats 100 passengers, while the type adopted by the Montreal Tramways is 80 ft. long, weighs 29½ tons and seats 90 passengers.

Statistics given in the accompanying tables of rolling stock were obtained from replies to questionnaires sent to all electric railways in the United States and Canada. Replies were received from companies representing more than 96 per cent of the total track mileage. Through the co-operation of the manufacturers, lists of cars built by them during the year were furnished so that the replies received from railways could be checked very carefully. In a few cases where replies were not received from electric railways themselves, the information furnished by the car manufacturers has been used. Replies were received from all car manufacturers. In addition to the information obtained from these two sources, the files of ELECTRIC RAILWAY JOURNAL have been used extensively. Particular care has been used to verify figures which appeared doubtful and it is believed that the final data are complete and accurate.

Analysis of the reports received on new rolling stock shows that the only types of cars of which there were

Table III—Railways Purchasing 20 or More Passenger Cars

Montreal Tramways	86	City, double truck, 2 man
	65	City, double truck, 1 man
	2	City, three truck, articulated units
	2	Snow plows
	4	Sweepers
	4	Dump cars
	1	Work car
Cincinnati Street Railway	104	City, double truck, 1-2 man
Department of Street Railways, Detroit	100	City, double truck, 1-2 man
Cleveland Railway	50	City, double truck, 2 man
	28	City, three truck articulated units
	18	Dump cars
Market Street Railway	26	City, double truck, 2 man
Quebec Railway, Light & Power Co.	20	City, double truck, 1-2 man
	2	Snow plows
	1	Sprinkler car
	1	Work car
Chicago, South Shore & South Bend Railroad	15	Interurban, double truck, 2 man
	5	Interurban trailers
	2	Cabooses
Illinois Central Railroad	10	Interurban motor cars
	10	Interurban trailers

Table IV—Electric Locomotives Ordered in 1928

Railway	No.	Weight Tons	Length Over All Ft.	In.
Alabama Power Co.	1	35.00	.....	
Chicago, South Shore & South Bend R.R.	2	80.00	.....	
Cincinnati, Hamilton & Dayton Ry.	1	43.50	49	0
Great Northern Ry.	1	307.50	94	4
Illinois Central R.R.	1	105.00	41	0
Illinois Traction System	4	80.00	40	0
Midland Utilities Co.	2	81.25	39	4
New York Central R.R.	5	30.00	.....	
New York State Rys. (Rochester)	1	50.00	37	0¼
Niagara Junction Ry.	1	60.00	35	0
Oklahoma Ry.	3	60.00	.....	
Oshawa Ry.	1	55.00	32	0
Piedmont & Northern Ry.	1	90.00	.....	
Sacramento Northern Ry.	2	62.70	.....	
Sand Springs Ry.	1	50.00	35	6
Springfield Suburban R.R.	1	37.50	33	0
Texas Electric Ry.	2	50.00	36	6
Toledo & Western Ry.	1	50.00	35	5¾
Waterloo, Cedar Falls & Northern Ry.	1	48.25	35	5
Total	32			

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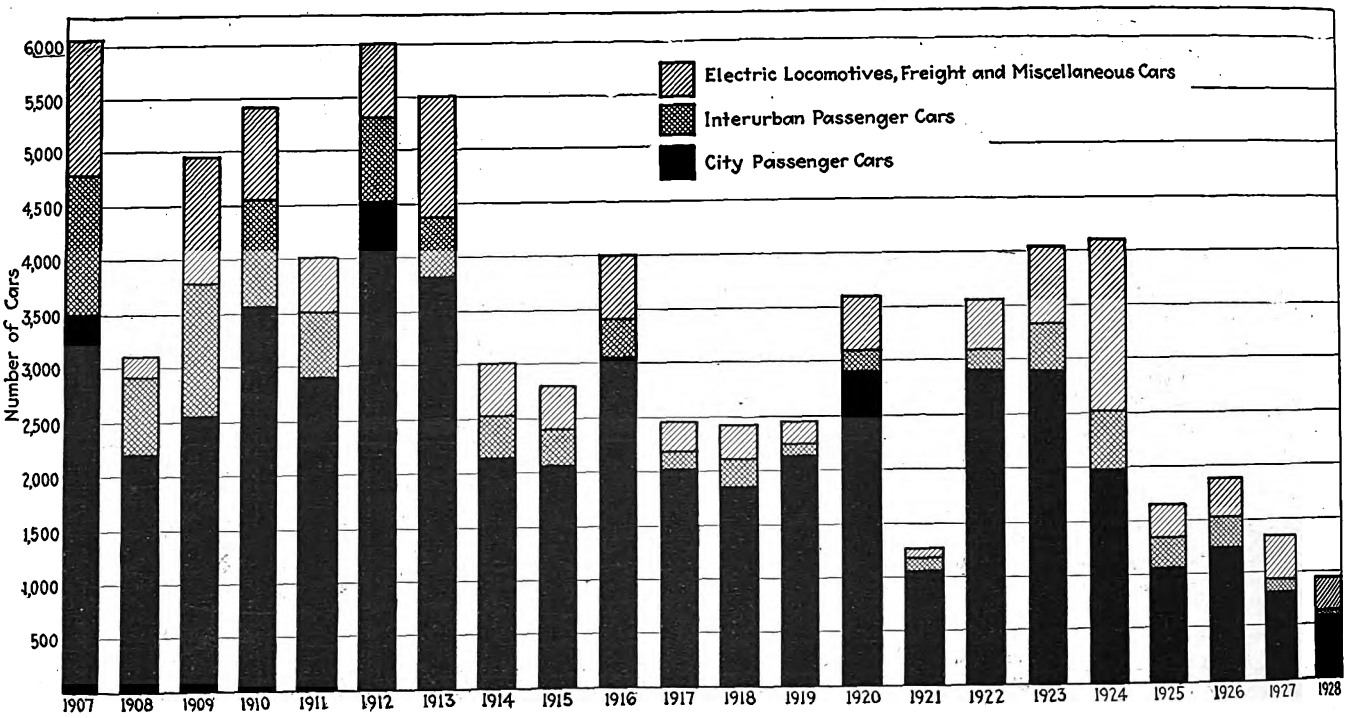


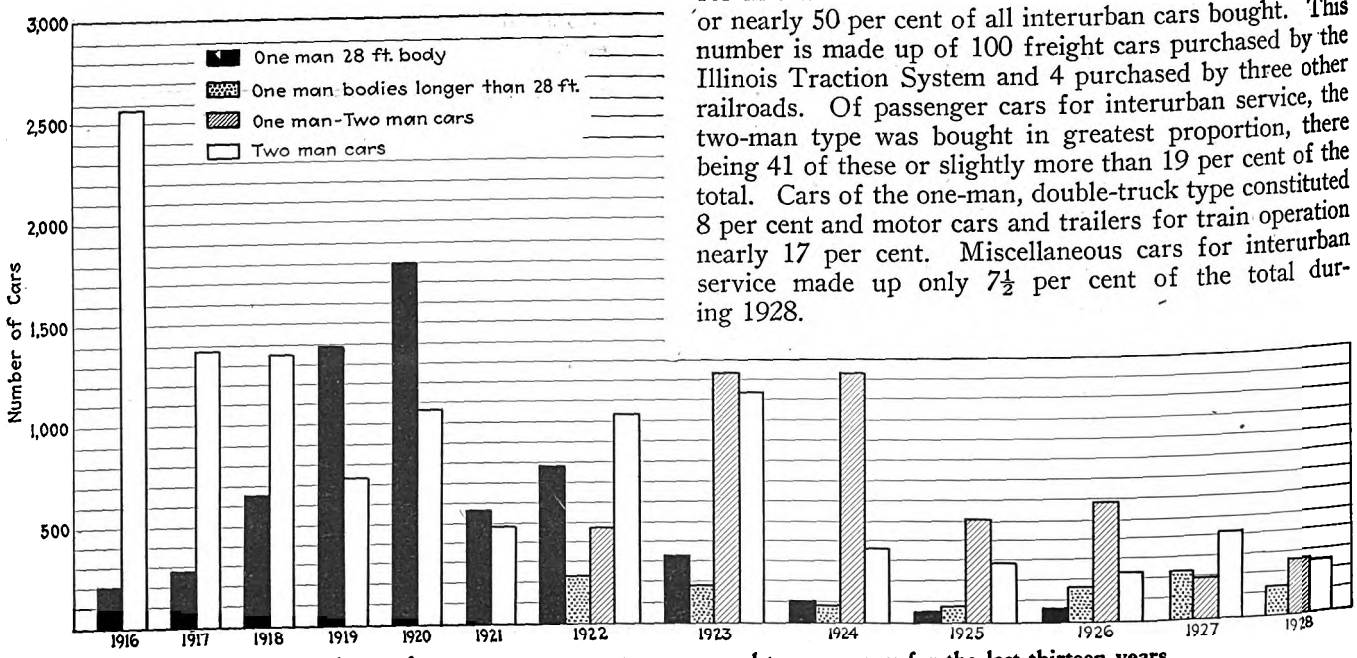
Analysis of city and interurban passenger cars and total cars and electric locomotives purchased during the past 22 years

increased purchases during 1928 over 1927 were one-man, two-man cars for city service and passenger trailers for interurban service. There were 268 one-man, two-man cars purchased in 1928 for city service as compared with 198 in 1927, and 20 passenger trailers for interurban service in 1928 as compared with 13 for 1927.

Interest naturally is greatest in the number of passenger cars purchased. Comparison of the last three years shows a total of 694 passenger cars ordered during 1928 as compared with 945 in 1927 and 1,558 in 1926. The numbers of city surface passenger cars in these were respectively 601, 754, and 932. No rapid transit motor cars or trailers were purchased in 1928, while there were 70 motor cars for rapid transit lines purchased in 1927 and 317 in 1926. Only 6 single-truck passenger cars were purchased in 1928, all being bought by the Mobile Light & Railroad Company. For interurban service 93 passenger cars were purchased in 1928 as compared with 121 in 1927 and 309 in 1926. The numbers of the various types of cars purchased during the last thirteen years are given in Table II.

Comparisons of the new cars purchased during 1928 are given at the beginning of this article in Table I and in the diagrams on page 79. From these it will be seen that 268, or more than 41 per cent of the cars purchased for city service, were of the one-man, two-man type. The next largest orders were for the two-man type, there being 219 of these or nearly 34 per cent of the total for city service. One-man, double-truck cars constituted 16½ per cent of the total, there being 108 of these, while the number of one-man, single-truck cars, being but 6, is less than 1 per cent of the total. Service and miscellaneous cars numbered 51, this being 7.8 per cent of the total of cars purchased for city service.

As has been the case for several years past, express and freight cars constitute the majority of those bought for interurban service. In 1928 there were 104 of these or nearly 50 per cent of all interurban cars bought. This number is made up of 100 freight cars purchased by the Illinois Traction System and 4 purchased by three other railroads. Of passenger cars for interurban service, the two-man type was bought in greatest proportion, there being 41 of these or slightly more than 19 per cent of the total. Cars of the one-man, double-truck type constituted 8 per cent and motor cars and trailers for train operation nearly 17 per cent. Miscellaneous cars for interurban service made up only 7½ per cent of the total during 1928.



Relative purchases of one-man; one-man, two-man; and two-man cars for the last thirteen years

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Table V—New Rolling Stock Ordered Since 1907

Year	Passenger Cars City	Passenger Cars Interurban	Freight and Miscellaneous Cars	Electric Locomotives	Total
1907	3,483	1,327	1,406	(a)	6,216
1908	2,208	727	176	(a)	3,111
1909	2,537	1,245	1,175	(a)	4,957
1910	3,571	990	820	(a)	5,381
1911	2,884	626	505	(a)	4,015
1912	4,531	783	687	(a)	6,001
1913	3,820	547	1,147	(a)	5,514
1914	2,147	384	479	(a)	3,010
1915	2,072	336	374	(a)	2,782
1916	3,046	374	491	31	3,942
1917	1,998	185	223	49	2,455
1918	1,842	255	278	44	2,419
1919	2,129	128	172	18	2,447
1920	2,889	227	465	17	3,598
1921	1,059	129	81	7	1,276
1922	2,910	187	405	34	3,536
1923	2,915	427	595	92	4,029
1924	1,985	538	1,538	31	4,092
1925	1,054	320	238	47	1,659
1926	1,249	309	264	60	1,882
1927	824	121	363	40	1,348
1928	601	93	171	32	897

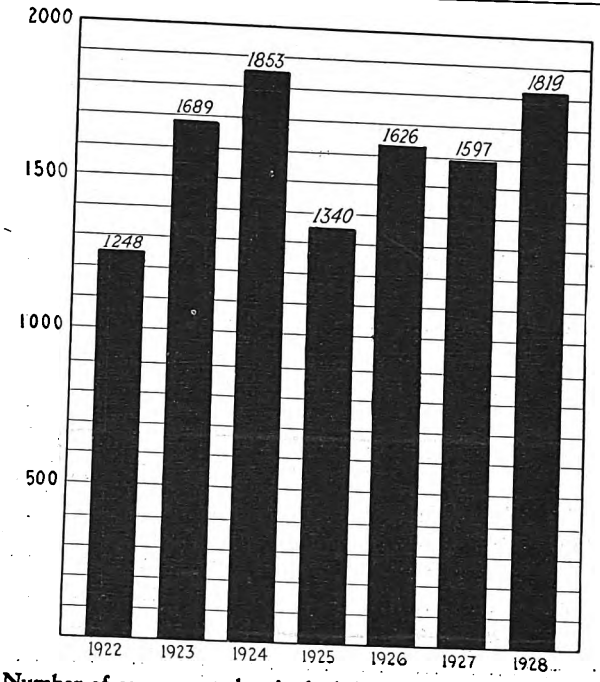
(a) Included in "Freight and Miscellaneous Cars."

Table VI—Dimensions of One-Man, Double-Truck Cars Ordered for City Service in 1928

Railway	Number Cars Ordered	Length Ft. In.	Weight Tons	Number Seats
Beech Grove Traction Corp.	1	39—8	12.50	44
Key System Transit Co.	1	40—8	15.00	45
Milwaukee Electric Ry. & Light Co.	10	45—0	18.47	54
Montreal Tramways	65	41—2	18.00	49
Oshawa Ry.	5	41—10	16.00	48
Pittsburg Rys.	2	44—6	19.00	36
Regina Municipal Ry.	7	41—2	16.82	47
Saskatoon Municipal Ry.	4	40—0	14.50	44
West Penn Rys.	2	43—1⅛	17.50	44
	97			
Maximum		45—0	19.00	54
Minimum		39—8	12.50	36
Weighted Average		41—8⅛	17.64	48

Various trends since 1916 in purchases of passenger cars for city operation are shown in the chart on page 80. It will be remembered that the Birney safety car first made its appearance in 1916, and this was really the beginning of one-man operation. At that time, of course, the majority of cars were of the two-man type, in 1916 there being 2,731 two-man cars purchased as against 187 one-man, single-truck cars with 28-ft. bodies. The one-man, single-truck car increased in popularity up to and including 1920, when a total of 1,699 cars of this type were bought. Since that time there has been a rapid drop and for the last two years, 1927 and 1928, no single-truck cars of the 28-ft. length have been purchased and in 1928 there were only six single-truck cars with bodies longer than 28 ft. purchased.

The year 1922 was marked by the introduction of single-truck cars with bodies longer than 28 ft., arranged for one-man operation, and also by the introduction of one-man, two-man double-truck cars. Since that time the latter type of car has increased in popularity and for the last six years, except in 1927, more of this type of car than of any of the other type were purchased for city operation. In 1928 there were 49 more one-man, two-man cars purchased for city service than were the straight two-man type. The greatest number of one-man, two-man cars for city service were purchased during the years 1923 and 1924, there being 1,076 of this type purchased in 1923 and 1,224 in 1924. Since then purchases of all types of cars have fallen off.



Number of cars reported as junked during the last seven years

Details of rolling stock ordered by individual companies are given in Table X, arranged alphabetically for each state. Reports from railways in the Dominion of Canada are grouped separately. The greatest number of cars purchased by railways in a single state was for Ohio, with a total of 204. The state of Illinois has second place in the number of cars purchased, 100 of these, however, being freight cars purchased by the Illinois Traction System. The order of 100 cars by the city of Detroit brings Michigan into third place in the number of cars purchased during 1928. These three states are the only ones in which purchases of 100 or more cars were reported. In the Dominion of Canada the Montreal Tramways with a total of 164 cars purchased tops the list.

Table VII—Dimensions of One-Man, Two-Man Cars Ordered for City Service in 1928

Railway	Number Cars Ordered	Length Ft. In.	Weight Tons	Number Seats
Calgary Municipal Ry.	3	46—0	19.36	52
Cincinnati Street Ry.	100	44—7⅜	17.90	50
City of Detroit, Department of Street Rys.	4	44—0	17.83	48
Delaware Electric Power Co.	100	48—5¼	18.50	52
Dominion Power & Transmission Co. Ltd.	10	42—1½	18.30	44
Phoenix Street Ry.	12	44—0	13.50	44
Quebec Railway Light & Power Co.	18	39—1	15.00	40
Winnipeg Electric Co.	20	41—0	20.00	42
	1	53—3	20.00	60
	268			
Maximum		53—3	20.00	60
Minimum		39—1	13.50	40
Weighted Average		45—3¾	17.92	49

Table VIII—Dimensions of Two-Man Cars Ordered for City Service in 1928

Railway	Number Cars Ordered	Length Ft. In.	Weight Tons	Number Seats
Cleveland Ry.	50	51—0	22.40	55
Dallas Ry. & Terminal Co.	17	45—8½	19.65	48
Market Street Ry.	26	47—0	19.80	52
Monongahela, West Penn Public Service Co.	10	45—3	17.77	48
Montreal Tramways	80	46—2	18.00	42
	6	41—2	18.00	42
	189			
Maximum		51—0	22.40	55
Minimum		41—2	17.77	42
Weighted Average		47—3¾	19.54	48

Table IX—Average Sizes of Double-Truck Passenger Cars Purchased for City Service During Last Three Years

Year	Number of Cases	Length Ft. In.	Weight Tons	Seats
1926	834	43—5	17.36	44
1927	738	45—5	18.20	47
1928	554	45—4	18.40	48

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Table X—Rolling Stock Ordered During 1928

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	Length Over All Ft. In.	Total Wt. Light Tons	No. Motors	Seating Capacity	One or Two Man	No. Cars Junked During Year†
Alabama											
Mobile Light & R.R. Co.	6	Passenger	City	Motor	Single	29— 6	10.25	2	33	One	7 CSM 3 CST
Arizona											
Phoenix Street Ry.	18	Passenger	City	Motor	Double	39— 1	15.00	4	40	Both	
Warren Co.											6 IM
Arkansas											
Texarkana Street Ry.											2 CSM
California											
Key System Transit Co.	1	Passenger	City	Motor	Double	40— 8	15.00	4	45	One	39 CDM 4 CDMW 3 CSMW 23 CDTW 12 CSTW
Market Street Ry.	26	Passenger	City	Motor	Double	47— 0	19.80	4	52	Two	26 CDM
Northwestern Pacific R.R.	5	Passenger	Interurban	Motor	Double	72— 4½	59.50	4	98	Train	
	5	Passenger	Interurban	Trailer	Double	72— 4½	35.50		103		
	10	Passenger	Interurban	Motor	Double	52— 2	28.90	4	65	Two	25 IDM
Pacific Electric Ry.	2	Dump	Interurban	Motor	Double	40— 0	36.90	4			5 IDW
	7	Dump	Interurban	Trailer	Double	40— 0	25.75				27 IF
San Diego Electric Ry.											5 CDM
Southern Pacific Co.											24 CDM 1 CMW
Colorado											
Denver Tramway											2 CDM 1 IF
Connecticut											
Connecticut Co.											1 CSM 17 CDOM 4 CDM 3 CSMW
Delaware											
Delaware Electric Power Co.	10	Passenger	City	Motor	Double	42— 1½	18.30	4	44	Both	
District of Columbia											
Capital Traction Co.											128 CSM 49 CST 4 CSW
Washington Ry. & Electric Co.											16 CDM
Florida											
Gulf Power Co.											2 CSOM 1 CSM 2 ITW
Illinois											
Chicago & West Towns Ry.	1	Snow plow	Interurban	Motor	Double	44— 0		4			
Illinois Central System	10	Passenger	Interurban	Motor	Double	72— 7½	70.00	4	84	Train	
	10	Passenger	Interurban	Trailer	Double	72— 7½	43.25		84		
Illinois Traction System	100	Freight	Interurban	Trailer	Double	37—11	22.00				
Indiana											
Beech Grove Traction Corp.	1	Passenger	City	Motor	Double	39— 8	12.50	4	44	One	
Chicago South Shore & South Bend R.R.	15	Passenger	Interurban	Motor	Double	60— 0	65.00	4	52	Two	
	5	Passenger	Interurban	Trailer	Double	60— 0	50.00		52		
	2	Caboose	Interurban	Trailer	Double	30— 0	19.00			Train	
Gary & Southern Traction Co.	2	Passenger	Interurban	Motor	Double	44—10	21.00	4	50	One	
Indianapolis & Cincinnati Traction Co.	10	Passenger	Interurban	Motor	Double	46— 2	20.00	4	38	One	12 IDM
Interstate Public Service Co.	1	Freight	Interurban	Trailer	Double	48— 8					
Iowa											
Cedar Rapids & Marion City Ry.											3 CSM
Iowa Ry. & Light Co.											10 CSM
Waterloo, Cedar Falls & Northern Ry.	5	Dump	Interurban	Trailer	Double	36—11½	32.65				1 IT
Kansas											
Union Traction Co.											3 CDM
Kentucky											
Kentucky Traction & Terminal Co.	1	Passenger	Interurban	Motor	Double	40— 3	13.00	4	44	One	
Kentucky Utilities Co.											5 CM
Maine											
Cumberland County Power & Light Co.	1	Snow plow	City	Motor	Double						25 CDM 9 IE
Massachusetts											
Boston Elevated Ry.	1	Work	City	Trailer	Double	47— 3					
	6	Snow plows	City	Motor	Double	46— 2¾	37.10	4			
Eastern Massachusetts Street Ry.											17 CDM 7 CDOM 2 SP 3 CDMW
Springfield Street Ry.											44 CSOM 23 CSM 34 CDM 12 IDMF
Worcester Consolidated Street Ry.											12 CSMW 4 SP 1 CSTW 5 CDOM
Maryland											
United Rys. & Electric Co.											12 CSM 11 CDM
Michigan											
City of Detroit—Department of Street Rys.	100	Passenger	City	Motor	Double	48— 5½	18.50	4	52	Both	59 CDM 4 CSMW
Menominee & Marinette Light & Traction Co.											6 CSM 14 CDM
Minnesota											
Northern States Power Co.											2 IDOM 2 CSM
Missouri											
Springfield Traction Co.											10 CDM 3 CDT 8 CW
St. Joseph Ry., Light, Heat & Power Co.											1 CSM 8 CST
St. Louis Public Service Co.											13 CDM 2 CDMW 1 CSTW

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Table X—Rolling Stock Ordered During 1928—Continued

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	Length Over All Ft. In.	Total Wt. Light Tons	No. Motors	Seating Capacity	One or Two Man	No. Cars Junked During Year†
Nebraska											
Lincoln Traction Co.											6 CSM
New York											
Brooklyn-Manhattan Transit Corp.										•	
Jamaica Central Rys.											85 CDM
New York State Rys. (Rochester)											2 CMW 1 CT 4 CDM
New York, Westchester & Boston Ry.	10	Passenger	Interurban	Motor	Double	72— 0¾	63.00	2	80	Two	6 CSTW 1 ITE
Niagara Gorge R.R.											
United Traction Co.											1 CDM 59 CSM
Ohio											
Cincinnati Street Ry.	100	Passenger	City	Motor	Double	44— 7⅜	17.90	4	50	Both	11 CDM
	4	Passenger	City	Motor	Double	44— 0	17.83	4	48	Both	
	28	‡Passenger	City	Motor	‡Three	101— 0	38.04	6	100	Two	40 CDM
Cleveland Ry.	50	Passenger	City	Motor	Double	51— 0	22.40	4	55	Two	8 CDT
	8	Dump	City	Motor	Double	39— 0½	24.00	4			
	4	Dump	City	Trailer	Double	36— 0½	17.50				
	6	Dump	City	Trailer	Double	40— 0	12.75				
Cleveland Southwestern Ry. & Lt. Co.											
Northern Ohio Power & Light Co.											1 CDM 3 IDM
Stark Electric Co.	3	Passenger	Interurban	Motor	Double	47— 3	16.25	4	52	One	63 CDM 27 IDM
	1	Freight	Interurban	Trailer	Double	48— 8					3 CDM
Oklahoma											
Northeast Oklahoma R.R.											2 IDM
Pennsylvania											
Allegheny Valley Street Ry.	1	Work	Interurban	Motor	Double	45— 0		4			1 IDM
Citizens Traction Co.											2 ISMW
Lackawanna & Wyoming Valley R.R.	3	Passenger	Interurban	Motor	Double	63— 2	45.00	2	76	Two	20 CM 6 IDM
Lehigh Valley Transit Co.	1	Passenger	Interurban	Motor	Double	63— 2	45.00	2	56	Two	3 CW 3 IDM
Philadelphia Rapid Transit Co.	1	Dump	City	Motor	Double	40— 0		4			
Philadelphia & Western Ry.	1	Crane	City	Motor	Double	65— 0	59.50	2			
	1	Work	City	Motor	Double	51— 8½	41.30	2			
Pittsburgh Rys.	2	Passenger	City	Motor	Double	44— 6	19.00	4	36	One	1 IDM 9 IDM 4 CDT 6 CDM
West Penn Rys.	2	Passenger	City	Motor	Double	43— 1⅝	17.50	4	44	One	21 CSM 2 ISMW 1 IDMW
South Carolina											
South Carolina Power Co.											18 CSM 6 CDM
Tennessee											
Knoxville Power & Light Co.	2	Work	City	Motor	Double	22— 0	9.00	2			
Texas											
Dallas Ry. & Terminal Co.	17	Passenger	City	Motor	Double	45— 8½	19.65	4	48	Two	16 CDM
Eastern Texas Electric Co.											5 CDM
Houston Electric Co.											9 CSM
Houston North Shore Ry.											
Northern Texas Traction Co.	1	Passenger	Interurban	Motor	Double	44— 4	20.00	4	51	One	
Utah											
Utah Light & Traction Co.	*11	Passenger	City	Motor	Double	31— 7½	8.15	2	45	One	16 CSM 3 IDT
Virginia											
Roanoke Ry. & Electric Co.											5 CDM
Virginia Electric Power Co.											3 CSM 6 CSM 1 CDM
Washington											11 CSOT
Puget Sound Power & Light Co.											5 IDL 5 IDW
Spokane United Rys.											137 IMF 175 IDM 16 IDT
West Virginia											
Monongahela West Penn Public Service Co.	0	Passenger	City	Motor	Double	45— 3	17.77	4	48	Two	2 CM
Wheeling Traction Co.	1	Work	City	Motor	Double	40— 0		4			
Wisconsin											
Milwaukee Electric Ry. & Light Co.	10	Passenger	City	Motor	Double	45— 0	18.47	4	54	One	2 IDM 2 ISM
Mississippi Valley Public Service Co.	1	Dining car	Interurban	Motor	Three	90— 0	67.50	4	57	Two	1 IDT
Wisconsin Public Service Corp.	1	Dining car	Interurban	Motor	Three	90— 0	67.50	4	38	Two	
											1 CDM 19 IDM 4 IDW
DOMINION OF CANADA											
Alberta											
Calgary Municipal Ry.	3	Passenger	City	Motor	Double	46— 0	19.36	4	52	Both	
	1	Sweeper	City	Motor	Double		36.00	4			
Manitoba											
Winnipeg Electric Co.	1	Passenger	City	Motor	Double	53— 3	20.00	4	60	Both	
Newfoundland											
Newfoundland Light & Power Co.											1 CM
Ontario											
Dominion Power & Transmission Co., Ltd.	12	Passenger	City	Motor	Double	44— 0	13.50	4	44	Both	16 CSM
Fort William Electric Ry.											4 CDM
Hydro-Electric Rys.	3	Work	City	Motor							
Niagara, St. Catharines & Toronto Ry.											3 CM
Oshawa Ry.	5	Passenger	City	Motor	Double	41—10	16.00	4	48	One	4 IDM
Toronto Transportation Commission.											1 ISMW 2 IDM 6 IDTF

*Trackless trolleys. †See explanation on page 84. ‡Two section articulated units.

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Table X—Rolling Stock Ordered During 1928—Concluded

Name of Company	No.	Class	City or Interurban	Motor or Trailer	Single or Double Truck	Length Over All Ft. In.	Total Wt. Light Tons	No. Motors	Seating Capacity	One or Two Man	No. Cars Junked During Year
Quebec											
Montreal Tramways Co.	65	Passenger	City	Motor	Double	41— 2	18.00	4	49	One	24 CSM
	80	Passenger	City	Motor	Double	46— 2	18.00	4	42	Two	45 CDM
	6	Passenger	City	Motor	Double	41— 2	18.00	4	42	Two	.....
	2	‡Passenger	City	Motor	‡Three	80— 0	29.40	4	90	Two	.....
	2	Snow plows	City	Motor	.....	.....	.....	.....	.....	.....	.....
	4	Sweepers	City	Motor	.....	.....	.....	.....	.....	.....	.....
	1	Work	City	Motor	Double	44— 0	.....	4	.....	.....	.....
	4	Dump	City	Motor	Double	40— 0	.....	4	.....	.....	.....
	20	Passenger	City	Motor	Double	41— 0	20.00	4	42	Both	14 CSM
Quebec Ry. Light & Power Co.	2	Snow plows	City	Motor	Double	35— 0	25.00	4	.....	.....	.....
	1	Sprinkler	City	Motor	Double	35— 0	20.00	4	.....	.....	.....
	1	Work	City	Motor	Double	40— 0	18.00	4	.....	.....	.....
Sherbrooke Ry. & Power Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1 CSM
Saskatchewan											
Regina Municipal Ry.	7	Passenger	City	Motor	Double	41— 2	16.82	4	47	One	.....
Saskatoon Municipal Ry.	4	Passenger	City	Motor	Double	40— 0	14.50	4	44	One	.....

‡ Two section articulated units.

ABBREVIATIONS AND NUMBER OF TYPES OF CARS JUNKED

CDM—City, double truck, motor	599
CDMW—City, double truck, motor, work	9
CDOM—City, double truck, open, motor	27
CDT—City, double truck, trailer	15
CDTW—City, double truck, trailer, work	23
CM—City, motor	31
CMW—City, motor, work	3
CSM—City, single truck, motor	389
CSMW—City, single truck, motor, work	22
CSOM—City, single truck, open, motor	46
CSOT—City, single truck, open, trailer	11
CST—City, single truck, trailer	60
CSTW—City, single truck, trailer, work	20
CSW—City, single truck, work	4
CT—City, trailer	1
CW—City, work	11
SP—Snow plow	6
IDL—Interurban, double truck line	5
IDM—Interurban, double truck, motor	291
IDMF—Interurban, double truck, motor, freight	12
IDMW—Interurban, double truck, motor, work	1
IDOM—Interurban, double truck, open, motor	2
IDT—Interurban, double truck, trailer	20
IDTF—Interurban, double truck, trailer, freight	6
IDW—Interurban, double truck, work	14
IE—Interurban, express	9
IF—Interurban, freight	28
IM—Interurban, motor	6
IMF—Interurban, motor, freight	137
ISM—Interurban, single truck, motor	2
ISMW—Interurban, single truck, motor, work	5
IT—Interurban, trailer	1
ITE—Interurban, trailer, express	1
ITW—Interurban, trailer, work	2
Total	1,819

For convenience in comparing rolling stock purchases during the past 22 years, and to show at a glance the number of cars purchased as divided between city and interurban passenger cars, and freight, express, service and miscellaneous cars, Table V has been prepared.

In addition to this table the trend of purchases is shown by the diagram on page 80. In this analysis the total rolling stock purchased each year is divided into three classifications; city passenger cars, interurban passenger cars, and miscellaneous, express, freight, service and electric locomotives. High points of purchases are shown by the chart for the years up to and including 1913, again for 1916, 1920 and for the years 1922, 1923, and 1924.

Purchases of electric locomotives during 1928 are listed in Table IV. The total number of electric locomotives bought is 32, as compared with 40 in 1927, 60 for 1926 and 47 for 1925. Locomotives were purchased by nineteen different companies in 1928. The heaviest and largest unit was that purchased by the Great Northern Railway, weighing 307½ tons.

In analyzing the various types of passenger cars purchased for city service during 1928, it is found that they are generally similar in length, weight and seating capacity. Details and comparisons are given in tables VI, VII and VIII. Lengths of one-man, double-truck cars vary between 39 ft., 8 in., and 45 ft. The weighted average length for all cars of this type is 41 ft., 8⅛ in.

Weights for this class of car vary from 12½ tons to 19 tons. The weighted average for all cars of the one-man, double-truck type is 17.64 tons. Seating capacities vary from 36 to 54 with a weighted average of 48.

The average dimensions of cars reported, as of the one-man, two-man type, are influenced largely by the two large orders of cars for the Cincinnati Street Railway and the city of Detroit. Weights are just a little heavier than for the one-man, double-truck type. Lengths vary from 39 ft., 1 in., to 53 ft., 3 in., and the weighted average length for all cars of this type ordered in 1928 is 45 ft., 3¾ in. Weights of one-man, two-man cars vary from 13½ tons to 20 tons with a weighted average for all cars of this class of 17.92 tons. Seating capacities vary from 40 to 60 and the weighted average is 49.

The two-man cars ordered for city service in 1928 were slightly larger than the other two types. Lengths of two-man city cars vary from 41 ft., 2 in. to 51 ft., and the weighted average length for all cars of this class is 47 ft., 3¾ in. Weights for two-man city cars are from 17.77 tons to 22.4 tons and the weighted average is 19.54 tons. Seating capacities vary from 42 to 55.

While these three classes of cars are reported under different names, actually they are similar in length, weight and seating capacity. To show variations of cars purchased for city service during the last three years, a general summary is given in Table IX. This gives weighted averages for all classes of cars reported, as ordered for city service, and include the double-truck, one-man car; the one-man, two-man type, and the straight two-man type. Lengths for 1927 and 1928 are practically the same and are about 2 ft. longer than for 1926. Weights have increased slightly, the average weight for 1926 being 17.36 tons, that for 1927, 18.2 tons and for 1928, 18.4 tons. Seating capacities also have increased slightly from 44 to 48.

An accompanying diagram shows graphically the number of cars junked during the past seven years. Referring to this diagram, it is seen that the number of cars junked during 1928, except for the year 1924, is the highest reported. There were a total of 1,819 cars junked during 1928, while the number for the year 1924 was 1,853. The last column of Table X shows the number of cars junked during the year arranged by companies, and at the bottom of this table the abbreviations used are explained and the numbers of each individual type is given. By grouping these into classes it is found that there were 1,277 city cars junked and 542 interurban cars. This includes 1,199 city passenger cars, 322 interurban passenger cars and 298 freight, express and miscellaneous cars. The two largest classes of cars for city service were 599 double-truck, motor cars and 389 single-truck, motor cars. Of the cars reported as used in interurban service, there were 291 double-truck, motor cars junked and 137 freight motor cars junked.

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Financial Status

IMPROVED MATERIALLY

Electric railway receiverships in 1928 were lowest on record. Restoration of industry's credit is progressing steadily. Refunding small in last year and in 1929

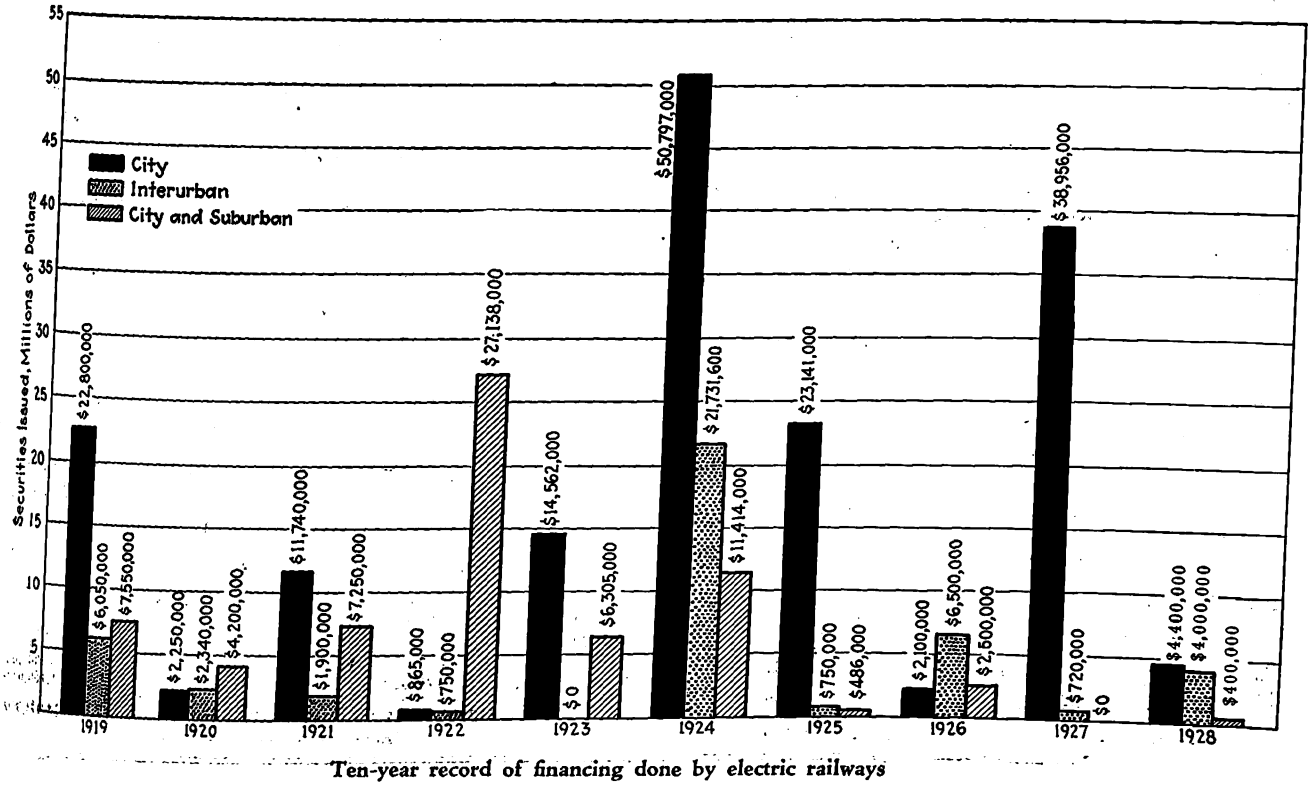
AGAIN, as in 1927, not one property of major importance was thrown into receivership. In fact, the receiverships were fewer in number than for any year since the cumulative record was begun in 1909. No company with more than 100 miles of track is included in the list of new receiverships and only two with trackage of more than 50 miles. These were the Buffalo & Erie Railway and the Puget Sound Electric Railway. On the constructive side, the affairs of the Detroit United were straightened out and the lines turned over to the successor railway, although, technically, the receivership for the old property is understood to be still in effect.

Financing by electric railways done publicly in 1928 was the smallest during the ten years for which the ELECTRIC RAILWAY JOURNAL has been keeping the record. The total was $8,800,000, divided, as an accompanying table indicates, into $4,400,000 for the city railways, $4,000,000 for the interurbans, and $400,000 for the city and suburban railways. This, of course, takes into account offerings only in amount of more than $400,000.

On the other hand, the maturities for the coming year are the smallest of any except one for which the record has been kept during the last ten years.

In the table of the disposition of the maturities for the year recently ended, the big items all appear to have been provided for in the period of easy money at the close of 1927. This was true of the Omaha & Council Bluffs issue, which was extended, and also of the Minneapolis & St. Paul city issue of $10,000,000. The tabulated statement of the disposition of the maturities in 1928, compiled with the aid of the statistical department of the American Electric Railway Association, tells its own story.

No really great improvement has been shown in the amount of outstanding electric railway bonds in default, this sum still being about $250,000,000 as it was at this time last year when the figures were compiled. The tendency should now be downward, since the electric railways have passed through their most trying period. From year to year the receivership situation has been improving. Thus more than $10,000,000



Ten-year record of financing done by electric railways

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Table I—Ten-Year Record of New Electric Railway Financing Involving Bond or Note Issues of More Than $400,000

	City Railway	Interurban	City and Suburban
1919	$22,800,000	$6,050,000	$7,550,000
1920	2,250,000	2,340,000	4,200,000
1921	11,740,000	1,900,000	7,250,000
1922	865,000	750,000	27,138,000
1923	14,562,000	.....	6,305,000
1924	50,797,000	21,731,600	11,414,000
1925	23,141,000	750,000	486,000
1926	2,100,000	6,500,000	2,500,000
1927	38,956,000	720,000	0
1928	4,400,000	4,000,000	400,000

Table II—Comparison of Maturities in the Electric Railway Field

1929	$27,316,600	1924	$73,051,600
1928	47,577,200	1923	94,851,800
1927	180,798,000	1922	160,015,860
1926	26,644,790	1921	207,617,530
1925	28,224,000	1920	80,466,100

of the issues of the Detroit United Railway were eliminated from the list, due to foreclosure and sale. Other issues, somewhat similar in nature, eliminated from the list are the Indianapolis & Cincinnati and the Morris County obligations, to mention just a few.

During the year two issues of stock were sold directly to the public, the Philadelphia Rapid Transit Company issue of $12,000,000 of 7 per cent stock, and the Chicago, South Bend & South Shore offering of $1,500,000 of 6½ per cent cumulative Class A stock, placed at $96.50 per share.

Only one major maturity of material size presents itself for disposition during 1929. This is the Brooklyn-Manhattan Transit one-year transaction of $10,000,000.

Table IV—Principal Electric Railway Maturities in 1929

(Based on Dow Jones & Company Compilation)

	Rate	Amount
January		
Interborough Rapid Transit Company ctfs	6½	$ 450,000
New Bedord, Middleboro & Brockton Street Railway 1st	5	324,000
Eastern Massachusetts Street Railway ref	6	300,000
Brooklyn City Railroad eq. tr	5	375,000
		$1,449,000
February		
South Shore & Boston Street Railway 1st	5	331,000
Philadelphia Rapid Transit eq. tr. G	5½	237,500
Pittsburgh Railways eq. tr	6	200,000
		768,500
May		
Marion City Railway 1st	6	328,000
July		
Lebanon Valley Street Railway 1st	5	500,000
Erie Traction 1st	5	353,000
Central Traction 1st	5	325,500
Sand Springs Railway 1st	6	300,000
La Crosse City Railway 1st	5	220,000
		1,698,500
August		
Atlantic & Suburban Railway 1st	4	591,100
Philadelphia Rapid Transit Company eq. tr. G	5½	237,500
Aroostook Valley Railroad 1st	4½	200,000
Brooklyn-Manhattan Transit 1 yr	6	10,000,000
		11,028,600
September		
Wilkinsburg & East Pittsburgh Railway 1st	5	1,989,000
Terre Haute, Indianapolis & Eastern Traction clt	6½	425,000
Hoosac Valley Street Railway ref	7	300,000
		2,714,000
November		
Baltimore Traction 1st	5	1,500,000
Pittsburg & Birmingham Traction 1st	5	1,500,000
Niagara, St. Catherines & Toronto 1st	5	1,098,000
Interborough Rapid Transit Company ctfs C	6	570,000
		4,668,000
December		
Lynn & Boston Railroad 1st	6	2,519,000
St. Louis Electric Terminal Railway 1st	5	1,724,000
Johnstown Passenger Railway cons	4	399,000
East McKeesport Street Railway 1st	5	250,000
Philadelphia Rapid Transit Company eq. tr. H	5½	270,000
		$5,162,000
Total		$27,816,600

Table III—Statement of Disposition of Electric Railway Maturities in 1928

Name of Company and Issue	Amount	Remarks
January		
Omaha & Council Bluffs Street Railway	$ 8,995,000	Extended
Omaha & Council Bluffs Railway & Bridge	1,923,000	Refunded
Oklahoma Railway, clt H notes	825,000	Retired
Stark Electric Railroad, 1st	730,000	Refunded
Los Angeles & Pasadena Electric Railway, 1st	628,000	Retired
Interboro Rapid Transit, eq. tr. B	450,000	Retired
Milford & Uxbridge Street Railway, 1st	335,000	(a)
Eastern Mass. Street Railway, serial	300,000	Retired
Niagara Falls Suspension Bridge & Clifton Susp. Bridge (International Ry.) 1st	300,000	Retired
Pennsylvania & Maryland Street Railway, 1st	224,000	Unknown
Brooklyn City Railroad, eq. tr	375,000	Retired
Bloomington & Normal Ry. & Lt., gen	1,164,000	Retired
Central Illinois Public Service, ser	400,000	Retired
January Total	$16,649,000	
February		
Pittsburgh Railways, 4 yr	$ 500,000	Retired
Philadelphia Rapid Transit, eq. tr. G	237,500	Retired
Pittsburgh Railways, car trust	200,000	Retired.
February Total	$ 937,500	
March		
Interboro Rapid Transit, eq. tr. A	$ 280,000	Retired
March Total	$ 280,000	
May		
New York City Interboro Railway, 1st	$ 2,164,000	Extended
City Light & Traction, 1 year	1,000,000	Retired
May Total	$ 3,164,000	
June		
Monongahela Street Railway, 1st	$ 998,000	Extended
June Total	$ 998,000	
July		
North Hudson County Railway, cons	$ 2,998,000	Retired
Chicago, No. Shore & Milwaukee R.R., 5 yr	2,684,200	Exchanged for 6% Pfd. stock
Lake Street Elev. R.R., 1st	1,598,000	Refunded
Pittsfield Electric St. Ry., 1st	242,000	Extended
July Total	$ 7,522,200	
August		
Philadelphia Rapid Transit, eq. tr. G	$ 237,500	Retired
Eastern Texas Electric, 3 year	4,000,000	Retired
Minneapolis Street Railway, 1st	5,000,000	Retired
August Total	$ 9,237,500	
September		
Southwest Missouri Electric Ry. ref	$ 1,150,000	Unknown
September Total	$ 1,150,000	
October		
Minneapolis & St. Paul City Ry., joint	$10,000,000	Refunded
October Total	$10,000,000	
November		
Dayton, Springfield & Urbana Ry., 1st	$ 1,500,000	Unknown
Interboro Rapid Transit, eq. tr. C	570,000	Retired
Columbus Electric & Power, 3 yr	2,500,000	Refunded
November Total	$ 4,570,000	
December		
Buffalo & Lackawanna Traction, 1st	$ 1,160,000	Unknown
Philadelphia Rapid Transit, eq. tr. H	270,000	Retired
December Total	$ 1,430,000	

(a) Company sold. Nothing as yet paid upon the principal of the bonds.

Summary of Disposition of Electric Railway Maturities in 1928

Month	Retired	Refunded	Extended	Exchanged	No Disposition	Unknow
Jan	$4,442,000	$2,653,000	$8,995,000	.....	$335,000	$224,000
Feb	937,500	.....	.....	.....	.....	.....
Mar	280,000	.....	.....	.....	.....	.....
Apr	.....	.....	.....	.....	.....	.....
May	1,000,000	.....	2,164,000	.....	.....	.....
June	.....	.....	998,000	.....	.....	.....
July	2,998,000	1,598,000	242,000	$2,684,200	.....	.....
Aug	9,237,500	.....	.....	.....	.....	1,150,000
Sept	.....	.....	.....	.....	.....	.....
Oct	.....	10,000,000	.....	.....	.....	1,500,000
Nov	570,000	2,500,000	.....	.....	.....	1,160,000
Dec	270,000	.....	.....	.....	.....	.....
Totals	$19,735,000	$16,751,000	$12,399,000	$2,684,200	$335,000	$4,034,000

Grand Total $55,938,200

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Table V—Outstanding Electric Railway Bonds in Default of Interest

(Based on Compilation by Dow, Jones & Company)

	Amount	Defaulted	
Auburn & Syracuse Elec. R.R. 5's	$1,752,000	April	1926
Binghamton Railway cons 5's	1,833,000	May,	1926
general & refunding 6's	426,200	July,	1925
Binghamton Railroad 6's, 1925	452,000	July,	1925
Binghamton, Lestershire & Union 5's, 1925	147,000	June,	1925
Bloomfield St. Ry. 5's, 1923	250,000	Aug.,	1923
Boise Valley Traction 5's, 1925	750,000	Jan.,	1923
Boise & Interurban Ry. 1st 5's	964,000	April,	1923
Brownsville Avenue St. Ry. 5's, 1926	300,000	Aug.,	1926
Buffalo & Erie 1st 6½'s	994,000	July,	1928
Buffalo & Lackawanna Traction 5's	1,150,000	Dec.,	1918
Calumet & South Chicago 5's, 1927	5,532,000	Feb.,	1927
Central Passenger Ry. 6's, 1924	125,000	Oct.,	1924
Chatham, Wallace & Lake Erie 5's, 1925	694,500	July,	1925
Chicago City & Connecting Railways 5's, 1927	20,616,000	Jan.,	1927
Chicago City Railway 5's, 1927	33,926,000	Feb.,	1927
Chicago Railways, 1st 5's, 1927	55,655,000	Feb.,	1927
consolidated A 5's, 1927	16,703,800	Feb.,	1927
consolidated B 5's, 1927	17,164,475	Feb.,	1927
purchase money 5's, 1927	4,073,000	Feb.,	1927
adjustment income 4's, 1927	2,500,000	Feb.,	1927
Chicago, South Bend & Northern Indiana 5's	3,099,000	Jan.,	1928
Citizen's Traction 1st 5's, 1927	246,000	Oct.,	1927
Clinton Street Ry., Clinton, Ia., 1st 5's, 1926	400,000	April,	1926
Columbus, London & Springfield 5's, 1920	1,260,000	Oct.,	1920
Dayton Springfield & Urbana 5's, 1928	750,000	Nov.,	1928
Des Moines City Ry. deb. 7's, 1927	618,000	April,	1927
Detroit, Altmont & Northern 6's	400,000	Aug.,	1925
Detroit, Jackson & Chicago 5's	881,000	July,	1925
Evansville & Ohio Valley Ry. 5's	1,034,000	Jan.,	1928
Geneva, Seneca Falls & Auburn 5's	497,000	Jan.,	1926
Hudson Valley Ry. cons. 5's	2,222,000	July,	1928
Indianapolis, Columbus & East Trac. 5's, 1926	6,400,000	Nov.,	1919
Indiana Northern Traction 5's	500,000	April,	1925
Indiana Ry. 1st 5's	1,000,000	Jan.,	1928
Indiana Union Traction 1st 5's	1,126,000	April,	1925
Indianapolis, Newcastle & East 6's	1,200,000	June,	1925
Indianapolis Northern Traction 5's	5,000,000	Jan.,	1925
Inter-Urban Railway, Des Moines, 1st 7½'s	652,500	April,	1927
debenture 6's	250,000	Jan.,	1923
Ithaca Street Ry. 1st 6's, 1922	175,000	July,	1922
Ithaca Traction ref. 5's	488,000	April,	1922
Jackson Consol. Traction 5's	790,000	May,	1925
Joplin & Pittsburgh Ry 1st 5's			
general 7's			
Kansas-Oklahoma Traction 6's	250,000	Nov.,	1924
La Porte & Michigan City Trac. 5's	234,000	Nov.,	1924
Lakeside Railway 1st 6's	150,000	May,	1926
Lima, Findlay & Toledo 5's, 1925	324,000	July,	1925
Lowell & Fitchburg St. Ry. 5's, 1926	275,000	Jan.,	1926
Michigan Electric Ry. ref. 5's	7,190,500	Jan.	1925
Michigan Railroad 1st 6's, 1924	4,050,000	May,	1924
Millvale, Etna & Sh. St. Ry. 5's 1923	741,000	Nov.,	1923
Minneapolis, Anoka & Cuyuna Range Ry. 5's	380,000	Nov.,	1925
Mississippi Valley Ry. & Pwr. 5's	800,000	July,	1917
Muncie, Hartford & Ft. Wayne 5's	916,000	Jan.,	1925
Muncie & Union City Traction 5's	925,000	Jan.,	1925
New York & Queens County Ry. cons. 4's	1,300,000	April,	1922
Northern Indiana Ry. cons. 5's	588,000	Jan.,	1928
Ogdensburg Street Railway 6's	150,000	Sept.,	1925
Penn Street Ry., Pittsburgh 1st 5's, 1922	250,000	June,	1922
Pittsburgh, Crafton & Mansfield 5's, 1924	171,000	July,	1924
Pittsburgh Traction 1st 5's, 1927	666,000	Oct.,	1927
Pittsburgh & W. End Pass. Ry. 5's, 1922	313,000	July,	1922
Public Light & Power 1st 5's	2,527,000	Feb.,	1928
Puget Sound Electric Ry. cons. 5's	2,427,000	Aug.,	1927
Rochester & Syracuse R.R. 1st 5's	2,448,500	May,	1927
Salt Lake & Utah 1st 5's	1,431,900	Oct.,	1925
convertible notes 7's	150,000	Oct.,	1925
Schuylkill Railway 1st 5's	180,000	April,	1926
Schuylkill Traction 1st 5's	500,000	April,	1926
consolidated 4½'s	105,000	July,	1926
Seattle & Rainier Valley Ry. 6's	484,000	July,	1928
Second Avenue R.R., New York, cons. 5's	5,682,000	Aug.,	1908
receivers' certificates 6's, 1914	3,140,000	Oct.,	1914
South Bend & So. Mich. Ry. 5's, 1927	750,000	Oct.,	1927
South Carolina Gas & Elec. 1st 6's	3,628,000	March	1928
Southern Michigan Ry. cons. 5's	395,000	March,	1928
Southwest Missouri Electric 6's	1,150,000	Sept.,	1926
Southwest Missour R.R. 5's	1,034,000	Sept.,	1926
Springfield Ry. 1st 5's	1,344,700	March,	1928
Steinway Railway, Long Island City 6's, 1922	1,500,000	July,	1922
Syracuse, Lake Shore & Nor. 5's	2,500,000	May,	1927
Tacoma Ry. & Power 1st 5's	1,236,000	April,	1928
Trenton, Bristol & Phila. Ry. 5's	413,800	March,	1925
Union Traction of Indiana gen. 6's	4,623,000	Jan.,	1925
Union Traction, Coffeyville, Kan. 5's	900,000	Jan.,	1925
Washington Electric St. Ry. 5's, 1927	125,000	Feb.,	1927
Waterloo, Cedar Falls & Northern 5's	5,773,000	Jan.,	1922
Webb City Northern El. Ry., Joplin, Mo., 5's, 1923	125,000	Sept.,	1923
Western Ohio Ry. 1st 5's	2,500,000	May,	1927
Youngstown & Ohio River 1st 5's	1,200,000	April,	1927
	$262,953,875		

Table VI—Details of New Bond and Note Financing in Amounts of More Than $400,000 Offered Publicly in 1927

Issue	Price	Maturity	Yield	Amount
Kansas City Public Service Company 1st gold 6's, Series A	95	1951	6.41	$4,400,000
Oklahoma Railway 1st M. Coll. 6½'s	100	1931	6.50	400,000
Lackawanna & Wyoming Valley Railroad 1st M's	97	1951	5.22	2,900,000
Debenture 6's	100	1948	6.00	1,100,000
Total				$8,800,000

Table VII—Electric Railway Securities Called in 1928

Month	Company	Mature	Amount	Price
April	Scranton & Wilkes-Barre Traction 6's	1934	$822,000	100
April	Warren Street Railway 2nd 5's	1931	125,000	100
July	Oklahoma Railway 1st 5's	1938	349,000	110
August	Scranton & Wilkes Barre 5's	1951	1,839,400	105
August	Lackawanna & Wyoming Valley Rapid Transit 5's	1951	733,000	105
December	Oklahoma Railway clt. 6½'s	1931	690,000	103

Table VIII—Electric Railway Receiverships—1928

	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver's Certificates
Southern Michigan Railway, South Bend, Ind.	32.05	$2,000,000	$1,145,000	None
Missouri & Kansas Ry., Kansas City, Kan.	20.03	1,000,000	655,000	None
Atlantic & Suburban Railway, Atlantic City, N. J.	16.00	150,000	691,000	None
Auburn & Northern Electric Railway, Syracuse, N. Y.	(a)	(b)	236,000	None
Buffalo & Erie Railway, Fredonia, N. Y.	96.23	1,450,500	910,300	$37,479
Syracuse, Lake Shore & Northern Railway, Syracuse, N. Y.	(a)	(b)	2,496,000	None
Springfield Railway, Springfield, Ohio	40.54	1,500,000	1,335,400	None
Puget Sound Electric Railway, Tacoma, Wash.	57.10	3,116,200	7,322,000	None
Total for 1928	261.95	$9,216,700	$14,790,700	$37,479

(a) Included with Empire State R.R. figures. (See Table XI.)
(b) Information not available.

Table IX—Record of Electric Railway Receiverships

Year	Number of Companies	Miles of Single Track Involved	Outstanding Securities—Stocks	Outstanding Securities—Bonds
1909	22	558.00	$29,962,200	$22,325,000
1910	11	696.61	12,629,400	75,490,735
1911	19	518.90	29,533,450	38,973,293
1912	26	373.58	20,410,700	11,133,800
1913	18	342.84	31,006,900	47,272,200
1914	10	362.39	35,562,550	19,050,460
1915	27	1,152.10	40,298,050	39,372,375
1916	15	359.26	14,476,600	10,849,200
1917	21	1,177.32	33,918,725	33,778,400
1918	29	2,017.61	92,130,388	163,257,102
1919	48	3,781.12	321,259,354	312,915,104
1920	19	1,065.31	28,758,455	72,283,575
1921	19	986.42	32,909,525	36,177,800
1922	14	695.43	18,140,150	20,304,400
1923	12	333.63	8,332,100	14,707,066
1924	12	1,021.88	28,489,700	35,716,000
1925	14	1,260.07	51,383,195	54,696,525
1926	16	1,228.28	17,769,435	117,560,073
1927	13	624.32	17,615,050	20,875,450
1928	8	261.95	9,216,700	14,790,700

Table X—Record of Electric Railway Foreclosure Sales

Year	Number of Companies	Miles of Track Involved	Outstanding Securities—Stocks	Outstanding Securities—Bonds	Outstanding Securities—Receivers' Certificates
1909	21	488.00	$22,265,700	$21,174,000	(a)
1910	22	724.36	19,106,613	26,374,075	(a)
1911	25	660.72	91,354,800	115,092,750	(a)
1912	18	267.18	14,197,300	10,685,250	(a)
1913	17	302.28	15,243,700	19,094,500	(a)
1914	11	181.26	26,239,700	44,094,241	(a)
1915	19	308.31	30,508,817	16,759,997	(a)
1916	19	430.14	13,895,400	22,702,300	(a)
1917	26	745.19	27,281,900	27,313,045	(a)
1918	23	524.22	37,740,325	20,149,384	(a)
1919	29	2,675.48	89,893,400	79,836,738	$42,300
1920	13	259.90	7,782,400	11,227,328	52,000
1921	13	777.97	33,642,255	30,863,526	5,000
1922	13	322.88	7,491,500	12,640,600	114,683
1923	15	927.45	118,077,959	110,638,250	12,265,000
1924	14	869.25	21,022,800	34,845,535	3,440,388
1925	13	569.39	18,074,300	18,329,555	53,000
1926	28	1,291.17	20,054,700	57,340,363	214,000
1927	16	940.68	53,345,000	78,445,100	3,140,000
1928	8	1,003.73	26,084,325	40,683,400	168,150

(a) Data not available.

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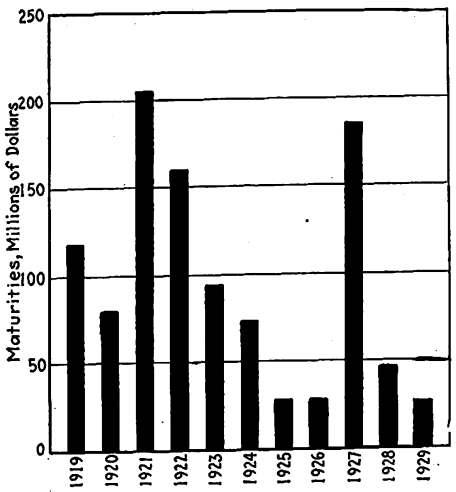
The next largest maturity due is the Lynn & Boston issue of $2,915,000 and the third largest the Wilkensburg & Pittsburgh 5 per cent issue totaling $1,989,000. No small percentage of the other maturities represents equipment trust obligations—the largest amount being $375,000.

Mileage in receivership on Jan. 1, 1929, was not changed materially over the previous year. If account is taken of the fact that the Chicago Railways with 597 miles is in default of principal, but is paying interest regularly, then the situation is much better than would seem at first. The total of securities of the companies which went into receivers' hands was only slightly less than $25,000,000. These companies may be said to represent extreme cases, being the type of road hardest hit under the present changed economic status of transportation. Aside from the Detroit United and the Chicago Railways, the one only technically still in receivership and the other earning its interest by a liberal margin and paying its interest, no large city systems are now in the hands of the courts and only a few interurbans with systems exceeding 100 miles of track.

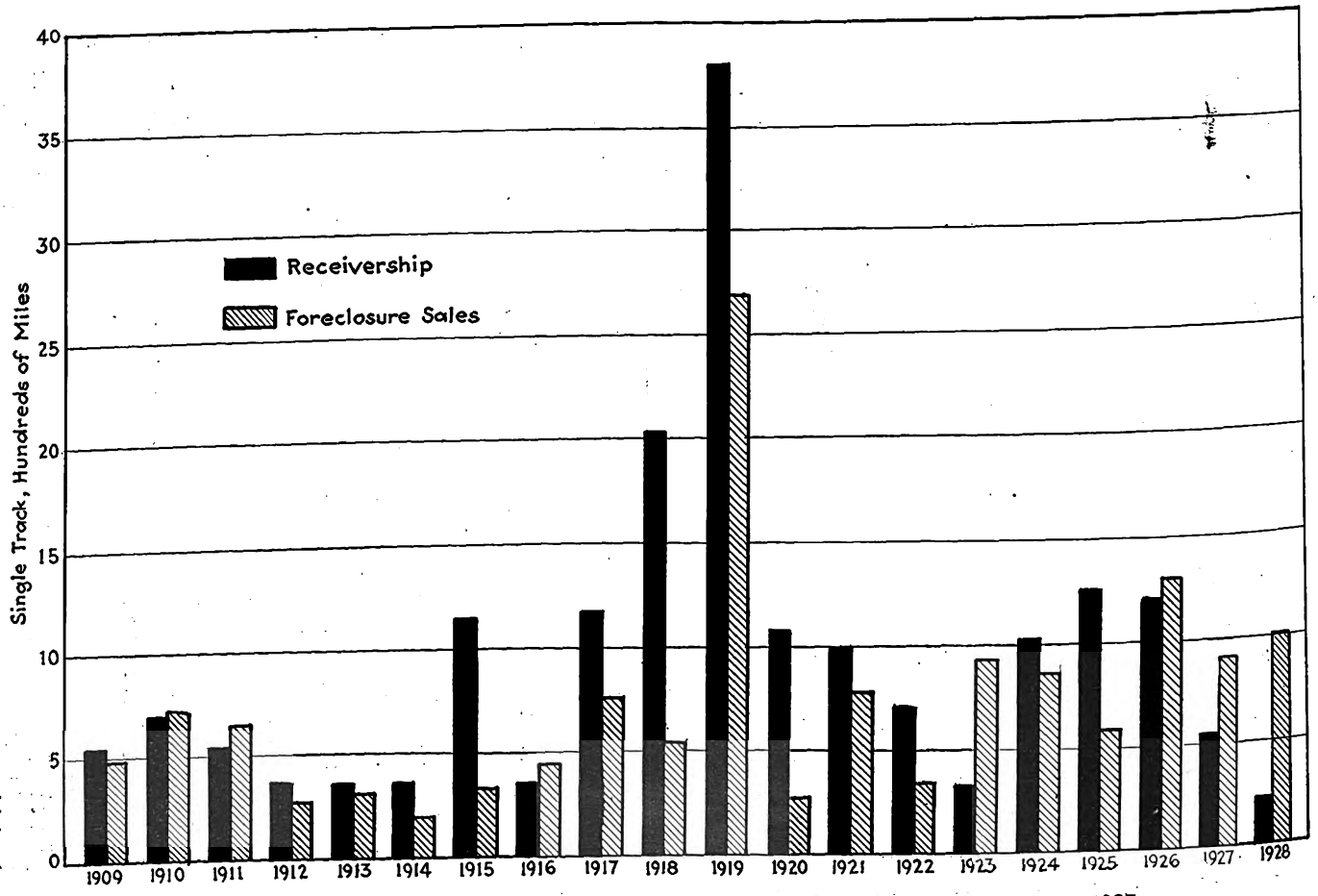
The number of receiverships long drawn out is comparatively small and the roads included are for the most part systems that do not bulk large in mileage. In practically every one of these cases the circumstances appear to be peculiar, but there does seem to exist good reason for the belief that the coming year will see the lifting of these receiverships.

So far as utilities in general are concerned notable progress was made in all departments of public utility financing, engineering and construction, operation and sales. Refinancing at lower interest rates was carried out wherever possible, and the savings made generally have been transmitted to customers in the form of reduced rates. Customer ownership did not assume the importance of former years, largely because much of the financing done during the year was in the form of senior securities to maintain the balance of corporate structures. Thus as J. J. O'Brien, president of H. W. Byllesby & Company, pointed out, sale of junior securities by the electric light and power companies of the country, particularly preferred shares of local operating companies, has become a comparatively easy matter due to the unusual popularity of this type of investment with the public, the problem now being one largely of supplying the demand.



No material change in amount of maturities

Of interest in this connection were several moves not strictly financial under the criterion of the accompanying statistics, but significant nevertheless. The most important, perhaps, was the proposal to merge the Capital Traction Company, the railway lines of the Washington Railway & Electric Company, and the Washington Rapid Transit Company, operating the bus lines in the



Miles of single track going into receivership during 1928 showed material reduction over 1927

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Table XI—Receiverships Terminated and Foreclosure Sales During 1928

Receivers Discharged With or Without Foreclosure Sales or Following Abandonment	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver's Certificates	
Washington-Virginia Railway, Washington, D. C.	40.00	$2,378,300	$5,614,000	None	Sold at foreclosure in 1927. Property now operated as the Mt. Vernon, Alexandria & Washington Railway and the Arlington & Fairfax Railway.
Chicago & Interurban Traction Co., Chicago, Ill.	50.00	1,000,000	1,816,000	None	Road has been dismantled and property sold.
Milford, Attleborough & Woonsocket Street Railway, Springfield, Mass.	29.73	315,000	300,000	None	Property liquidated and receiver discharged.
Grand Rapids, Grand Haven & Muskegon Railway, Grand Rapids, Mich.	44.09	1,200,000	1,500,000	None	Operations abandoned and property sold for dismantling.
Kansas City, Lawrence & Topeka R.R., Kansas City, Mo.	12.00	250,000	400,000	None	Operations discontinued in 1927. Reorganized as Kansas City, Merriam & Shawnee Railroad in 1928, now operating 5 miles.
Helena Light & Railway Co., Helena, Mont.	18.50	935,000	878,000	None	Property dismantled and receiver discharged.
Brooklyn Heights R.R., Brooklyn, N. Y.	5.10	200,000	250,000	None	Operations discontinued.
Geneva, Seneca Falls & Auburn R.R., Geneva, N. Y.	12.00	157,100	507,000	None	Sold at foreclosure and operations discontinued.
Olean, Bradford & Salamanca Ry., Olean, N. Y.	100.00	3,808,000	472,818	None	Operations discontinued.
Penn Yan & Lake Shore Ry., Penn Yan, N. Y.	8.50	94,000	100,000	None	Sold for scrap and receiver discharged.
Cincinnati, Lawrence & Aurora Electric Street R.R., Cincinnati, Ohio	31.67	808,900	None	None	Receivership lifted March 1, 1928.
Pennsylvania & Maryland Street Railway, Meyersdale, Pa.	7.00	190,800	216,000	None	Property sold to Associated Gas & Electric Company in 1926, and is no longer operating. Receiver discharged.
Total of receiverships terminated (12 cos.)	358.59	$11,337,100	$12,053,818	None	
Sold at Foreclosure Sale But Receiver Not Yet Discharged					
Indianapolis & Cincinnati Traction Co., Indianapolis, Ind.	101.00	$3,600,000	$2,600,000	156,000	Sold at receiver's sale.
Detroit United Ry., Detroit, Mich.	613.89	15,375,000	29,745,500	None	Sold at foreclosure sale and reorganized as the Eastern Michigan Railways.
Michigan Railroad Co., Jackson, Mich.	156.71	4,000,000	4,050,000	None	Sold at receiver's sale.
St. Paul Southern Electric Ry., Hastings, Minn.	17.54	658,225	364,900	12,150	Sold at public auction and property now being dismantled.
Total of foreclosure sales without discharge of receivers (4 cos.)	889.14	$23,633,225	$36,760,400	168,150	

District of Columbia. Nothing came of the matter, but it is again subject to legislative consideration.

Then there was the move by which the Public Service Railway and the Public Service Transportation Company, both subsidiaries of the Public Service Corporation of New Jersey, were brought together as Public Service Co-ordinated Transport, the avowed reason being to improve the financial structure, including the possibility of an open-end mortgage under which it would be easier to secure new capital for the extension and betterment of transit facilities. The managerial purpose of the consolidation was to co-ordinate into one operating unit the two companies which had previously operated the cars and the buses.

In Philadelphia the move to have the city condemn the underliers was strictly in accord with the suggestion of the committee on finance of the American Electric Railway Association, looking toward the simplification of financial structures. It is an act without precedent—a friendly action before the Public Service Commission, in which the City Council and officials of the underlying companies joined with the City Solicitor and his staff in petitioning the commission to affix a fair price for the acquisition of the Philadelphia Rapid Transit Company underliers by the city. At the close of the year this matter was still the subject of discussion, but the advisability of the move had come to be generally accepted as essential, except on the part of some holders of the underlying securities, jealous of what they deemed their present favorable rights—rights by no means irrevocably secured under the changing aspects of present-day transportation.

As indicated elsewhere in this issue Judge Finletter, in Common Pleas Court, recently fixed Jan. 19, to hear the petition asking for a court ruling on whether the $138,376,907 which the city proposes to pay for the purchase of the underlying companies of the Philadelphia Rapid Transit may be deducted from the city's indebtedness in ascertaining its borrowing capacity. To date Controller Hadley has failed to join in the court action. The city intends to issue bonds in the amount needed to acquire the franchise of the underliers. The company now pays $8,822,845 annually to the subsidiaries as rentals, but Mr. Hadley desires that assurances be made to the city that the transit company will continue to pay rentals sufficient to meet bond sinking-fund and interest charges.

One or two moves saw the further segregation of railway properties from light and power properties with

NOT even the most optimistic street railway man believes the industry is out of the woods yet or anywhere near it, but they are all now certain that any idea of extinction was merely a nightmare, that the bottom has been touched and the way is now upward.—*Investment Bankers' Association.*

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Table XII—Electric Railway Receiverships as of Dec. 31, 1928

	Year of Receiver-ship	Miles of Single Track Involved	Capital Stock	Funded Debt	Receiver's Certificates
Illinois					
Chicago Railways, Cnicago	1926	597.06	$100,000	$103,854,255	None
Peoria Railway Terminal Co., Peoria (1)	1922	25.28	1,000,000	2,444,000	None
Indiana					
Chicago, South Bend & Northern Indiana Ry., South Bend	1927	125.00	7,500,000	4,955,500	None
Evansville & Ohio Valley Ry., Evansville	1927	70.00	511,985	1,960,900	None
Indianapolis & Cincinnati Traction Co., Indianapolis (2)	1925	101.00	3,600,000	2,600,000	$156,000
Southern Michigan Railway, South Bend	1928	32.05	2,000,000	1,145,000	None
Union Traction Co. of Indiana, Anderson	1924	445.50	11,500,000	15,858,000	None
Iowa					
Des Moines City Ry., Des Moines	1927	103.31	3,019,100	4,821,000	None
Mississippi Valley Electric Co., Iowa City	1926	6.00	592,835	184,500	None
Kansas					
Joplin & Pittsburg Ry., Pittsburg	1924	94.52	7,000,000	3,078,500	None
Missouri & Kansas Railway, Kansas City	1928	20.03	1,000,000	655,000	None
Union Traction Co., Coffeyville	1927	85.00	700,000	1,500,000	None
Kentucky					
Owensboro City R.R., Owensboro	1923	12.50	75,000	400,000	None
Massachusetts					
Milford & Uxbridge Street Ry., Milford (1)	1926	35.00	540,000	500,000	None
Michigan					
Detroit United Ry., Detroit (3)	1925	613.89	$15,375,000	29,745,500	None
Houghton County Traction Co., Houghton	1921	32.15	957,200	660,000	None
Michigan Railroad Co., Jackson (2)	1924	156.71	4,000,000	4,050,000	None
Minnesota					
Minneapolis, Anoka & Cuyuna Range Ry., Minneapolis	1926	29.25	300,000	284,000	None
St. Paul Southern Electric Ry., Hastings (4)	1918	17.54	658,225	364,900	$12,150
Wahpeton-Breckenridge St. Ry., Breckenridge	1925	1.00	42,500	None	None
Missouri					
Hannibal Railway & Electric Co., Hannibal	1927	6.50	111,165	102,500	None
Southwest Missouri R.R., Webb City	1926	90.00	5,000,000	2,341,000	None
New Jersey					
Atlantic & Suburban Ry., Atlantic City	1928	16.00	150,000	691,000	None
New York					
Auburn & Northern Electric R.R., Syracuse	1928	(a)	(b)	236,000	None
Binghamton Ry., Binghamton	1925	47.31	978,895	2,807,200	None
Buffalo & Erie Ry., Fredonia	1928	96.23	1,450,500	910,300	$37,479
Buffalo & Lackawanna Traction Co., Buffalo	1918	8.80	55,000	1,000,000	None
Eighth & Ninth Avenues Ry., New York	1927	37.27	232,000*	None	None
Empire State R.R., Syracuse	1927	70.00	2,950,000	2,750,000	None
Hamburg Ry., Buffalo	1920	21.72	None	750,000	$4,000
Ithaca Traction Corp., Ithaca	1924	12.72	400,000	763,000	$25,000
Manhattan & Queens Traction Corp., Long Island City	1917	21.66	20,000	None	None
New York & Queens County Ry., Jackson Heights	1923	35.07	3,235,000	1,300,000	None
Ogdensburg Street Ry., Ogdensburg	1922	7.74	150,000	150,000	None
Second Avenue R.R., New York	1908	23.96	1,862,000	5,682,000	$3,140,000
Staten Island Midland Ry., Brooklyn	1920	28.68	1,000,000	1,000,000	$3,000
Steinway Ry., New York	1922	31.11	None	1,500,000	None
Syracuse, Lake Shore & Northern Ry., Syracuse	1928	(a)	(b)	2,496,000	None
Westchester Street R.R., New York (1)	1920	16.32	700,000	168,000	None
Ohio					
Indiana, Columbus & Eastern Traction Co., Springfield (5)	1921	153.23	4,025,000	7,900,000	$65,000
Springfield Ry., Springfield	1928	40.54	1,500,000	1,335,400	None
Oklahoma					
Lawton Railway & Light Co., Lawton	1927	6.31	100,000	100,000	None
Tulsa Street Ry., Tulsa	1925	23.00	580,000	771,000	$25,000
Pennsylvania					
Schuylkill Ry., Girardville	1927	34.00	400,000	1,550,000	None
Utah					
Salt Lake & Utah R.R., Salt Lake City	1925	97.55	5,043,700	2,532,320	$200,000
Washington					
Puget Sound Electric Ry., Tacoma	1928	57.10	3,116,200	7,322,000	None
Net receiverships Dec. 31, 1928 (45 cos.)	....	3,585.61	$93,531,305	$225,218,775	$3,667,629

(a) Included with Empire State R.R. figures.
(b) Information not available.
(1) Sold at foreclosure in 1927. Receiver not yet discharged.
(2) Sold at receiver's sale.
(3) Sold at foreclosure and reorganized as Eastern Michigan Railways. Receiver not yet discharged.
(4) Property being dismantled.
(5) Merged with Cincinnati, Hamilton & Dayton Ry. Receiver not yet discharged.
* 58,000 shares. No par value. Based on market quotation.

which they had heretofore been identified, but under circumstances that gave every indication of the more intensive development of the railways under segregated operation. Outstanding examples of this tendency were furnished in the cases of the railways at Roanoke and Lynchburg. On the other hand, several railway systems in the Southeast, notably the Augusta-Aiken Railway & Electric Company and others, were brought into the system of the Southeastern Power & Light Company, surely a company with greater resources of management, money and men than at the command of these companies under previous ownership. Somewhat similar in import was the passage of the control of the Spokane United Railways to the American Power & Light Company along with the Washington Water Power Company, by which the railways were previously controlled. Similarly the Indiana, Columbus & Eastern and the Lima-Toledo properties passed to the Cincinnati, Hamilton & Dayton Railway. Also last summer the so-called Phillips interests took over the lines of the New York State Railways in Rochester and Syracuse and have since concluded negotiations by which the Schenectady Railway and the United Traction of Albany pass to their control, the latter system previously under the control of the Delaware & Hudson Company with L. F. Loree as its head.

Attention should be called to the fact that the Cincinnati Street Railway has placed its $50 par capital stock on a $3 annual dividend basis, against $2.50 paid previously and that the Montreal Tramways, paying $10 a share per year, recently offered holders additional rights on the basis of one new share for every six held at a price of $150 a share.

Restoration of the credit situation of the electric railways has been a slow process—painfully slow, for instance, compared with that of the electric light and power companies. Ten years ago some of the soundest utility organizations were unable to do better than finance with 8 per cent preferred stock and 7 per cent bonds, while direct liens on power houses, as one commentator has pointed out, were placed with issues that carried a 7 per cent coupon. In view of the favorable terms under which light and power companies are now able to do their financing, sight sometimes is lost of the facts of the period of high money rates only a few years removed. It should not be assumed, however, that terms for financing, similar to the favorable ones which prevail at present in the light and power field, are likely soon to be realized by strictly electric railway properties. On the other hand, as the report of the public service securities committee of the Investment Bankers' Association pointed out, while not even the most optimistic street railway men believe the industry is out of the woods or anywhere near it, they are now certain that the bottom has been touched and the way is now upward. And the financial record for the year would indicate this to be true.

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Electric Railway Fares and Wages

At Highest Point in 1928

These factors show increases similar to those of 1927. Commodity prices, construction costs and operating materials costs on slight upward swing during the year, but with no marked change from general level course of past five years

By Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

DURING the year 1928 the weighted average street railway fare in the United States increased from 7.57 cents to 7.71 cents. The measure of the 1928 increase in average fare, about 2 per cent, is almost exactly the same as the increase during the preceding year. The 1928 change in average fare was principally due to increases in Baltimore (two during the year), Los Angeles, St. Louis, Schenectady, Savannah, Portland, Maine, Youngstown and Sacramento. The effect of these changes on the weighted average fare is in the order in which the cities have been named. Other changes have had much smaller influence on the weighted average fare, on account of either the smallness of the fare change or the small population involved.

Changes in average fares during the three years 1926 through 1928, inclusive, are shown on the first of the accompanying charts. Two sets of averages are there shown, namely, the weighted average fare figures as computed by the writer, and the unweighted average cash fare figures of the American Electric Railway Association. In the Richey index, all cities in the United States of more than 50,000 population are included, and in computing the average the fares are weighted in accordance with the population of the cities; further, for each city where reduced rate tickets are used, an average fare is used which includes both cash and ticket rates; children's or workmen's tickets, or other forms of special reduced rates are not considered. New York City is excluded on account of its large population and abnormally low street railway fare. The American Electric Railway Association fare index includes all cities of more than 25,000 population and is an average of cash fares only. It is not weighted, so that each city is of equal importance in the final average, regardless of its size and the number of patrons affected by the fare.

Wage Increases on Seven Railways During Past Year

Indexes of the average wages of electric railway trainmen during the years 1926 through 1928, inclusive, are shown in Fig. 2. Here again two indexes are shown, both using 1913 as a base. In both indexes the maximum hourly rates of trainmen in two-man service are used. The Richey index includes wages on 137 street and interurban railways, and is weighted in accordance with the number of trainmen employed on such railways. The American Electric Railway Association index uses 85 railways and is unweighted with respect to the number

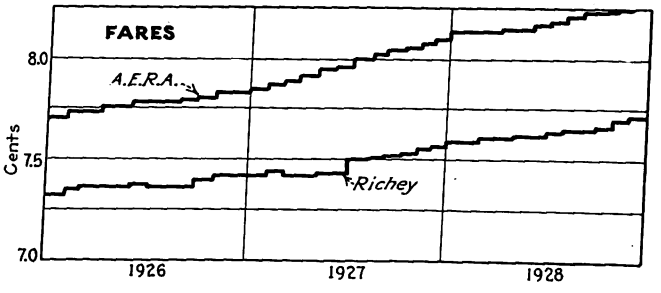

Fig. 1—Street Railway Fares (1913 = 4.8425 cents)

of men employed. Since the roads employing the greater number of men have had, as a rule, made larger increases in hourly rates since 1913, the Richey weighted index stands somewhat higher than the unweighted A.E.R.A. index, as is indicated by Fig. 2. Both indexes

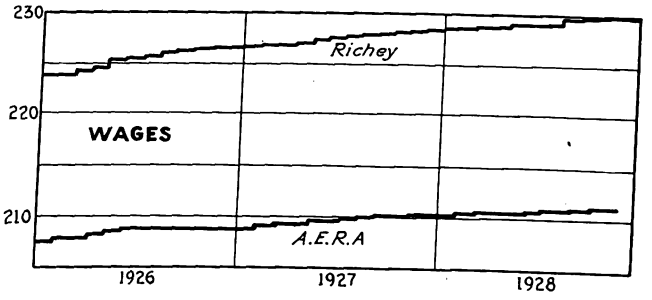

Fig. 2—Electric Railway Wages (1913=100)

show about the same measure of increase in trainmen's wages during the last year and during the last three years. The wage changes during 1928 which have principally affected the Richey index, and in the order of their effect on that index, were at Chicago, Cleveland, Baltimore, Pittsburgh, Atlanta, Eastern Massachusetts Street Railway, and Cincinnati.

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As pointed out in last year's article on this subject, the increase in electric railway wages, amounting to 130 per cent since 1913, is out of all proportion to the increase in the cost of living, which, as measured by the

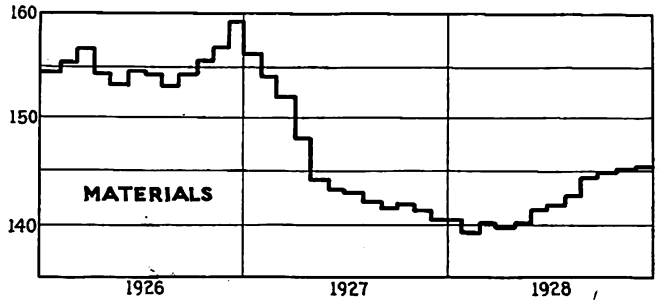

Fig. 3—Electric Railway Operating Materials (1913=100)

index of the National Industrial Conference Board, had increased only 63 per cent between 1914 and November, 1928. The "real wages" of electric railway trainmen as compared with 1913 and 1914 may be represented by an index number of 141, which is the present index of wages (230) divided by the present index of the cost of living (163). This means that the average electric railway trainman in the United States is now able to increase his standard of living 41 per cent over that of 1914. A similar computation a year ago showed the index of "real wages" of electric railway trainmen as 138, compared with the present 141, which indicates an increase in "real wages" of about 2 per cent during the past year. During this year, again, this has been due partly to increases in wages, but also in some measure to a decline in living costs.

Changes in Construction Cost Slight

The trend of costs of electric railway operating materials has been slightly upward during the past year, the index for December being 145.5 as compared with

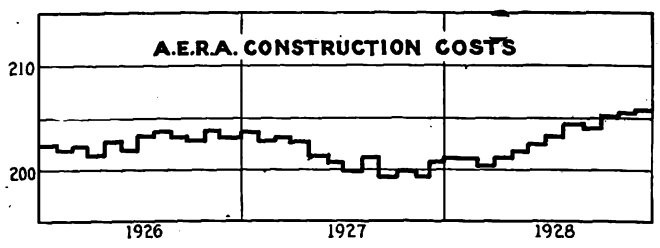

Fig. 4—A.E.R.A. Electric Railway Construction Costs (1913=100)

that of 140.6 for December, 1927. This rise is small compared with the drop which occurred during the first half of 1927 from the 1926 average of 155.0, as is indicated in Fig. 3.

Electric railway construction costs have remained at a remarkably uniform level during the past 5½ years, as indicated by the American Electric Railway Association Construction Cost Index, shown in Fig. 7, and on a larger scale for the past three years by Fig. 4. This index of electric railway construction costs may be compared with the construction cost index of the *Engineering News-Record,* as shown in Fig. 5, for the past three years. The latter is an index of general construction costs and includes structural steel and other building materials in a considerably greater weighting than such materials are used in the Electric Railway Construction Cost Index. The electric railway index is somewhat stabilized by the heavier weighting of steel rail, the price of which has remained constant since October, 1922; it has, however, a very much heavier weighting of the common labor item, the average cost of which increased nearly 2½ per cent during 1928.

The Wholesale Commodity Index of the United States Bureau of Labor Statistics is shown for the past three years in Fig. 6. As was noted in the article on this subject a year ago, this index, which previously had been calculated on the base of 1913 = 100, was discontinued on that base in August, 1927, and since then has been calculated on the base of 1926 = 100. The revision also included an increase in the number of commodities (from 404 to 550) and the adoption of a weighting somewhat different from that previously employed. The figures shown in the tabulation herewith include this index on its revised base for the years 1913 through 1928.

Five of the indexes mentioned above have been grouped together for the years 1914 through 1928, inclusive, in the chart shown as Fig. 7. The indexes there shown are: (1) The American Electric Railway Association Index of Electric Railway Construction Costs, (2) the Richey Index of Electric Railway Operating Materials Cost, (3) the Richey Index of Electric Railway Wages, (4) the Richey Index of Street Railway

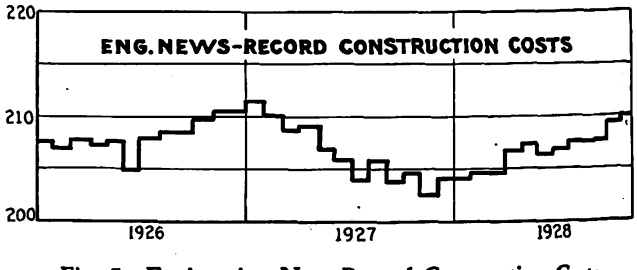

Fig. 5—Engineering News-Record Construction Costs (1913=100)

Fares, and (5) the U. S. Bureau of Labor Statistics Index of Wholesale Commodity Prices. The tabulation of numerical values includes these five and also the *Engineering News-Record* Index of General Construction Costs. The tabulation shows the averages of these indexes by years from 1913 through 1928, and also the monthly values from January, 1925, through 1928. It will be noted that all of the indexes shown in Fig. 7 and in the tabulation are on the base of 1913 = 100 except the Wholesale Commodity Price Index, which, as above noted, is on the base of 1926 = 100.

All of the above-mentioned indexes are included in a series of index numbers compiled regularly by the writer under the heading of "Conspectus of Indexes" and published monthly by Electric Railway Journal in its Financial and Corporate section. The Conspectus also includes the Bradstreet Wholesale Commodity Index, the U. S. Bureau of Labor Statistics Index of Retail Food Costs, the National Industrial Conference Board's Index

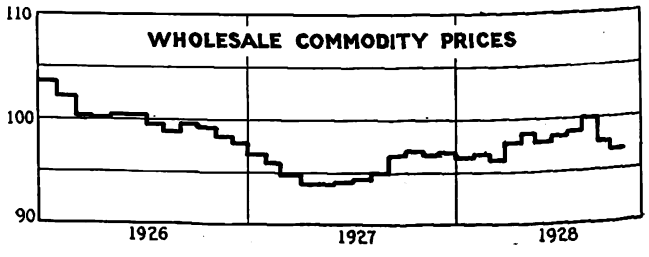

Fig. 6—Bureau of Labor Statistics Wholesale Commodity Prices (1926=100)

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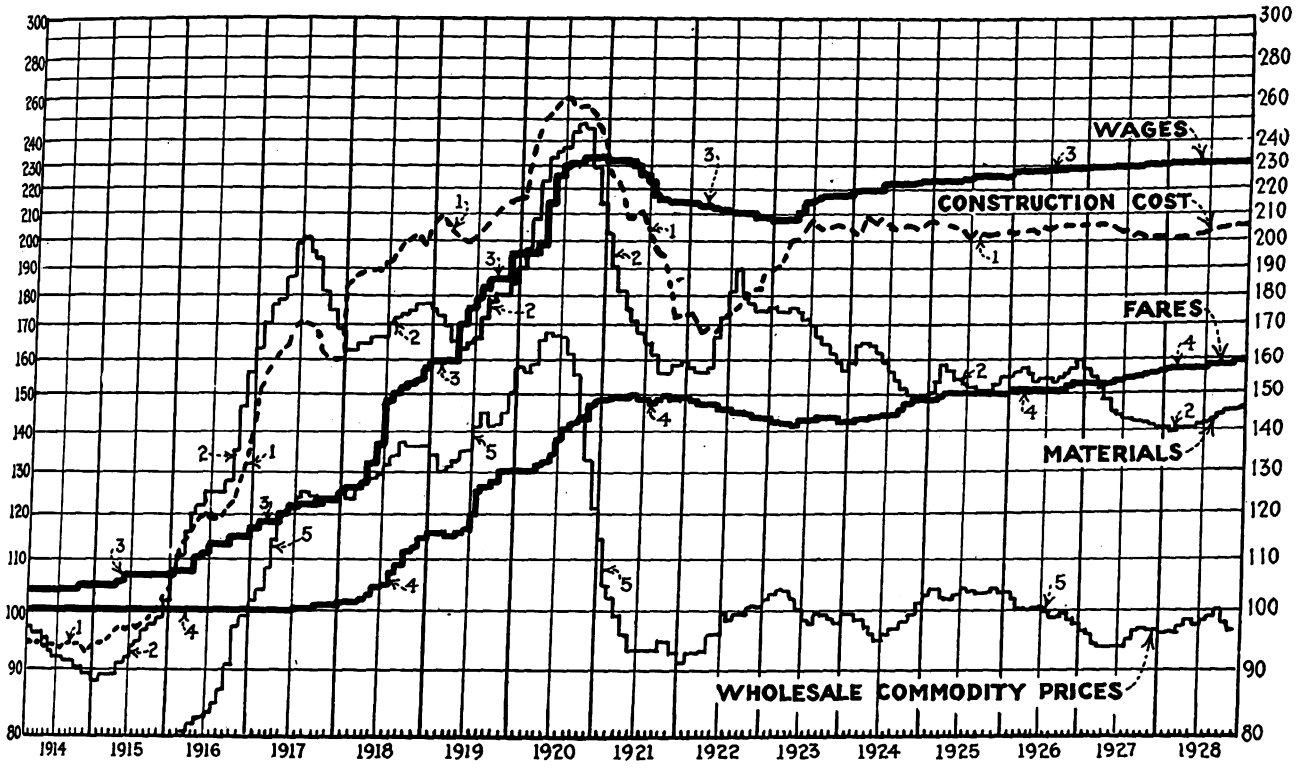

Fig. 7—Trend of Construction and Operating Costs, Wages and Fares 1914-1928

1. Electric railway construction costs (according to American Electric Railway Association).
2. Electric railway operating materials costs (Richey). Includes fuel for power; weighted according to average use in maintenance and operation.
3. Electric railway wages (Richey). Maximum hourly wages of platform men, weighted according to number of men.
4. Street railway fares (Richey). U. S. cities (except New York); weighted according to population.
5. Wholesale commodity prices (U. S. Bureau of Labor Statistics).

AVERAGE FARES AND COSTS 1913-1928

Base 1913 = 100

	Street Railway Fares (Richey)	Elec. Ry. Operating Materials Costs (Richey)	Electric Railway Wages (Richey)	Elec. Ry. Construction Costs (Am. Elec. Ry. Assn.)	General Construction Costs (*Eng. News-Record*)	Wholesale Prices, All Commodities* (U. S. Bur. Lab. Stat.)
1913.....	100.0	100.0	100.0	100.0	100.0	69.8
1914.....	100.0	92.6	104.2	94.0	88.6	68.1
1915.....	100.1	93.5	106.2	97.3	92.6	69.5
1916.....	100.1	126.2	111.6	119.8	129.6	85.5
1917.....	100.3	181.9	120.6	162.7	181.2	117.5
1918.....	106.2	168.8	140.5	192.5	189.2	131.3
1919.....	120.7	172.2	174.0	205.1	198.4	138.6
1920.....	137.2	224.6	217.3	244.7	251.3	154.4
1921.....	148.9	169.9	222.7	200.7	201.8	97.6
1922.....	146.0	170.0	210.0	175.2	174.4	96.7
1923.....	142.9	168.0	212.1	200.2	214.1	100.6
1924.....	149.2	156.0	219.2	204.6	215.4	98.1
1925.....	150.2	153.1	222.2	202.4	206.7	103.5
1926.....	152.2	155.0	225.3	202.6	208.0	100.0
1927.....	154.6	145.7	227.5	201.1	206.2	95.4
1928.....	157.7	142.2	229.3	203.1	206.8	.....

*Base 1926 = 100.

MONTHLY INDEX OF FARES AND COSTS FOR PAST THREE YEARS

Base 1913 = 100

1926	Street Railway Fares (Richey)	Elec. Ry. Operating Materials Costs (Richey)	Electric Railway Wages (Richey)	Elec. Ry. Construction Costs (Am. Elec. Ry. Assn.)	General Construction Costs (*Eng. News-Record*)	Wholesale Prices, All Commodities* (U. S. Bur Lab. Stat.)
January....	151.2	154.3	223.8	202.2	207.2	103.6
February...	151.8	155.3	223.8	201.9	206.6	102.1
March.....	151.9	156.4	224.1	202.0	207.6	100.4
April.....	151.9	154.2	224.7	201.3	207.0	100.1
May.....	151.9	153.1	225.4	202.4	207.3	100.5
June.....	152.1	154.4	225.5	201.9	204.8	100.5
July.....	152.0	154.1	225.7	203.2	207.8	99.5
August.....	152.0	153.1	225.9	203.6	208.3	99.0
September..	152.0	154.2	226.1	203.2	208.3	99.7
October....	152.8	155.4	226.2	202.9	209.8	99.4
November..	153.2	156.6	226.3	203.7	210.8	98.4
December..	153.2	159.2	226.3	203.2	210.8	97.9
1927						
January....	153.2	156.0	226.6	203.5	211.5	96.6
February...	153.8	154.0	226.7	202.9	210.2	95.9
March.....	153.4	152.1	226.7	203.0	208.8	94.5
April.....	153.4	148.0	226.9	202.6	209.0	93.7
May.....	153.6	144.2	227.4	201.0	206.8	93.7
June.....	153.6	143.0	227.5	200.6	205.6	93.8
July.....	155.2	142.9	227.8	199.9	203.7	94.1
August.....	155.3	142.1	227.9	200.9	205.5	95.2
September..	155.5	141.6	228.0	199.4	203.6	96.5
October....	155.7	141.8	228.2	199.8	204.4	97.0
November..	156.1	141.3	228.3	199.4	202.0	96.7
Decemoer..	156.2	140.6	228.4	200.7	203.9	96.8
1928						
January....	156.7	140.6	228.6	200.9	203.9	96.3
February...	156.7	139.5	228.7	200.9	204.6	96.4
March.....	157.2	140.1	228.8	200.5	204.6	96.0
April.....	157.2	140.0	228.8	201.2	206.4	97.4
May.....	157.3	140.4	229.2	201.9	207.0	98.6
June.....	157.3	141.4	229.2	202.7	206.2	97.6
July.....	157.7	141.8	229.2	203.3	206.6	98.3
August.....	158.0	142.5	229.7	204.5	207.3	98.9
September..	158.1	144.2	229.7	204.4	207.3	100.1
October....	158.2	144.9	229.9	205.5	207.7	97.8
November..	158.9	145.1	229.9	205.7	209.5	96.7
December..	159.3	145.5	229.8	205.1	210.2	.....

*Base 1926 = 100.

of Cost of Living, the *Electrical World's* Industrial Activity Index, an index of bank clearings outside of New York City, and data on the number and total liabilities of business failures as reported monthly by Bradstreet.

In the annual statistical numbers of the JOURNAL (the first or second issue in January each year beginning in 1923) charts and tables have been presented similar to those shown in this article. The methods used in the computation of the indexes shown in Fig. 7 were described fully on page 37 of the JOURNAL for Jan. 2, 1926, in an article which also contained a tabulation showing the numerical values of the various indexes monthly from January, 1920, through December, 1925. The earlier monthly numerical values, from January, 1914, through December, 1919, may be found on page 19 of the JOURNAL for Jan. 5, 1924.

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Trade Prospects Favorable

for the New Year

Car and equipment purchases expected to increase during the coming year. Larger demand for track material probable. Heavy sales of bus equipment likely to continue. General business conditions good

TRADE conditions in the electric railway industry were unsettled during the year 1928 and could scarcely be called as favorable as in 1927. Fewer cars were purchased, and, in almost every instance, producers of car equipment and accessories reported a decrease in sales. On the other hand some divisions of the industry reported substantial increases during the year. There were heavier sales of buses and bus equipment, shop equipment, and track materials and supplies, as well as of line material and power equipment.

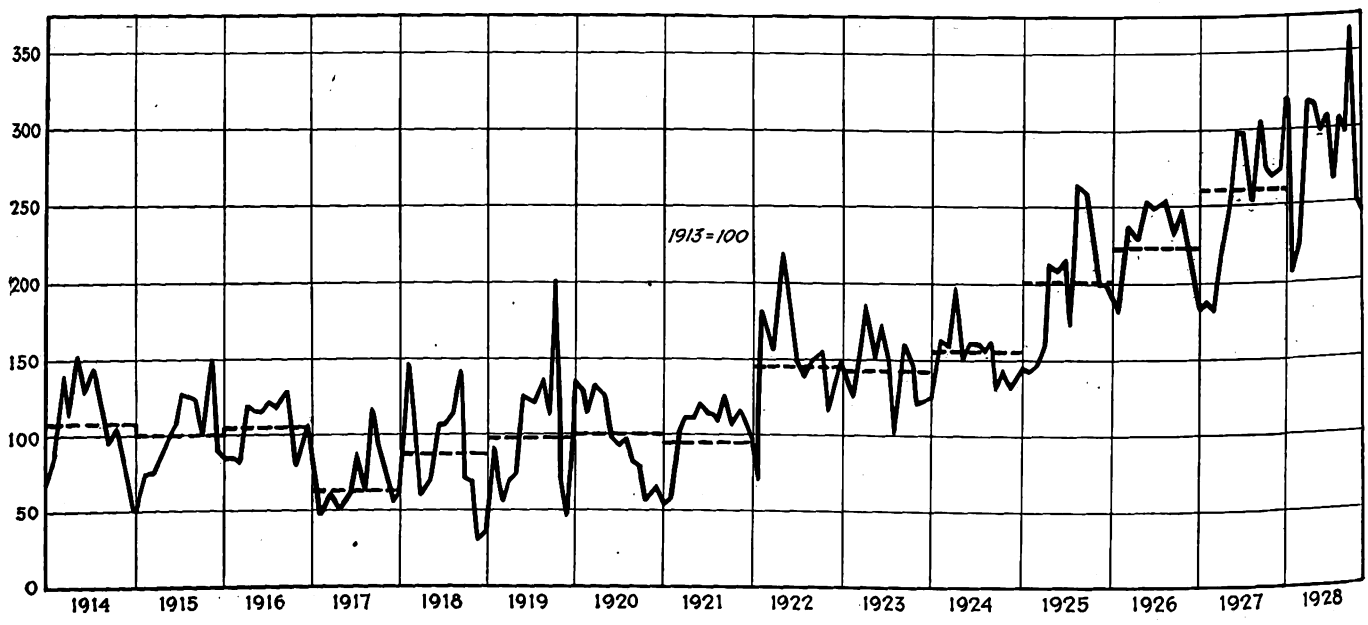
For several years there have been deferred purchases of cars and equipment. It has been predicted that this situation could not last indefinitely and it is now the opinion of many that the release of these purchases will occur this year. There has been much new development during the past year in cars and car equipment. As soon as the full value of these and other improvements now under way is realized, there should be an accelerated trend toward rehabilitation.

Many Improvements in Design

While the year 1928 in the railway equipment field has not resulted in the amount of business anticipated and hoped for, development effort by the manufacturers has been noteworthy. A number of companies have spent large sums for the improvement of their products. It appears that this research toward improvement will continue throughout the coming year, as the budgets for practically all of the larger companies show amounts for improvements that either equal or are greater than the amounts allotted last year. However, during this time, the manufacturers have had an opportunity to improve and perfect motors, drives and other types of equipment. Requirements have undergone a change over two or three years and are continuing along the lines instituted in 1927, in that higher speed, lighter weight and higher rates of acceleration and braking are required. A marked increase is anticipated in the demand for electric railway vehicles, and, necessarily, parts associated therewith. With the improvements that are now apparent in electric railway cars, it is anticipated that cars will be ordered in considerable quantities during the year 1929. Estimates on the increase in sales during 1929 made by various car equipment manufacturers on the products which they sell, range from 5 to 50 per cent of the 1928 sales.

Purchases of car seats and accessories fell off during the year. However, developments in car seating have been made, and it is indicated that there will probably be an increase in sales this year. The credit situation is satisfactory and it is believed that prices will have a tendency to go higher.

No particular changes occurred in 1928 in line mate-



Index of general construction volume is highest in fifteen years

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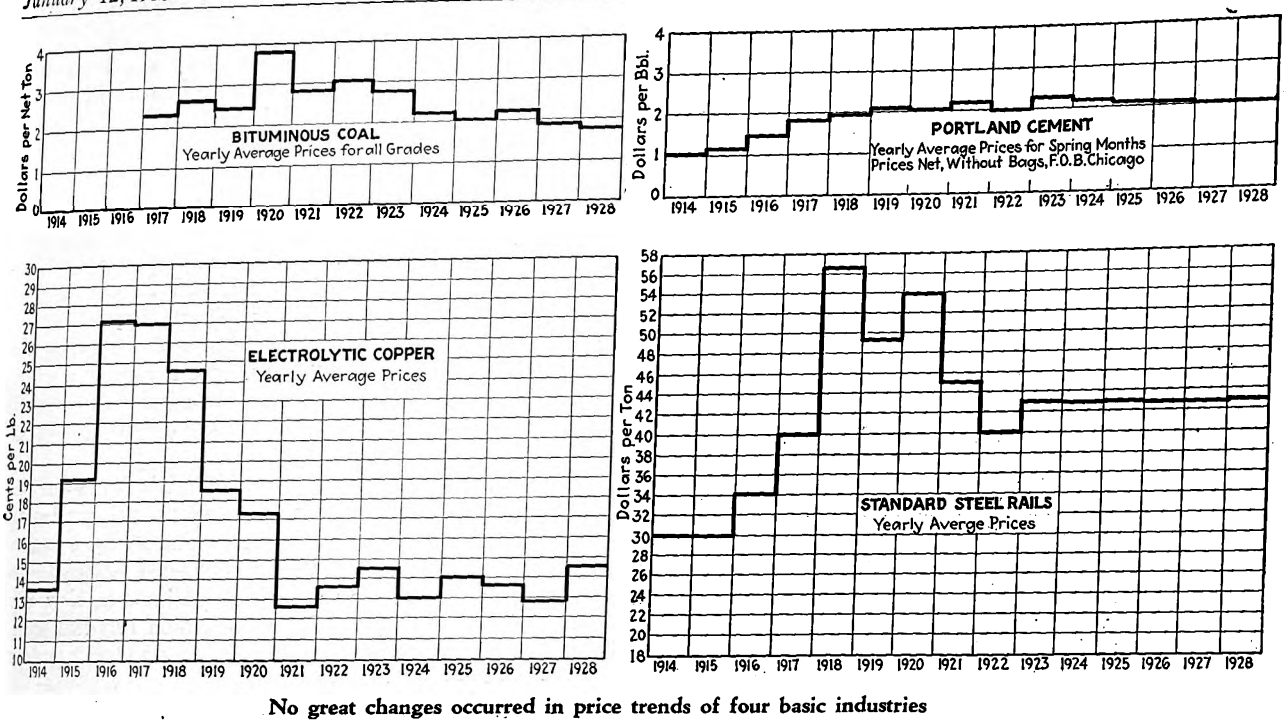

No great changes occurred in price trends of four basic industries

rials. The credit situation is satisfactory and prices have been steady, although the advance in copper toward the end of the year necessitated some increases. It is claimed that electric railways are becoming more receptive to new products which are fundamentally sound, and that there is apparently more recognition of value in the product and a keener realization that the first cost is not the total cost. It is probable that there will be a continued change in trade conditions during 1929, affecting these products. Several manufacturers report greater sales of track material during the year 1928 than for some years and are expecting a further increase during the coming year. Plant capacity is being increased, and additional developments are planned.

Bus Sales Increased

The sale of buses and bus equipment to electric railways increased during the year. Manufacturers of buses reported various increases up to 450 per cent of the 1927 sales. While this represents a maximum for one company only, a marked increase in sale of buses to electric railways is anticipated and a number of manufacturers are increasing their plant production capacity.

Sales of bus equipment went up 5 to 100 per cent during the year 1928, and increases are anticipated by various manufacturers for the coming year, ranging from 10 to 1,000 per cent of last year's sales. Development budgets for 1929 are materially greater than for 1928, and many plant production capacity increases will be made.

Increased purchases of shop equipment during the year are reported. Development in this type of equipment is expected throughout 1929 and further increases in sales are expected.

A representative number of railways indicate in their returns that approximately 33 per cent of their materials and supplies are purchased locally, that is, from local dealers, jobbers, distributors, or manufacturers as distinct from manufacturers selling to the industry through direct representatives or sales agencies. Such supplies as coal, oil and waste are almost always bought in this manner. Of course, this figure varies considerably according to the location of the railway.

Deliveries indicate that manufacturers are maintaining stocks for prompt shipment. The average time of delivery for car equipment, given by a number of railways, was 38 days, bus equipment 14 days, line material 23 days, track material 20 days, power equipment 35 days, and shop equipment 18 days. Only in a few remote instances of track material purchases was delivery indicated as very slow.

Supplies purchased on contract by the companies replying average 25 per cent of their total. Purchases on contract of these companies were approximately, electrical supplies, 56 per cent; gas, oil, and grease, 88 per cent; seating material, 21 per cent; brakeshoes, 52 per cent; lamps, 44 per cent. So far as reported, welding gas, tires, coal, line material, ties, paint and maintenance materials were purchased on contract to a limited degree.

Of the railways reporting on trade conditions, 53 per cent had a decrease in inventory. In value, the average decrease was approximately 7 per cent of the total material and supplies account. Sixty-nine per cent of the companies reporting had an inactive stock of approximately 8 per cent of their material and supplies accounts, but 30 per cent of them had an average decrease of 12 per cent in their inactive stock during the year.

The price advance on most products has been slightly upward, according to the purchasing agents. The principal increases in materials were: Copper, 12 per cent; lumber, 8 per cent; insulated copper wire 8 to 10 per cent; and anthracite coal 1 per cent. The principal decrease in prices was for brakeshoes, 3.7 per cent. Slight decreases were noted in lead and tin. The average price of all grades of coal has decreased during the year.

General Business Conditions Good

The general business situation at the turn of the year is distinctly encouraging and fully warrants the expectation that the prosperity which the country has enjoyed will continue. Basic conditions in industry and trade seldom have been so favorable after a long period of high

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activity. This optimism, of course, must be qualified by a word of caution as to the financial markets. No large volume of purchasing power is created by the advance in security prices except as it reflects proportionate increased earnings in fact or in immediate prospect. On the contrary, a pronounced market reaction would impair confidence and affect business adversely.

The rise in money rates is due largely to the policy of the Federal Reserve Board. A definite cessation of the speculative boom would probably cause a downward revision of money rates. However, the unequal distribution of the world's gold makes it difficult to anticipate a return to the easy money situation of the last seven years.

In general, the course of trade has been upward during the year, and with record production in the iron and steel, building and automobile industries, the demand has kept stocks of manufactured goods at lower levels than in 1927. In consequence, the commercial situation appears thoroughly sound despite the sustained industrial activity. Wages continue high and unemployment is at a minimum. The average weekly earnings for wage earners at the close of 1928 were the highest since 1920. Corporation earnings advanced materially over those in 1927. Retail trade exceeded that of the year previous by a wide margin and the purchasing power of the general public, both urban and rural, was substantially increased.

Good Outlook for Electric Railways

In the street railway industry, despite the readjustment which has been going on for some years, there is apparently a very general movement for the fifteen improvements of street railway properties, more particularly in the larger cities. However, this demand is not confined entirely to the larger cities requiring mass transportation. This is exemplified in the modernization program undertaken at Phœnix, Ariz.

Major car orders during the year included Montreal Tramways, 151 double-truck cars and 2 articulated units; Cincinnati Street Railway, 104 cars; Detroit Street Railway, 100 cars; and Cleveland Railway, 50 double-truck cars and 28 articulated units. Among important modernization programs carried out during the year was that completed by the Kansas City Public Service Company in installing modern control equipments on existing cars, and the Dallas Railway & Terminal Company by placing in service 17 new light-weight cars. Other companies making major improvements during the year include the Delaware Electric Power Company, the Indianapolis and Southeastern Railway and the Community Traction Company. Experiments on new rolling stock are being conducted by a number of railways in various sections of the country. During the coming year the city of New York is expected to commence the purchase of cars for its new subway system, the first order probably being for about 300 units. A number of large track projects were completed during the past year and good-sized programs for reconstruction and extensions are being announced for 1929.

While electrification of steam railroads during the past year was the greatest for many years, still greater are the prospects for the coming year. Among these projects on which plans are practically completed, is included the Pennsylvania Railroad electrification between New York and Philadelphia. The Cleveland Union Terminal project has been under way for several years and will probably near completion this year.

Electrification plans which have been definitely made include electric suburban service from Hoboken, New Jersey on the lines of the Delaware, Lackawanna & Western Railroad and from Philadelphia, Pa., on the Reading Railroad. Several other railways have definitely let it be known that they are actively engaged in making studies for electrification. The capital expenditures in prospect as a result of these undertakings will total hundreds of millions of dollars.

With few exceptions, optimism prevails in the electric railway industry. There should be additional equipment business in the year 1929. There is no doubt that the public in general is appreciating, as it never has before, the advantages to be secured by up-to-date and satisfactory street railway operation and are reflecting this confidence in better franchise and rate-of-fare conditions. The railway industry has had time to study and try out these new improvements and should now be in a position to go ahead with a program of purchasing new equipment during 1929.

Comments of a Bus Manufacturer

WE BELIEVE that the electric railway industry has passed the lowest ebb of its depression period and that there is a definite upward swing in progress affecting confidence as a result of increased earnings which should, no doubt, operate as a favorable factor in regard to bus and car purchases during 1929.

Comments of an Electrical Manufacturer

THE electric railway industry at present is in a much more satisfactory position than it has been for a decade. The principle is now generally accepted that only by means of a system in which the cars and the buses are properly coordinated under a single expert and responsible management can efficient urban transportation be secured and an effective remedy for traffic congestion be found. The automobile, which seemed at one time to threaten extinction of the electric railways, has brought about conditions which make the electric railway even more essential.

Comments of an Equipment Manufacturer

WE FIND the electric railways more and more receptive to new products which are fundamentally sound and which give promise of giving the railways a better and longer return on their investment. There is apparently more recognition of value in the products and a keener realization of the fact that the "first cost is not the real cost."

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News of the Industry

Need for New Fare Stressed in Cleveland

A demand for an arbitration on a zone-fare system was made on the City Council of Cleveland, Ohio, recently by the Cleveland Railway. In a letter to the Council, Joseph H. Alexander, president of the company, pointed out that since September the interest, or fare barometer fund, has been below $500,000, which, according to the Tayler grant, is *"prima facie* evidence of the necessity for an increase in fare" to the next step as provided by the Tayler grant scale. The present rate of fare is 7 cents cash, eight tickets for 50 cents; the next step calls for 8 cents cash, seven tickets for 50 cents.

Mr. Alexander then called attention to Section 24 of the Tayler grant. This states that whenever an increase is proposed other than to the next step in the Tayler grant, the proposal may be arbitrated. He pointed out that last June the company had proposed consideration of a zone plan, but that the Council had never taken any action. Accordingly he notified the city that the company desired to arbitrate the question and had appointed Attorney Charles Higley as its arbitrator.

The Council has always balked at any suggestion of a zone plan. It is preparing to resist the demand for an arbitration on the ground that a zone plan is not a proper subject for arbitration and that the proposal of the railway is too vague to arbitrate. Should the Council agree to arbitrate, it has until Jan. 16 to name its arbitrator. If the Council refuses to appoint an arbitrator, the railway is prepared to name a representative for the city, as provided in the arbitration clause of the Tayler grant.

The big stumbling block to a zone system of fares has been the separate suburban contracts. In the past six months, however, two of the suburbs, East Cleveland and Cleveland Heights, have been put on a zone plan, paying a differential of 2 cents for a thorough ride from the suburb to the city. Lakewood car riders still have the same rate of fare as Cleveland and a 3-cent local rate.

The proposal of the Cleveland Railway is to establish an inner and outer zone, the boundary to be at a convenient point from 4 to 5 miles from the Public Square. The rate within each zone would be determined by the condition of the interest fund, as at present, plus a differential, similar to that now in effect in East Cleveland, for a through ride.

As pointed out in President Alexander's letter, under this system only a few Cleveland riders would be required to pay an increase, while if a zone system is not adopted the fare will have to go to 8 cents.

C. M. Ballou, traction commissioner, told the Council that an 8-cent fare could be averted by permitting the company to operate one-man cars on a number of lines.

Petitions for an initiated ordinance to grant the Cuyahoga Subway Company a franchise in Cleveland, Ohio, were filed with the Cleveland City Council on Dec. 31 by Charles H. Hubbell, former candidate for Mayor of Cleveland and one of those interested in the subway company. M. F. Bramley, president of the Cuyahoga Subway Company, declared the filing of the petitions was unauthorized. Mr. Hubbell replied that he was disgusted with the delay and had filed the petitions to force action on the subway proposition before the Cleveland Railway and Van Sweringen interests presented a proposed $100,000,000 merger of surface, underground and transit lines on private right of way.

City Clerk Fred W. Thomas ruled that the petitions would have to stay on file and go through the usual procedure of being checked and considered by the Council.

Penn-Ohio System Wins Brady Medal

Awards distributed at meeting of Metropolitan Section of A.E.R.A., in New York. To be competed for again next year

AT A MEETING of the Metropolitan Section of the American Electric Railway Association held in New York City on Jan. 4, the feature was the presentation of the Anthony N. Brady Awards for Safety to the Penn-Ohio System, Youngstown, Ohio, the Tampa Electric Company and the Tidewater Power Company, Wilmington, N. C., with honorable mention to the Louisville Railway and the El Paso Electric Company. In addition to a large representation from the membership of the section there were present a number of prominent electric railway executives from various parts of the country.

Arthur Williams, president of the American Museum of Safety, expressed the belief that the work of the electric railways along the lines of accident prevention has been exceedingly valuable in re-establishing them in the estimation of the public.

J. P. Barnes, president of the American Electric Railway Association, told of the effect upon the personnel of his property, the Louisville Railway, of the winning of the Brady Award in 1926.

"There has never been a month since the winning of the award," said Mr. Barnes, "that has not seen more trainmen with accident-free records." The people of Louisville, he said, were quick to grasp the fact that their company had accomplished a noteworthy achievement, and the response had been a decided stimulus to community safety.

L. S. Storrs, managing director of the American Electric Railway Association, spoke briefly on the interest of the electric railways in the safety movement, explaining that accidents were now costing approximately 4 per cent of the gross receipts, and would be even more expensive but for the accident-prevention work which the properties were carrying on along systematic and methodical lines. "I am opposed," said the speaker, "to safety drives and campaigns of a week or a month. Every day must be safety day in our business." The ideal man for safety work, he explained, is not an enthusiast, but a man with a keen, analytical mind, a proper sense of values and, above all, a thorough understanding of human nature.

Col. A. B. Barber, manager of the transportation and communication department, Chamber of Commerce of the United States, spoke on "The Nation-wide Movement for Better Street and Highway Traffic." He told of the far-reaching effects of the measures taken by electric railways along the lines of accident prevention and the building up of good will among their employees. He said:

> If the electric railway systems in the country could be brought to realize the opportunity which the safety movement offers for their future welfare they would not delay in entering the contest for the Brady Awards. Furthermore, if local civic organizations appreciated what participation in this contest can effect in securing better street transportation service for their citizens, I believe they would be among the first to insist that the systems which serve them be entered in the contest.

The speaker explained the organization of the Hoover Conference on Street and Highway Safety, which has resulted in the adoption of uniform vehicle code and standard traffic ordinance, the standardization of traffic signs and of pavement markings. In telling of the excellent results that had followed the abolition of automobile parking in the Loop district of Chicago he paid high tribute to the work of officials of the Chicago railways, which had made these results possible. The colonel classified the present traffic regulations in New York as obsolete and cast doubt upon the assumption that the

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local situation was in any way unusual. Pennsylvania, he stated, had the best traffic laws. According to conservative estimates traffic delays are costing the country $2,000,000,000 a year.

Lewis Gawtry, chairman Brady Award committee of the American Museum of Safety, then presented the Brady medals. The gold medal, for companies operating over 5,000,000 car-miles during the year, was accepted on behalf of the Penn-Ohio System, Youngstown, Ohio, by C. S. MacCalla, vice-president of the property. Present also, representing the winning company, were R. P. Stevens, T. A. Kenney, W. H. Sawyer and R. N. Graham. Mr. MacCalla gave credit for the company's excellent showing to the close co-operation of its employees.

In 1928 the Penn-Ohio System won the Coffin Award and also annexed an award offered by *Forbes Magazine*, for notable progress made in the field of establishing better public relations. The Penn-Ohio System is the only property to have the distinction of receiving all three of these awards.

The silver medal, for properties operating between 1,000,000 and 5,000,000 car-miles in 1927, was accepted for the Tampa Electric Company by C. S. Edwards, head of traffic. Mr. Wendell accepted the bronze medal on behalf of the Tide Water Power Company, Wilmington, N. C., which won the award during the previous year. Certificates of honorable mention were awarded the Louisville Railway, which won the gold medal in 1926, and to the El Paso Electric Company, which won the silver award that year.

The awards will be made next year.

The Brooklyn City Railroad Band made a surprise appearance, coming direct from its engagement on the Keith Circuit. Employees of the Brooklyn City Railroad also put on a splendid minstrel show.

Boston's Mayor Sees Inadequate Transit Facilities

Mayor Malcolm E. Nichols, in his fourth annual address to the City Council, drew attention to the inadequacy of the rapid transit facilities of metropolitan Boston as being "far from what they should be." He claimed that the run-down condition of the Boston Elevated when it was taken under public control in 1918 was a matter of common knowledge.

His address in part follows:

During the past ten years the physical properties of the Elevated have been rehabilitated. In the ten years ending Dec. 31, 1927, $22,115,563 had been expended from the depreciation account by the public trustees and included in the cost of service to the car-rider, as against $1,006,249 similarly applied in the preceding ten years. I believe that necessary rapid transit extensions should be provided with comparatively slight, if any, burden on the taxpayer.

I shall urge upon the Legislature this year the construction of the Huntington Avenue Subway, the extension to Day Square in East Boston, the extension of the Boylston Street Subway to Harvard Avenue, with the necessary extension on Beacon Street at Governor Square, and the extension of the Elevated from Forest Hills out Hyde Park Avenue to a station near Mt. Hope to care for the residents of Hyde Park, and thence across the main line of the New Haven Railroad and Washington Street to the West Roxbury Branch, and thence along the West Roxbury Branch through Roslindale and West Roxbury.

P.R.T. Offers Aid in Traffic Problem

DURING this last year it has become increasingly apparent in Philadelphia that the factor of street-traffic congestion is having a strangling effect upon business and industrial prosperity. Traffic in the central business area and in various important outlying business centers has seemingly reached—and passed—the saturation point. Not only the public transportation mediums but almost all other phases of the city's economic life are vitally affected by the resulting congestion.

All authorities agree that sweeping steps should be taken to correct this condition before Philadelphia can hold its present industrial leadership and hope for future expansion. Accordingly, Mitten Management, operator of the Philadelphia Rapid Transit Company, has volunteered the services of its engineers and traffic experts toward the working out of a solution for this problem. Already comprehensive steps have been taken in making a city-wide survey of traffic conditions, with a view to preparing a plan for the city which will make possible immediate relief from congestion.

The features of co-ordinated transportation in this community have been and will continue to be applied toward the elimination of congestion caused by the public transportation services; 1929 will be a year of increased activity for every member of the P.R.T. organization.

R. T. SENTER,
President Philadelphia Rapid Transit Company, in the Philadelphia *Ledger*.

Jeweled Badges for Chicago Employees

Nearly 1,000 veteran employees of the "L" lines were presented recently with jeweled service badges by Britton I. Budd, president of the Chicago Rapid Transit Company, Chicago, Ill. A total of 923 men and 75 women employees, who have worked on the "L" for twenty years and upwards, were awarded the jeweled emblems, accompanied by a personal letter of congratulation from Mr. Budd. The wives of the veteran employees received annual passes on the lines for their personal use.

A survey of employment records on the "L" showed that 35 employees had been with the railroads for 35 years; 145 more than 30 years; 317 more than 25 years and 501 more than 20 years. The years of service are denoted by the jewels in the gold badges, 20-year badges having one ruby; 25 years, two rubies; 30 years, three rubies and 35 years, one diamond. About 17 per cent of the entire working forces on the "L" lines are represented in the veterans' legion.

Electric Railway Status Before Commission

The bill, introduced by Representative Johnson of Indiana, designed to clarify the status of electric railways in relation to the Interstate Commerce Act, which was opposed by the Interstate Commerce Commission last session, has been brought forth again with modifications. This revised measure is now being considered by the commission, which must approve the matter before it can be taken up by the House Committee on Interstate Commerce.

Mr. Johnson's bill proposes to place a type of electric railway, to be designated as a commercial electric railway, on a parity with steam lines as far as the Interstate Commerce Act is concerned. The commission last year expressed a willingness to grant this parity of rating, but disapproved the method of classifying commercial electric railways.

Supporters of the bill state that, in general, the measure has been modified so as to meet many of the objections raised by the commission. It is pointed out also that particular attention has been directed toward retaining control of electric railways in the hands of local agencies, so far as this can be done. Although it is not believed that the commission will be able to report on the measure in time to have it receive attention by Congress this session, it is thought that the effect will be to emphasize the necessity of clarifying the electric railway phase of the Interstate Commerce Act.

Children Favored in Westchester

An amendment, approved by the commission, to the tariff of the Westchester Street Transportation Company, Inc., controlled by the Third Avenue Railway System, New York, N. Y., establishes a new regulation to the effect that school children in regular attendance at schools served by its lines, on which the fare for a single ride or in a single zone is not less than 10 cents, will be permitted to ride between the hours necessary for attendance at schools, for a 5-cent fare in any single zone. A certificate from the principal of the school stating that the pupil is a regular attendant, must be presented at the time of fare payment.

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Subway Film Shown in Philadelphia

A motion-picture film made by the Department of City Transit, Philadelphia, Pa., depicting the construction of the Broad Street subway, was shown for members of the Special Libraries Council at a meeting in the offices of the department in City Hall Annex on Jan. 4. Details of the work were explained by Norman M. Rolston, the department's photographer, as the film progressed.

Colonel Alexander on the Passing of the Straphanger

"Elegance came to Cleveland's streets with the inauguration of the new duplex car train service, the last word in metropolitan street transportation. The forerunner of similar de luxe service that will one day soon serve all the city, the new cars are the finest combination of comfort, convenience, speed and safety yet devised. Luxurious appointments combine with the most modern heating, lighting and operating devices to make these new trains the ultimate in travel accommodations. The day of the straphanger is passing, for these cars have the ample accommodations of a transcontinental limited, they start with the easy acceleration of an automobile and stop without a stutter on a dime."

So says Joseph H. Alexander, president of the Cleveland Railway, Cleveland, Ohio, writing in the Cleveland Trust Company monthly for November. As Mr. Alexander sees it, there is no more important factor in this day of rapid metropolitan transportation than accessibility and today it is measured in terms of minutes rather than of miles. He says to the public of Cleveland that no matter where its destination may be, there is a street car that will take you there. As near as the nearest car stop, as free from traffic worries as your fireside, the chief points of civic and industrial interest of Cleveland are at your command. Parks, theaters, churches, schools stores, even the great out-of-doors is reach easily, quickly, conveniently and cheaply by street car. Mr. Alexander continues:

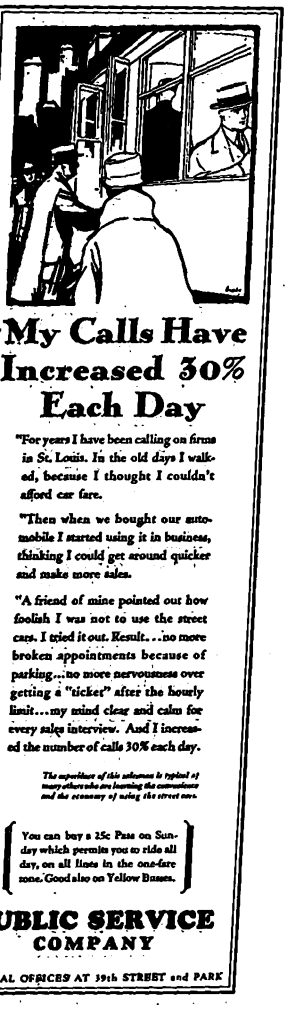
It's a far cry from the days when the late John L. Stanley drove a horse-car and it seems almost as far from the days of the Municipal Traction Company and the 3-cent fare of the late Tom L. Johnson, but the basis of the service of the Cleveland Railway was founded in those days of stress and the constant effort to keep just a little ahead of the rest of the country, in the type of service offered to Cleveland, has reached from those early days to the present.

When the business of the Cleveland Railway is good, the car rider, not the stockholder, benefits. At present 6,200 people own the stock of the company and through the Tayler grant they are paid only the 6 per cent return upon their investment and no more. All expenditures are authorized by the Cleveland City Council. The service is fixed by City Council and the fare is determined by the cost of that servcie. No other large city in the United States has had a car fare so low as Cleveland and no city a service equal to that offered by the Cleveland Railway.

Six thousand people are employed by the Cleveland Railway and their salaries amount to more than $10,000,000 a year. That may give some idea of the scope of the work that goes on behind the motorman and the conductor.

One of a Series in St. Louis

The St. Louis Public Service Company, St. Louis, Mo., is using considerable newspaper advertising space to popularize the use of street cars and



to combat the inroads of automobiles on street car revenue. Part of the copy is from the personal experience of street car users.

A typical ad was from a salesman who increased his calls 30 per cent a day by using the street cars instead of his own automobile. He met with no delay over parking space and suffered no worry over possibility of getting a summons while making a sale.

The no-parking rule for the downtown section of St. Louis, Mo., which proved effective in the Christmas shopping period, has been continued in force by Chief of Police Gerk. Enforcement of this rule is simply a matter of courtesy on the part of autoists as there is no city ordinance covering it. However, the police experienced little difficulty in keeping the streets clear of automobiles.

City and Interurban Co-ordination at Milwaukee

Progress is reported in the work of co-ordinating the city and interurban lines of the former Milwaukee Northern Railway with the rest of the system of the Milwaukee Electric Railway & Light Company. The most modern one-man safety cars of the Milwaukee Electric are being operated, greater frequency of service has been established, universal transfer privileges extended, and other improvements made.

At the same time, designated city stops have been made effective on the Northern Division interurban line, in accord with the practice on the rest of the rapid transit system of the Milwaukee Electric. These improvements were made possible by the merger of the Milwaukee Northern Railway with the Milwaukee Electric several months ago.

Rapid transit service between Milwaukee, Racine and Kenosha has been improved further by extension of local city service from Racine north to the Four Mile road. Interurban cars now make only certain designated stops in the city of Racine while the new local service takes care of the city and suburban passengers formerly carried on the interurbans.

New freight connections have been constructed and car inter-change arranged for between the East Troy-Burlington Rapid Transit line and the Chicago & Northwestern and the Chicago, Milwaukee, St. Paul & Pacific Railroad systems. Through freight tariffs have been filed and as a result shippers are able to save the additional switching charge formerly collected by the steam roads.

Stations benefitting most from the new plan are East Troy, Big Bend, Muskego and Rochester. Mukwonago and Burlington are already served directly by steam railroads, but will also be able to ship via Milwaukee Electric and Northwestern or Milwaukee steam roads.

Older Employees May Be Saved in Seattle

The preference prescribed for former service men under a city charter amendment, voted by the people as a post-war measure, must be observed in trimming down the operating force of the Seattle Municipal Street Railway System, Seattle, Wash. This decision was reached by the Civil Service Commission after two conferences between representatives of the street car men's union and George B. Avery, superintendent of city utilities, had failed to settle the question satisfactorily. Approximately 110 street car motormen and conductors are to be dropped from the payroll when Mr. Avery replaces shortly most of the city's two-man street cars with one-man equipment as part of his retrenchment program. Union officials have maintained that seniority rules and personal efficiency should decide which men are to keep their jobs.

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Ohio Property Sold

The Southern Ohio Public Service Company, which operates between Columbus and Zanesville, Ohio, has been sold to the American Gas & Electric Company, of New York. The purchase includes all property and holdings of the company. It was understood the deal involved several millions of dollars. It is part of the $17,000,000 expansion program announced by the American Gas & Electric Company.

Permission was recently granted by the Ohio State Utilities Commission to the Southern Ohio Public Service Company to discontinue the Columbus-Zanesville line on Jan. 15. Officials of the New York concern said they would abide by the decision of the commission. Southern Ohio Public Service Company will continue to operate under the same name with E. J. Wagenhals, Newark, Ohio, as general supervisor.

Ordinance Perfection Going Forward in Chicago

Several provisions in the proposed ordinance for the unification of Chicago elevated and surface lines are being questioned as to their constitutionality by attorneys for the companies. In the opinion of the attorney for the Chicago Railways several sections of the city's ordinance draft, upon which negotiations have been proceeding since last October, will not stand test. He referred specifically to the provision requiring the city to pay the discount on all new capital to be invested in the consolidated system. Further study is being given to the validity of the section authorizing the city to buy the bonds of the new company. As an alternative it was suggested that the negotiating committee consider the ordinance prepared several years ago by Francis X. Busch, former corporation counsel, which did not necessitate enabling legislation. The attorney also urged the committee to ask the General Assembly for the required legislation before deciding upon the terms of the ordinance.

A similar recommenation was made several weeks ago by A. W. Harris, chairman of the Chicago Railways' bondholders protective committee. It is reported that the new Citizens Traction Settlement Committee, appointed by Federal Judge Wilkerson, also believes that enabling legislation should precede the passage of a franchise ordinance. Six bills conferring the power to make the new ordinance effective were prepared recently by the Corporation Counsel for submission to the legislature, but were not considered by the local transit committee.

Leonard A. Busby, president of the Chicago City Railway, contended that the discount on new money could be absorbed by amortization and as for the city buying the bonds of the company, it could use the money to buy other bonds and get just as good a return on the investment.

Mr. Busby added that before going to the Legislature and asking for new powers, an agreement on fundamentals in the proposed ordinance was necessary.

The session during the week ended in the Aldermen's deciding to continue the work of perfecting the present ordinance before seeking enabling legislation.

Action Deferred in Erie County

Following a public hearing, the Erie County Board of Supervisors, Buffalo, has deferred action on the proposed purchase of the franchise of the Erie County Traction Company operating an interurban line between Buffalo and Hamburg for $125,000. It is proposed to use the right-of-way to widen state highways which parallel the traction line. County Engineer George C. Diehl estimated it would cost between $1,500,000 and $2,000,000 to acquire rights-of-way if the route of the railway line is not purchased by the county and an additional $500,000 would be required to eliminate grade crossings.

Richard S. Persons, president of the Erie County Traction Company, said that upwards of $750,000 has been invested in the property and the amount asked for the right-of-way would only pay taxes and retire the first mortagage bonds. The railway company would scrap the line and substitute buses. People along the line are protesting the substitution of buses.

In this connection State legislation of a permissive but not mandatory nature will be sought by the Erie Supervisors to insure the legality of the proposed purchase of the railway between the Buffalo city line and town south.

The plan to purchase the property and widen the highway is approved by the trustees of towns affected. The Board of Supervisors believes it lacks sufficient power to negotiate the purchase without state legislation.

The Governor's Appointments

SEVERAL of the big appointments now made by Governor Fuller of Massachusetts are of importance chiefly to the Metropolitan district. The Boston newspapers accept as satisfactory the three men named as state trustees of the Boston Elevated Railway. Winthrop Coffin, who voluntarily retired, could not be replaced, in view of his long experience and special knowledge of public utilities, yet Messrs. Harriman and Johnson possess real qualifications for these positions. Gen. Charles H. Cole, the third appointee as trustee, should prove to be a capable representative on the board of a large section of the population served by the Elevated system. The competent Col. Charles R. Gow succeeds Mr. Harriman as chairman of the Metropolitan planning division and his prestige as an engineer is beyond question. — *Springfield Republican.*

United Corporation Organized

Bankers join to acquire certain minority interests in U.G.I., Public Service of New Jersey and Mohawk-Hudson

THE United Corporation has been organized under Delaware laws by J. P. Morgan & Company, Drexel & Company and Bonbright & Company, Inc., to acquire certain minority interests in the United Gas Improvement Company, the Public Service Corporation of New Jersey and the Mohawk-Hudson Power Corporation held by the organizers and the American Superpower Corporation. The capitalization of the corporation is as follows:

	Authorized, Shares	To Be Presently Issued, Shares
First preferred stock.....	1,000,000 (no par value)	None
Preference stock.....	2,000,000	944,187
Common stock.....	*10,000,000	3,810,853

*Four million shares will be reserved against exercise of option warrants.

There will also be presently issued option warrants entitling holders to purchase at any time without limit not in excess of 4,000,000 shares of common stock at $27.50 per share.

The preference stock presently to be issued will be known as three-dollar cumulative preference stock, will be entitled to cumulative dividends at the rate of $3 per annum, payable quarterly; will be redeemable at the corporation's option at $55 per share, and will be entitled on liquidation to $50 per share and accrued dividends.

There have been purchased by the organizers, for $20,000,000 cash, 800,000 shares of the common stock and option warrants for 2,000,000 shares of common stock. The balance to be presently issued of the common stock and option warrants and the 944,187 shares of three-dollar cumulative preference stock are to be issued in exchange for securities. The prices at which securities have been acquired by the corporation from the organizers are in excess of the cost to them, but below the present market.

The corporation's present assets will consist of the securities described, which have an aggregate value in excess of $130,000,000, and cash in excess of $20,000,000. The balance of the authorized capital may, in the discretion of the directors of the corporation, be issued for cash or property without offering to the stockholders. The directors of the corporation will be Thomas S. Gates, Alfred L. Loomis, Landon K. Thorne and George Whitney.

American Superpower Corporation Announcement

The American Superpower Corporation announced that at a meeting of its board of directors held on Jan. 12 the board unanimously voted to accept the offer of the United Corporation to exchange its holdings of Public Service Corporation of New Jersey and the United Gas Improvement Company for securities of the United Corporation.

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C.E.R.A. Committees Complete Plans

Rooms have been reserved by the hotel and arrangement committee of the Central Electric Railway Association for the annual meeting to be held at the Claypool Hotel, Indianapolis, Ind., Jan. 24-25, 1929, as follows: 100 rooms at $3.50; 75 rooms at $4; 25 rooms at $4.50; 10 suites at $10 (parlor, bedroom and bath).

These prices are for one in a room; $1.50 additional for two. Members are asked to make reservations with the hotel direct as early as possible.

Provision has also been made by the committee for the annual dinner on the evening of Jan. 24, at which time some unusual entertainment will be offered, and ample arrangements have been made for the entertainment of ladies attending the convention.

The program committee has practically completed its work and printed programs will be mailed out soon. The subjects selected are of vital interest to members of the association, and the committee has endeavored to secure some of the best available talent to address the meeting. Each member of the association is urged to attend and to take part in the discussions.

Federal Trade Postponment in Electric Bond & Share Case

Federal Judge Thomas D. Thatcher recently postponed for one month argument on the motion of the Federal Trade Commission to compel certain officers of the Electric Bond & Share Company to appear before the commission with ledgers and vouchers. Subpoenas for the officers were issued in October. They contended the Electric Bond & Share Company was not engaged in interstate business and not subject to investigation by the commission.

Judge Thatcher found himself disqualified from sitting in the case because he had represented the company as counsel before seeking the bench.

Railway Man of Alliance Honored

Everett W. Sweezey, general manager of the Stark Electric Railroad, Alliance, Ohio, and head of a large Ohio utilities combine, was named a director of the Alliance First National Bank at the annual meeting on Jan. 8. He will fill a vacancy on the board of directors.

One-Man Car Legislation in Pennsylvania

Legislation aimed at the operation of one-man cars has been prepared by two Allegheny County members for introduction into the Pennsylvania Legislature, now in session at Harrisburg. The bills will be sponsored by Representative George F. Howe and Representative Frank E. Hoofman.

Mr. Howe's bill would require a crew of more than one on cars operating over grades of more than 2 per cent. The other measure would require a crew of at least two persons on all cars with a seating capacity of 40 or more passengers.

Different Rates Sought in Holyoke

The Holyoke Street Railway, Holyoke, Mass., has petitioned the Public Utilities Commission for permission to revise its rates, so as to sell three tickets for 25 cents in place of four tickets for 30 cents as at present. Request also is made for permission to sell school children's tickets at the rate of 42 cents for ten instead of 38 cents for ten.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Jan. 14-18*—American Road Builders' Association, convention and road show, Cleveland, Ohio.**

***Jan. 15-16*—Kentucky Association of Public Utilities, annual meeting, Brown Hotel, Louisville, Ky.**

***Jan. 16-17*—Central Electric Traffic Association, La Salle Hotel, South Bend, Ind.**

***Jan. 22*—New York Electric Railway Association, mid-winter meeting and dinner, Hotel Commodore, New York, N. Y.**

***Jan. 23-25*—Electric Railway Association of Equipment Men, Southern Properties, and Southwestern Public Service Association, Mechanical Division, joint meeting, Houston, Tex.**

***Jan. 24-25*—Central Electric Railway Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 25-26*—Central Electric Railway Accountants' Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 28-Feb. 1*—American Institute of Electrical Engineers, annual convention, 33 W. 39th St., New York, N. Y.**

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, New Public Auditorium, Atlantic City, N. J.**

"4 C's" to Bring Success in Boston

Contact, Conference, Confidence and Co-operation are the four C's of a successful new year, the goal of the Boston Elevated Railway, Boston, Mass. They are words advanced by E. K. Hall, vice-president of the American Telephone and Telegraph Company, as the "4 C's" of good employer-employee relations in an address before the National Industrial Conference Board on Nov. 15, 1928. The Boston Elevated employees are asked to make the theory work in a practical way.

What Happens to Tokens in Rochester

With the advent of a 10-cent cash fare on railway and bus lines of the New York State Railways in Rochester on Jan. 1, the metal "takens" used for convenience in making change during the 9-cent fare's reign, are no more. The tokens will be held in reserve during the life of the present service-at-cost contract under which the railways operate their lines, as a reduction in fare is possible. Despite the 1-cent cash fare boost, the tickets can still be purchased at the old rate, 8⅓ cents each or twelve for $1. The change, railway officials expect, will result in an increased use of tickets. Under the 9-cent fare, it was estimated that about 60 per cent of riders used tickets. Thus the casual rider will bear the brunt of the fare increase.

The fare was raised to enable the railway to recoup the balancing fund of $300,000 created when the service-at-cost contract went into effect in 1920.

New Fare Agreement in Bloomington and Decatur

Demand of modification of the street car and bus fares in Bloomington and Decatur, Ill., has resulted in the Illinois Power & Light Corporation agreeing to establish a schedule of seven street car or bus fare tokens for 50 cents and fifteen for $1, effective Feb. 1. The company is retaining the present authorized fare of 10 cents with three tokens for 25 cents.

Wage Increase in York

An increase in pay for both motormen and conductors was a New Year's gift to employees on the York Railways, York, Pa. Under the new scale trainmen on two-men cars will receive an increase from 48 to 55 cents an hour and operators of one-man cars an increase of from 53 to 60 cents an hour. This increase was in recognition for "loyal and efficient" service. The company for the first eleven months of 1928 reported a decrease of approximately $60,000 in revenue.

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Recent Bus Developments

Buses May Succeed Manhattan Bridge 3-Cent Line

Transit Commissioner Charles C. Lockwood recently announced that he would recommend to the full commission that the Manhattan Bridge 3-Cent Line is "an undue obstruction to traffic" on the bridge. His action is in rapport with a resolution adopted by the Board of Estimate last October on the recommendation of Controller C. W. Berry, who urged the immediate purchase of the right-of-way at the price of $184,000. Later $206,760 was named as the price to be paid.

The railway franchise expires in 1937. It covers a surface route running from the Bowery at Canal Street to Flatbush Avenue, Brooklyn. Edward A. Byrne, chief engineer of the Department of Plant and Structures, stated that a temporary bus route would be established as soon as the tracks have been removed.

The Equitable Coach Company, in the amended franchise petition now pending in the Board of Estimate, seeks to operate a bus line across the bridge between the terminal points now connected by the 3-cent surface car route.

The surface car line's equipment includes sixteen cars, automobiles, poles, wire, paving and other supplies. The company's figure of $184,000 included $57,600 as payment for the equipment and $126,000 as the value of the unexpired portion of the franchise.

This purchase by the city was referred to in the ELECTRIC RAILWAY JOURNAL issue of Nov. 3, 1928.

Higher Fares on Rochester Lines

The Public Service Commission has approved a new schedule for the Rochester Railways Co-ordinated Bus Lines, Inc., under which the cash fare on its several lines in the city of Rochester, N. Y., is increased from 9 to 10 cents. Fares to or from points outside the limits of the city of Rochester are similarly increased. There is no change in transfer arrangements, except that on the Grand View Bus Line and Island Cottage Bus Line transfers issued by the New York State Railways will be accepted without additional payment.

Bus Likely to Supplant Whitestone Branch

The Long Island Railroad through George Le Boutillier, vice-president, has applied to the Interstate Commerce Commission for permission to abandon the Whitestone Branch, an electric division. In its application the company claims that three factors have forced the road to this conclusion. They are the continuous falling off of business for a number of years, resulting in an operating deficit of upwards of $10,000 a month, grade crossing eliminations required by the Transit Commission which would cost at least $4,000,000 and the fact that inevitably the city's own rapid transit lines must serve the territory traversed by the Whitestone Branch.

In addition to these considerations, the bus situation, which has been more or less in suspense for a considerable time, is rapidly straightening out and a comprehensive system of buses in the territory will be completed in the near future.

Change in Vehicle Requirements Proposed in Boston

Henry I. Harriman, for the Boston Elevated Railway trustees, has had filed at the State House a bill permitting the use of buses 31 ft. 6 in. long, instead of 29 ft. as the present law requires, on routes of the Boston Elevated and bus routes in the state authorized by the department of public utilities. At the present time, to conform to the Massachusetts law, buses have to be especially built, since the state's regulations differ from the other states.

Extensive Rerouting in Toledo

Toledo's most ambitious rerouting of its public transportation system in many years became effective on Jan. 1 when the new Franklin-Fulton bus line was put into service, a new Lincoln Avenue line created, and the Ottawa Park and Ottawa Hills line, serving the same territory partially, began operations in conformity with the railway-bus plan of the Community Traction Company, amending the Milner ordinance operation.

Announcement of the new bus routing was simplified by Commissioner E. L. Graumlich by issuing them to newspapers and in pamphlets in the form of a small map in black and white.

Bus revenue of the Community Traction Company, is now nearly three times as great as it was a year ago.

The Bancroft Belt line, one of the oldest railway lines in Toledo, was abandoned on Dec. 31, 1928. Thomas Shirley, a motorman on the railway lines in Toledo for 35 years, was assigned to take the last car around the loop. He had broken in on the line about four years after it started. On the car that night were passengers whose parents Shirley had carried to school on the cars of the old line.

The Bancroft Belt was one of the lines laid out in 1889 by the Toledo Electric Street Railway. Two of its sister lines have been abandoned in recent years. It was one of the so-called Robison lines. Loss of this line will be compensated by a new bus line.

New Certificate Sought by Pacific Electric

The Pacific Electric Railway has applied to the Railroad Commission for a certificate of public convenience and necessity to operate an auto stage service between Wingfoot (Pacific Electric Station) in Los Angeles and the Ford plant in Long Beach and intermediate points.

Seattle-Tacoma Now Has Reduced Rates

After providing transit facilities between Seattle and Tacoma for the past 26 years, the Seattle-Tacoma interurban line of the Puget Sound Electric Company ceased operations on Dec. 30. At 11:30 o'clock, single-car trains left the Seattle Station and the Tacoma Station on the last runs over the line. They were manned by four men who have been with the line since its establishment in 1902. When these cars reached their terminals one hour and ten minutes later, the road passed into history. The competition of auto stage lines and private automobiles has caused a falling off in passenger traffic so great that abandonment became necessary. Rolling stock and equipment will be sold or transferred to other holdings of the company and shops and trackage removed.

The North Coast Transportation Company, a Stone & Webster subsidiary, which operates automobile stages between the two cities, announced a reduction of stage fares, effective on Jan. 3, following more frequent service and faster running time. Fares for the one-way and for the round trip are reduced. Reductions also are made in fares from Seattle to Olympia, Aberdeen, Chehalis, Centralia and several other points.

Highway Costs Should Also Be Met by Bus Companies

James F. Hamilton, president of the New York State Railways, believes that bus and trucking companies should pay their share of highway upkeep costs. Asked for his opinion after Charles Barham, vice-president of the Nashville, Chattanooga & St. Louis Railroad, had declared at a Chamber of Commerce meeting in Rochester that motorized carriers should be taxed for road repairs and construction, President Hamilton said:

The companies should be taxed in proportion to the amount of wear and tear they give the roads. Not only do they offer unfair competition to the railroad and trolley lines by being able to use highways free while the latter have to pay large amounts for the upkeep of their paving, but the trucks and buses are to a large measure accountable for wearing out roads.

The company of which Mr. Hamilton is president, besides operating the electric surface and subway lines in Rochester, has a fleet of more than 100 city and interurban buses in operation at the present time.

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Financial *and* Corporate

Maturities of Eastern Massachusetts Met

The Eastern Massachusetts Street Railway, Boston, Mass., paid off on Jan. 2 maturing bonds totalling $628,700 consisting of the following issues:

$55,500 Mystic Valley 6s; $220,000 New Bedford, Middleboro & Brockton 5s; $46,000 Boston, Milton & Brockton 6s; $224,000 Eastern Massachusetts S-A 6s and $79,200 Eastern Massachusetts S-C 6s.

In addition, the road had in its own treasury bonds of these various issues aggregating $258,300 which have also been retired.

On Feb. 1, there is a further maturity of $293,000 South Shore & Boston 6s which will undoubtedly be paid off from treasury resources, as were the bonds coming due Jan. 2.

Western Line to Be Taken Over by Steam Road

W. E. Brown president of the Cowlitz, Chehalis and Cascade Railway and Chicago, Milwaukee & Pacific Railroad, has announced a proposition to take over the interurban electric line operating for the last twenty years between Chehalis and Centralia, Washington. The tentative plan is contingent on permission being granted by the city of Chehalis to extend the trackage.

Other plans include an extension of the electric line east of the Southwest Washington fair grounds directly to the big sawmill plant of the Eastern Railway & Lumber Company in Centralia.

It is reported that about $500,000 will be spent and it is also proposed that the entire trackage will be rebuilt and rehabilitated with heavy steel used.

The purpose of this enterprise is mainly to insure permanency at Chehalis of the big sawmill plant of the Coal Creek Lumber Company, owned by C. L. Brown, and to insure future log supply of the Eastern company at Centralia.

Georgia Employees Again Sell Stock

Through its employees the Georgia Power Company, Atlanta, Ga., is offering $5 preferred stock at $90 per share, plus accrued dividends, on terms and conditions similar to those under which the company employees so successfully sold the company's $6 preferred stock. Employees are to be paid a commission of $1 a share on all stock sold. The stock pays dividends quarterly, is offered to residents of Georgia only and is being sold both for cash and on the time-payment plan, the latter calling for down payment of $10 per share and payment of $10 per share per month until the stock is paid for. As an inducement to employees to purchase the stock themselves special terms have been arranged of $5 per share down and $5 per share per month until the stock is paid.

$492,514 Net in Baltimore

For the first eleven months of 1928 there was an increase in passenger revenue of the United Railways & Electric Company, Baltimore, Md., of $72,423. For the eleven months operating expenses increased $186,590, and net earnings decreased $97,994. The company says that this decrease will be more than offset by the adjustments that were made at the end of last year through allowance by the Maryland Public Service Commission for increased costs of power and accidents.

November showed an increase in gross revenue slightly less than the increase noted for October. The passenger earnings for November were $1,344,326 compared with $1,317,692 for November, 1927, an increase of $26,634. Net income increased $1,881.

The effect of the new fare rate of four tokens for 35 cents or 10 cents straight will not be known until the December operating report is compiled, as the rate did not become effective until Dec. 1.

The statement of the company for the eleven months ended Nov. 30 is as follows:

	1928	Increase
Passenger revenue	$14,646,254	$72,423
Other revenue	196,512	x19,406
Totals	$14,842,766	$53,016
Operating expenses—		
Way and structures	$804,498	$31,810
Equipment	845,145	13,891
Power	1,299,692	37,816
Conducting transportation	4,731,114	16,402
Traffic	20,804	9,273
General and miscellaneous	1,468,980	69,127
Transportation for inc.—Cr.	*6,912	8,268
Totals	$9,163,323	$186,590
Depreciation	742,158	2,650
Totals	$9,905,462	$189,241
Net operating revenue	$4,937,304	x$136,225
Taxes	1,449,625	x15,859
Operating income	$3,487,679	x$120,365
Non-operating income	134,237	x12,469
Gross income	$3,621,916	x$132,835
Fixed charges	2,616,068	x34,840
Remainder	$1,005,847	x$97,994
Interest on income bonds	513,333	.....
Net income	$492,514	x$97,994

The net income by months was as follows:

	1928	Increase
January	$18,366	x$53,761
February	18,769	x8,820
March	63,255	x18,254
April	37,535	x23,465
May	61,738	x1,191
June	30,009	x11,711
July	34,506	x1,863
August	20,453	x395
September	39,034	342
October	92,584	19,845
November	76,260	1,881
	$492,514	x$97,994

*Credit. xDecrease.

P.R.T. Underliers Petition to Be Heard

Judge Finletter, in Common Pleas Court, recently fixed Jan. 19, to hear the petition asking for a court ruling on whether the $138,376,907 which the city proposes to pay for the purchase of the underlying companies of the Philadelphia Rapid Transit may be deducted from the city's indebtedness in ascertaining its borrowing capacity. To date Controller Hadley has failed to join in the court action. The city intends to issue bonds in the amount needed to acquire the franchise of the underliers.

The company now pays $8,822,845 annually to the subsidiaries as rentals, but Mr. Hadley holds the view that there is no guarantee to the city that the transit company will continue to pay rentals sufficient to meet the sinking-fund and interest charges on the proposed bond issue.

Further Steps in Washington Merger

By action taken at a meeting of the Senate District committee on Jan. 9, Congress has eliminated any fixed valuation amount from its consideration of the bill proposing a merger of the Washington street railways. A resolution was adopted directing the District Utilities Commission to evaluate the properties within two years, during which time it was agreed that the rate of fare should remain unchanged. The Senate committee also requested the Utilities Commission to allow Dr. Milo R. Maltbie, whose services have been engaged by the committee for the purpose of advising it on the merger situation, to direct the valuation.

It is believed in some quarters that the Senate's action in placing Dr. Maltbie in charge of the valuation study is intended as a rebuke to the Utilities Commission. It is pointed out that Dr. Maltbie reported to the Senate that the companies' $50,000,000 figure is excessive. The Senate in striking the valuation factor from the merger bill, however, did so without prejudice.

Dr. Maltbie was authorized also to represent the Senate Committee in conferences with street railway officials for the purpose of settling the disputed points.

California Short Line Acquired

Formal acquisition of the Sacramento Short Line by the Sacramento Northern Railway, subsidiary of the Western Pacific, has been effected. Operation of the Short Line will enable the Sacramento Northern to operate a through line of electric railroad between Oakland and Chico, via Sacramento.

H. M. Adams, president of the Western Pacific Railroad, has been elected president of the Sacramento Northern Railway to fill the vacancy created by the resignation of G. F. Detrick.

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Personal Items

E. G. Buckland Heads New Haven Road

Edward G. Buckland was elected chairman of the board of directors of the New York, New Haven & Hartford Railroad, with the authority to exercise the powers and perform the duties of president until a president is elected. He fills the vacancy caused by the recent death of Edward J. Pearson.

Mr. Buckland has been connected with the New Haven system since 1898 when he became attorney for Rhode Island with office in Providence. In 1904 he was appointed attorney for Connecticut and New York and in 1907 was appointed vice-president. Later, his duties were extended to that of general counsel. At the time the government took over control of the railroads in 1918, Mr. Buckland became president of the corporate organization which position he held until 1920 when the road was returned to private control. He was then re-elected vice-president and general counsel. In 1924, under a revision of the company's organization, Mr. Buckland became vice-president in charge of law and finance and corporate relations.

Mr. Buckland was born in Buffalo in 1866. He holds degrees from Washburn College and from the Yale Law School. For the nine years ended 1898 he was an instructor and assistant professor of law at Yale.

Messrs. Fullen and Murray Appointed

William G. Fullen has succeeded John J. Gilchrist as chairman of the New York Transit Commission. He has been in contact with rapid transit affairs in New York for more than twenty years. As chief counsel he served the old Public Service Commission and later in a similar capacity with the New York City Board of Transportation he learned much about the transit problems affecting the metropolis. In 1907 he became a clerk in the office of the old Public Service Commission only later to become secretary to counsel and ultimately chief counsel, holding that office when the Board of Transportation was established in 1924. He then became chief counsel to that body, but resigned last August to enter private law practice.

John F. Murray has been appointed a member of the New York Port Authority by Governor Roosevelt, to succeed H. K. Twitchell, deceased. For several years the incumbent was vice-president and general manager of the Metropolitan Service Corporation, Brooklyn, and in 1923 he became the vice-president of Thomas E. Murray, Inc., consulting engineers of Brooklyn, a position he now holds along with others. Mr. Murray was born in Albany. He was educated in the Brooklyn Preparatory School and was graduated from the Stevens Institute of Technology.

James F. Hamilton Leading Figure in New York State Acquisition

James F. Hamilton, of Rochester, for ten years president of the New York State Railways, has been elected president of the Schenectady Railway, the United Traction Company of Albany and the Capitol District Transportation Company, all recently acquired by the E. L. Phillips interests of New York, owners of the New York State Railways. It is expected that the systems, serving eight cities and scores of rural communities, will be merged into one of the biggest combines in the state, with executive offices in Rochester and with

James F. Hamilton

Mr. Hamilton as president. The merger awaits approval by the Public Service Commission. It is believed that, following his usual policy, Mr. Phillips will form a holding corporation to govern all the companies embraced in the pending merger.

Mr. Hamilton began his railway career as a conductor in Buffalo when a boy. He succeeds Leonor F. Loree, president of the Delaware & Hudson Railroad, at the helm of the United Traction and the Capitol District Companies, and replaces James H Hustis as head of the Schenectady unit. Mr. Hamilton has had a Horatio Alger career. Born on a farm in Birdsall, Allegheny County, he was a conductor on the Buffalo surface lines for several years. In 1903 he became assistant superintendent of the Schenectady Railway and seven years later was promoted to superintendent. In 1911 he was made general superintendent of the United Traction Company in Albany and the next year became general manager of the Albany and Schenectady lines. He came to the New York State Railways as general manager in 1917 and the following year was named a vice-president. In 1918, a few months later, he was elevated to the presidency of the company, a position he has held without interruption since. He is a past president of the New York Electric Railway Association.

Under the combination, the electric railway, bus and trackless trolley lines of Rochester, Syracuse and Utica (New York State Railways) Albany, Rensselaer, Troy, Cohoes and Watervliet (United Traction Company) and Schenectady (Schenectady Railway) will be united. The Capitol District Transportation Company operates bus lines in the Albany territory. Many other interurban and bus lines serving western and central New York will be part of the gigantic system.

Schenectady Railway directors are James F. Hamilton, B. E. Tilton, of Syracuse; E. J. Crammey and H. P. Frost, of E. L. Phillips & Company, New York; E. G. Connette, United Gas & Electric Engineering Corporation; and Frank J. Stolz and A. S. Kleeman, of New York. Officers are James F. Hamilton, president; J. B. Mahon, secretary-treasurer; J. M. Joel, general auditor, and Roy R. Hadsell, general manager.

United Traction Company directors are James F. Hamilton and Howard L. Reichart, of New York State Railways; H. B. Weatherwax, of Albany, and E. J. Crummey, Frank J. Stolz, George W. Olmstead, Ernest Murphy and B. S. Granley of New York. Officers are president, James F. Hamilton; vice-presidents, Messrs. Stolz and Weatherwax; secretary, E. J. Crummey; treasurer, H. L. Reichart and comptroller, J. M. Joel.

Capitol District Transportation Company directors are Messrs. Hamilton, Stolz, Murphy, and Weatherwax. Officers are the same as those of the United Traction Company.

H. Lee Jones, former newspaperman and director of the Kansas Public Utility Information Bureau, has been appointed, effective Jan. 1, assistant to the vice-president of the Kansas Gas & Electric Company at Wichita to succeed the late Col. R. H. Timmons, who was drowned recently. For a number of years Mr. Jones was connected with the staff of the Topeka Capital. Six years ago he returned to Topeka as director of the information bureau formed by the Kansas public service companies.

E. I. Lewis has been elected chairman of the Interstate Commerce Commission to serve the year 1929. He succeeds Commissioner J. B. Campbell in the post, under the plan of rotation among the nine members. Mr. Lewis was chairman of the Indiana Public Service Commission when named to the Interstate Commission.

Fred I. King, who has been associated with the Indiana State Fire Marshal's office for the last three years, has been named secretary of the Indiana Public Service Commission.

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Manchester's New Manager Is Versatile and Progressive

R. Stuart Pilcher, general manager of the Edinburgh Corporation Tramways, has been approved as the unanimous choice of the Manchester Tramways committee for general manager of the Manchester Corporation Tramways. Mr. Pilcher is an outstanding example of a craftsman who is internationally minded—an eclectic willing to adopt or adapt good ideas regardless of origin or local prejudice.

Mr. Pilcher's early training was obtained in Canada with the Montreal Tramways. From 1906 to 1918 he was general manager at Aberdeen, where he proved his ability to keep out of the grooveway. His experiments with zone-fare prepayment cars and his work with de luxe car seating at that time might have gone a long way toward earlier rejuvenation of the industry if the war and post-war conditions had not prevented this.

Mr. Pilcher went to Edinburgh in 1918, when the privately-owned cable railway came into the possession of the city. At that time the bus had come to be quite generally accepted for use in Great Britain. As a result there was great clamor from more or less interested forces to remove Edinburgh's rails altogether. After wide study Mr. Pilcher concluded that certain routes should undoubtedly be electrified, but that others could provisionally be operated with buses. Experience would furnish the basis for extending or stopping the electrification of additional routes. The result of this policy was the electrification of track on all the important routes. This decision did not prevent Mr. Pilcher from encouraging the use of the bus and turning that recently developed transportation vehicle to advantage in supplying sightseeing services.

In recent years he has made effective on a large scale the de luxe seating program advocated by him more than a decade ago. Car illumination also has been greatly improved, and every possible effort made to eliminate noisy cars. An example of his independent thinking in equipment matters is the comprehensive installation of air brakes in reversal of the use of the electric brake formerly general in Great Britain. Mr. Pilcher believed that the air brake was as desirable for shortening stops as greater capacity motors were for permitting faster starting.

Mr. Pilcher's success in securing acceptance of unusual ideas comes from the combination of a pleasing personality and thorough study of the facts. On one occasion, when members of the Edinburgh Council suggested that the American flat fare be adopted, it developed that the general manager was already completely conversant with the fare history of the United States and Canada. His statement on the subject left nothing effective to say in reply.

In employee relations Mr. Pilcher has also shown unusual traits. When he started an employee magazine he did not remain content to urge subordinates to work for the magazine, but set the example with his own contributions.

Qualities such as these will give the metropolis of Manchester a transportation executive ideally fitted to cope with its great problems be they underground railways or lines in the congested districts, or far-flung coach services in the greater Manchester area.

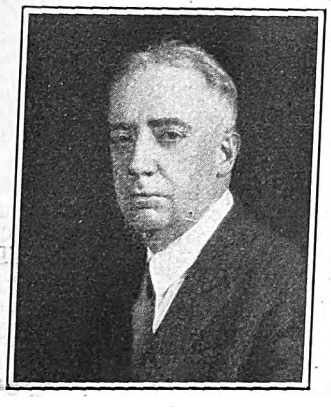
New Appointments on Ohio Interurban

Messrs. Stoughton and Donecker honored. Two experienced railway men take over new work in Conway organization

RUSSELL S. STOUGHTON and H. C. Donecker were recently elected assistant to the president and vice-president respectively of the Cincinnati, Hamilton & Dayton Railway, Cincinnati, Ohio, operating more than 300 miles of track.

Mr. Donecker was originally associated with Tom L. Johnson and his brother, Albert L. Johnson, in the construction and operation of the Nassau Electric Railroad, Brooklyn, N. Y. He acted as secretary and general assistant to Albert Johnson, who was president of the company which subsequently acquired the Atlantic Avenue Railroad, and was itself purchased by the Brooklyn Rapid Transit Company. Mr. Donecker then went to St. Louis and was secretary and assistant to the late Jilson J. Coleman, who had been general manager of the Nassau Company, and assisted in the work incident to the preliminary investigations, actual consolidation, and initial operation of the railroads there merging under the name of St. Louis Transit Company. He then returned to New York to enter the employ of Ford, Bacon & Davis, of New York, engaging while there in reporting work on railway properties. His next connection was with the American Electric Railway Association, where for a number of years he acted as secretary and treasurer, retiring in 1912 to become assistant general manager of the Public Service Railway of New Jersey, one of the largest properties in America. Mr. Donecker served in this capacity for about twelve years. Since that time he has been engaged in general reporting work on utilities and in other activities connected with railway and bus operations.

Russell S. Stoughton is a graduate of the Engineering School of the University of Pennsylvania. He has been associated with the Conway organization for the past eight years in connection with public utility investigations made during that time. He also had charge of the field work of a number of important investigations and studies in connection with operating and traffic problems made during the last few years by Thomas Conway and his associates.



H. C. Donecker

R. S. Stoughton

Personnel Changes in St. Louis

Dan Evans, assistant engineer of maintenance of way department of the St. Louis Public Service Corporation, St. Louis, Mo., was appointed insurance engineer attached to the treasury department, reporting directly to the executive vice-president, Stanley Clarke. Mr. Evans will have charge of all matters pertaining to insurance.

The chemical laboratory department was discontinued and M. M. Ridker, chemist, and his assistant J. J. Lewis have been transferred to the equipment department as engineers of tests reporting direct to O. C. Wright, general superintendent of equipment. Messrs. Edward Boehm and Henry W. Finklang of the chemical laboratory were transferred to the material and stores department, reporting to general storekeeper, D. J. Kelly. These changes were effective Jan. 1.

OBITUARY

SAMUEL WHITE, chairman of the Bristol, England, Tramways & Carriage Company, died on Nov. 29. He and his late brother Sir George White built up the tramway system of Bristol and introduced there some of the first electric cars to be used in England.

CHARLES GEORGE ROWLETTE, vice-president and treasurer of the Timken-Detroit Axle Company, Detroit, Mich., died on Dec. 24. Previous to this connection he worked in various capacities and locations for the American Sheet & Tin Plate Works. In 1916 he entered the Timken-Detroit Axle Company service as accounting manager. Two years later he was made assistant treasurer and in 1919 was elected treasurer. Later he became treasurer and assistant secretary, vice-president and treasurer and in 1926 a director.

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Book Reviews

Handling London Underground Traffic

By J. P. Thomas, operating manager of London's Underground. Published by London's Underground, 55 Broadway, Westminster, London, S.W. 1. Cloth. 237 pages with index. Price 7s.6d.

This is a very interesting account of various aspects of the operation of the underground railways in London, primarily from a transportation point of view. Its preparation was begun originally for the benefit of the staff employed, to assist them to view their work as a whole from the outside. Then it was felt that a still wider audience might be interested. The result is the most extensive volume on the operation of any single electric railway or group of electric railways under one management which has ever been published. The nearest approaches are probably the volumes issued some 25 years ago by the Grosse Berliner Strassenbahn and by the Interborough Rapid Transit Company (the latter mostly on construction), and the 50-year Jubilee Book on "State Railways and Tramways in the Dutch East Indies," published in 1925, though the latter also contained much information on steam traction.

Mr. Thomas is to be congratulated on the thorough manner in which he has treated his subject. Thus, the table of contents shows that the topics treated in their order are: organization of the operating department, staff education and control, arranging and providing the service, problems of operation, control of the traffic, signalling and emergency devices, abnormal traffic movements, rolling stock, fare collection, design and operation of waiting stations and relations with employees, with two additional chapters of statistics. One of these relates to the movement of population in London, with the functions, advantages and disadvantages of other means of transit, like bus and tram. The other chapter gives passenger and financial records of the underground railways themselves.

Many articles relating to operating practices of the underground system in London have appeared in previous issues of the JOURNAL. From them readers of this paper are familiar with the main principles involved. Mr. Thomas' book, of course, describes these methods in much greater detail, as well as many others of great value. American managers, especially of rapid transit lines, can obtain a great many helpful ideas from a study of this book, particularly on the subject, now considered so important here, of making railway travel easy and comfortable, and thus attracting passengers.

The book contains a foreword by Frank Pick, managing director. He explains that while it may give the reader the impression of a fixed and settled state of affairs on the London Underground, this is far from the case. Improvement is never ended. The practice of the company is not static. It is and always must be subject to constant change.

Digest of Motor Court Decisions on Motor Carrier Operations

By John M. Meighan, secretary National Motor Bus Division, American Automobile Association, published by National Motor Bus Division of the American Automobile Association, Washington, D. C. 711 pages. Price, $10.

The general use of buses is so recent it is not surprising that the law respecting them is still in the making. There has been, of course, a great deal of legislation, but until a statute has been construed by the courts its practical effect is often uncertain. The American Automobile Association, through its Motor Bus Division, has therefore conferred a favor on the industry by compiling decisions of the courts, relating to this branch of the transportation industry. These decisions are not printed in full but are digested, so as to make the salient points as accessible as possible. They are grouped into fourteen divisions, or chapters, as follows:

Accident Liability; Certificates of Public Convenience and Necessity—Interstate Carriers; Certificate of Public Convenience and Necessity—Intrastate Carriers; Constitutionality of Regulations; Constitutionality of Taxation; Common and Contract Carriers—Determination of Status; Indemnity Bonds and Insurance; Injunctive Action Restraining Competition; Rates; Regulation as Exercised Under State and Local Police Powers; Scope of State Commission's Regulations; Taxes—Interstate Carriers; Taxes — Intrastate Carriers; Miscellaneous. Each chapter is further divided into decisions of the United States Supreme Court, United States district courts and state courts. An index is included in which there is a short syllabus of each case, giving the main points involved.

To keep the report up to date the publishers expect to issue monthly supplements of new decisions at an annual subscription price.

Propaganda—The Public Mind in the Making

By Edward L. Bernays. Horace Liveright, New York, N. Y. 159 pages. Price, $2.50.

If there is any sinister meaning attached to the word propaganda, Edward L. Bernays can find little justification for it, for to him propaganda has become a national interpreter explaining new ideas and working toward a productivity that will eventually bring order out of chaos. Thus does he in "Propaganda" which he terms "The Public Mind in the Making," see this influence as immortal.

The author, whose book "Crystallizing Public Opinion" has been widely read, says that his purpose in the later work was to explain the structure of the mechanism which controls the public mind and to tell how the special pleader and propagandist seeks to create public acceptance for a particular idea or commodity. And why not? As it would be impossible for all men to study for themselves the difficult social, political and business problems of the day, a man is satisfied to have objects and ideas brought to his attention through the agency of propaganda. How entirely the public has become subjects of dictators and new propagandists, who win the public mind over to concentration on some particular idea or object is shown in some pertinent examples. He draws a clear picture of the present-day public relations counsel and explains his efforts to analyze his public.

In fact, after a reading of this book, one might say there is propaganda in everything, or rather nothing is without propaganda. The author shows its potency in business and its relations with the public, in politics in its "drive for votes," in education in an effort to make the public understand the relationship between the general public and the academic idea. Social service, too, needs propaganda activities, whether it be a campaign to preserve the teeth or one to urge the laying out of better parks. To win public approval of an unknown artist's canvases, an intensive propagandizing effort must also be made.

After an intensive study and comprehensive survey of the methods and motives of propaganda and its agents, Mr. Bernays concludes that as a consistent, enduring effort to create or shape events to influence the relations of the public to an enterprise, idea or group, propaganda will eventually bring order out of chaos.

"Appointments For 1929"

In a decorative cardboard cover and with half-tone cuts in sepia reproduction, "Appointments for 1929" is a pretentious piece of printed matter, the work of the London Underground System, London, England. It includes a calendar of London's beauty with occasional comment from the best authors. The illustrations, on highly coated stock, alternate with text on antique stock. Some well-known works of art are reproduced whose originals are in the Tate Gallery, National Gallery, British Museum and in London life as it appears today. The inside back cover shows the original manuscript of the National Anthem by Dr. Arne. One especially attractive page shows the Lely Beauties at Hampton Court (reproduced by gracious permission of H. M. The King).

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL, *Publishing Director*

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Home Manufacture Frequently Is Self-Delusion

IT IS altogether or entirely natural that many improved devcies for electric railway maintenance originate with the men who do the repair work. These men, being in close contact with daily maintenance procedure, appreciate the need for better tools and equipment. Many of the ideas that originate in the shop are eventually taken up by manufacturers and developed for general use by the industry. Others, however, are suitable only for the local conditions in a particular shop or on a particular property, and do not have wide enough application to warrant commercial development.

Recently, a large operating company, in providing equipment for a newly constructed shop, was confronted with the problem of developing many special shop fixtures which could not be obtained readily in the open market. Included in the list were armature racks and trucks, axle racks, tool racks, special storage bins and cabinets, work and welding benches, equipment overhauling stands, chemical cleaning tanks, etc. As the railway had a new shop, well equipped with modern machinery, there was the natural temptation to go ahead with the manufacture of the new fixtures. This company, however, first made drawings and sketches of the equipment needed. These were submitted to several manufacturers with a request for prices on the finished products. At the same time, estimates were made of costs to build the equipment in the railway shops. It was found that manufacturers were willing to build the needed devices at a cost considerably below that estimated for home manufacture.

This company decided that inexperienced men working with more or less makeshift machinery could not be expected to compete with manufacturers properly equipped for this class of work. Furthermore, the management was frank enough with itself to admit that special fixtures produced in its own shop under conditions of inadequate personnel, machines and inspection, would probably be inferior to the product of experienced manufacturers, and would cost more in the long run. Subsequent results proved that these conclusions were sound. Not only was the price lower, but the quality and finish of the final product proved to be superior to that which could have been expected had the work been done in the company's own shop.

The general question of home manufacture has received much discussion from many angles. All too frequently, the mechanical man with a penchant for manufacturing includes only direct labor and material in estimating costs. The important items of overhead, including power, heat, rent, taxes and particularly supervision, are frequently overlooked. When this is done, it is, of course, obvious that the master mechanic is merely misleading himself or his superiors into the belief that he is "beating the game."

But in many instances there is another explanation for the prevalence of the practice of "home making" inferior equipment at excessive cost. Due to a policy of false economy enforced by their superiors, the mechanical men on many properties find it impossible to get approval of requisitions for new equipment needed in the shop. Their only recourse is to build this equipment themselves, even though the cost may be high and the final product crude. The transaction does not go to the boss for an appropriation. The materials are frequently picked out of the scrap heap, and the labor is charged to routine maintenance. If the boss should happen to see the final job, he is likely to compliment the mechanical man for his ingenuity and economy. When this occurs, it is the management, not the master mechanic, that is at fault.

Maintenance Budget Figures Show Favorable Trends

CLOSE analysis of the expenditures made by electric railways during the year 1928 for maintenance materials and labor reveals some encouraging trends. The total decreased $13,351,000 during the past year in comparison with 1927. This was accounted for in the very large recession in the way and structures item, which, in turn, was lowered by the increased activity in track reconstruction not chargeable to maintenance account.

It is significant that the expenditures for both car and bus maintenance increased during the year, the car figure by $2,607,000 and the bus figure by $10,867,000. Further increases for both of these accounts are forecast for 1929, the increase for car maintenance being estimated at $1,400,000. Also, the way and structures maintenance account, which receded $26,000,000 during 1928, is expected to increase more than $10,000,000 during 1929, according to the estimate. This, of course, is based upon indications that operating properties that have been concentrating on the reconstruction of bad track, during the coming year, will give increased attention to the maintenance of existing track that is still in fair condition.

During the past three or four years the maintenance situation was rather distressing. Companies faced with decreasing revenue and increasing operating expenses cut wherever possible and the maintenance department suffered in the general move. That this was carried to a dangerous point is indicated by the decreases in expenditures for maintenance materials during the years 1926 and 1927, when the figures receded $25,000,000 and $21,500,000, respectively. Part of the large decrease in the car maintenance figures can be attributed to the in-

This is the issue in January that is devoted essentially to maintenance and construction subjects

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creased interest in the bus, with consequent neglect of cars. Now that the uncertain period seems to have passed operators are awakening to the importance of keeping all of their equipment in proper condition and are spending more for this purpose. The estimated increase for the present year is not large, being less than $1,000,000, but it is sufficiently large to show that operators are becoming aware of the need for better maintenance.

A large increase in the bus maintenance figure for 1928 was to be expected with the increase in the number of buses, but the actual figure exceeded preliminary estimates. The increase in material alone amounted to $5,590,000, while the total of material and labor for the year reached $10,867,000 above 1927. The steadily increasing number of buses in use and the growing average of the vehicles in service are accountable for the increases in maintenance expenditures which have occurred every year since the bus was first used intensively by electric railways. Another increase is forecast for 1929, totaling almost $2,000,000 above 1928.

The budget data gathered each year serve to show the trends in each maintenance department and when studied over a period of years reveal whether the standards are being raised or lowered. It is a good omen that the figures for 1928 and 1929 show favorable trends and that electric railways are planning to spend more for this important phase of operation in the future.

Pedestrian Regulation Needed

MUCH has been said in recent traffic discussions concerning the necessity for expediting the movement of mass transportation vehicles. Because these vehicles carry about 75 per cent of all the people who ride, interference with their progress is the most serious form of traffic delay. It must be remembered, however, that no small part of the delay to the 75 per cent who ride is occasioned by the same 75 per cent when they are on the streets as pedestrians. At any intersection in the congested district, at any hour, pedestrians may be observed occupying a portion of the roadway when vehicular traffic has the signal to go. This not only reduces the street area available for moving traffic, but also causes the traffic to move considerably slower. The progress of all vehicles is hampered and much unnecessary delay results.

Before blaming the pedestrian for his annoying behavior, however, we should consider the cause of it. The fact is that many pedestrians cross streets at the wrong time because there is no right time. Having a legal right-of-way avails them nothing. Often when the pedestrian is crossing in the same direction as the movement of traffic, his progress is seriously hampered by vehicles making right-hand and left-hand turns. In some respects this danger is more difficult to guard against than the danger from vehicles going straight. Seldom does the pedestrian have an opportunity to cross the street entirely free from interference. Hence, pedestrians have generally adopted the policy of crossing when and where they can regardless of signals—each one for himself and the devil take the hind-most.

That this creates a bad condition is easily seen, but it is not so easy to suggest a remedy. If it were possible to establish periods for pedestrians only in the cycle of the traffic lights, this might solve the problem. At busy intersections, however, the volume of vehicular traffic is so great that it is impracticable to establish even short periods when all vehicles are stopped. Overhead crossings and subways for pedestrians have been tried in a number of places. They have not proved popular; probably because the pedestrian feels that his rights on the street antedate those of the automobile and that he should not be discommoded for the sake of wheel traffic.

Pedestrian control also has been tried in a number of places. Results have not been particularly encouraging. In general, it has been found that pedestrians obey the lights only when there is a policeman on hand to compel obedience. A campaign of education is needed to teach the pedestrian that regulation of his movements at street intersections is to his own advantage. It is probable, also, that the length of the traffic cycle has a considerable influance on the tendency of pedestrians to cross against signals. For the success of any plan of pedestrian regulation, it will be necessary that the walker be given a reasonable opportunity to cross streets free from interference of vehicular traffic. This phase of the traffic problem is one which mertis greater attention than it has received.

Wide Variety of Maintenance Problems

JANUARY 15 was the closing date for material submitted in ELECTRIC RAILWAY JOURNAL's maintenance contest for the first group of departmental prizes. Nearly 100 items were received. Of these 65 per cent describe practices and equipment in the rolling stock and shop divisions, 20 per cent of the entries were from the way and structure department, 10 per cent were items on bus and garage practice and 5 per cent presented practices in the electric and line departments. A meeting of the committee of judges is scheduled early next week, and winners of the first series of four department prizes will be announced in the Feb. 16 issue of the JOURNAL.

In going over the material submitted in the contest, one is impressed with the particular problems in which these men are interested—the improvements in maintenance practices that are being made and the new tools that are being used to advantage. Of the items relating to rolling stock and shops, more than 30 per cent deal with improved methods that are saving time, labor and money and reducing the number of equipment failures in service. Shop constructed tools for doing special maintenance jobs easily constitute the next largest classification. These represent about 20 per cent of the total. Improved methods of testing and apparatus for testing, small tools, jigs, fixtures and improvements in car equipment each constitute about 10 per cent. Other items cover methods for increasing the efficiency of car equipment, improvements in shop tools, economies resulting from the use of new machine tools and safety precautions that are being taken in the shops.

Articles submitted by way and structure men show that they are concerned particularly with methods for preventing trouble, types of construction to increase track life, improved tools for speeding up work, and the solution of special design and construction problems. Attention is being directed primarily toward reducing the time and cost of track repairs, while at the same time providing better types of construction that will give increased life.

Men connected intimately with bus maintenance seem to be concerned chiefly in improving their inspection practice, overhauling procedure and general maintenance methods and in providing new tools that will assist in doing improved work at minimum cost. Several items describe economies that have resulted from new equip-

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ment and new tools that were constructed to do jobs quicker.

Special design and construction problems seem to occupy the attention of line engineers. The items submitted relate particularly to types of construction that are being used to advantage. This brings to light an interesting phase of the maintenance contest. When we think of maintenance work the most general assumption is that this relates to the removal and replacement of worn parts or methods that will increase their life. In the distribution department particularly, life of the overhead is increased by use of improved types of construction. These are usually developed by the men in the field who are in direct contact with daily problems. When a special construction job is encountered, when clearances are close or obstructions are in the way, the men in charge of overhead find a way of mastering the problem. It is just such solutions of special problems that are of particular interest to the distribution maintenance forces of other properties, and these ideas, therefore, predominate in the maintenance contest entries.

Electrification Exceeds Expectations

STEAM railroad electrification has been gaining steadily for the past decade, although in the installations of electric equipment there has not been the spectacular touch that is looked for so eagerly by publicity agents. The review of the subject, appearing in the issue of this paper for Jan. 12, indicates that more than 4,100 miles of track formerly devoted to steam service are now being operated with electric locomotives or motor cars. This, of course, does not include electrifications of the type of the New York and Chicago elevated lines, nor of portions of steam railroad systems sold or leased to trolley companies. Additional projects now under way will increase this mileage approximately 40 per cent. This figure in itself is an indication of the present interest in the subject being taken by railroad men.

The latest addition to the lists of electrified lines is the Great Northern Railway, which began full electric operation of the division through the Cascade Mountains between Skykomish and Wenatchee, in the State of Washington, on Jan. 12. While a portion of the line had been converted for electric service nearly two years ago, the vital link, the new tunnel through the Cascade Mountains, was not completed until a short time ago. Accordingly, the full benefit of the change to electricity is only now being realized.

The Great Northern electrification differs from any other in that it succeeds an electrification put in service through the old Cascade tunnel twenty years ago. Experience with the earlier system had much to do with the decision to extend the electric zone and to build a tunnel for steam service as long as the new one. The new installation, extending over the mountains, will make possible a material increase in capacity of freight trains that can be hauled on the system, and will reduce the running time by several hours. In addition, there will be material savings in the cost of operation that will make the new system pay a good return on the investment.

Experiences with electrification show that the success of each one far exceeds expectations. At first it took a long time to convince the railroad operator of the value of electricity as a motive power, but, as more and more installations are made, the evidence becomes stronger. Furthermore, the need for electrification, due to the concentration of traffic and the necessity of handling heavier trains at higher speeds, is becoming greater. It is not too much to anticipate a number of major projects in the next few years in addition to those already announced.

Give Finance the Thought it Deserves

AGREEMENT exists among bankers and others that business may be expected to continue at its present level indefinitely unless factors now unforeseen should suddenly intervene. This is reassuring to men engaged in supplying local transportation since it means that their business will probably remain at its present level, a level none too satisfying to some, but one highly propitious for others. To meet that condition, many of the railways are adequately prepared with equipment and men, even if few of them have exhausted the possibilities which lie in intensive stimulation of the use of the service.

Gradually, of course, ever so gradually, the situation is improving financially, considered in its broadest sense, if not in the sense of increasingly larger net earnings. Some one will arise to say that the net is the real desideratum. And it is. But greater net is to be expected since the prospects for financing at reasonable rates have improved, the amount of bonds in default has been reduced, and maturities are apparently to be cared for as they arise without undue strain.

While the prospects are good for borrowers who must come into the market, it is to be regretted that greater advantage was not taken of the period of easy money to revamp more financial structures along the lines recommended by the committee on finance of the American Association. For some companies to temporize with this situation longer is to compromise with a bad condition, if not almost to invite disaster. Voluntary readjustment is seldom easy to accomplish, but it surely is worth the effort since the prospect is remote of the earnings of some companies ever reaching the point where a return can be realized on all the issues outstanding. Surely the prospect of probable returns should be sufficiently alluring for holders in companies now making little progress to make the effort really worth while. Inventory write off is not unusual in other industries, so why should it be to the electric railway, especially if by such process equipment can be discarded that should long since have been replaced by up-to-date means that assure not only the payment of their own way but of a real profit.

On the whole, there are no disquieting factors in the financial situation. Earnings are not in every case all they should be, but quite as often as this is chargeable to the inadequacy of the rate of fare, is it chargeable to the fact that full advantages have not been taken of the possibilities of intensive use by management and men of facilities at hand or that could be brought to bear on the situation.

It has taken the industry a long while fully to realize the competitive nature of the business in which it is now engaged, but where that change has come to be accepted for what it really means and where anything like an adequate fare has been allowed, the outlook is anything but dark. Supplying local transportation is a business very different from what it was a few years ago, and those have profited most who were sufficiently alert to recognize the change and to adjust themselves to it quickly.

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Great Northern Electrification Extended

Opening of new Cascade Tunnel, the longest in the Western Hemisphere, inaugurates 100 per cent electric operation. The line included is between Skykomish and Wenatchee, a distance of 73 miles

One of the Great Northern's 371-ton single-phase locomotives hauling a ten-car passenger train

DRIVING of the new 8-mile Cascade Tunnel and the relocation of lines through Chumstick Creek, on the eastern slope of the Cascade Mountains in the state of Washington, represent only part of the betterments recently completed on the Cascade division of the Great Northern Railway. The electrification of the mountain section of the Cascade division is in itself a development of the greatest importance. Train operation through the 8-mile tunnel on the 1.5 per cent grade, without the addition of artificial ventilation, would be impossible without electric motive power. Electrification of such a tunnel is, of course, imperative, and with the electrification of the tunnel its extension to the limits of the heavy grade sections approaching the tunnel followed as a matter of progressive policy.

The Great Northern Railway was a pioneer in heavy electric traction. In 1909 it electrified the original 2¾-mile Cascade tunnel extending between Tye and Cascade. This electrification consisted of a three-phase contact system from which two trolley pole collectors fed three-phase locomotives. The 6,600-volt contact system consisted of two direct-suspended trolley wires and the rail. This was the only installation of three-phase traction of any moment ever made in America.

In 1926 the Great Northern decided to extend its electrification to Skykomish at the western base of the Cascade grade. The railway management, in view of its experience with the high voltage, three-phase system and with the desire of obtaining the advantages of high-voltage power transmission on the contact system, together with the excellent characteristics of the d.c. motor for freight drag service on the heavy grade, specified an 11,000-volt single-phase contact line to be used with motor-generator type locomotives. The Great Northern today is the largest user of this type of locomotive, and, in view of its two years of experience with

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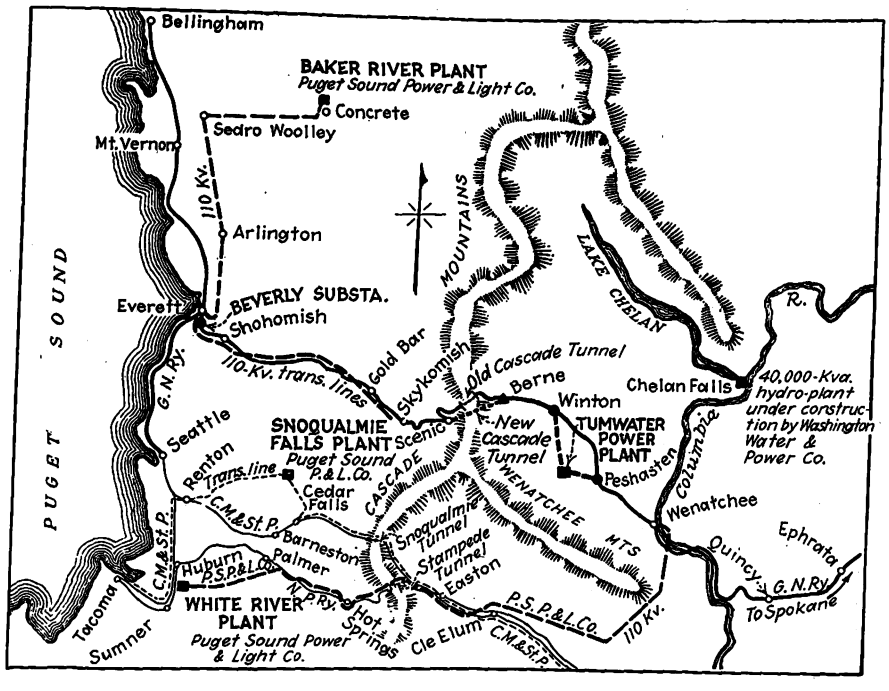
motor-generator engines in operation between Skykomish and Cascade, it is interesting to note the layout and characteristics of the system, together with some of the operating results obtained to date.

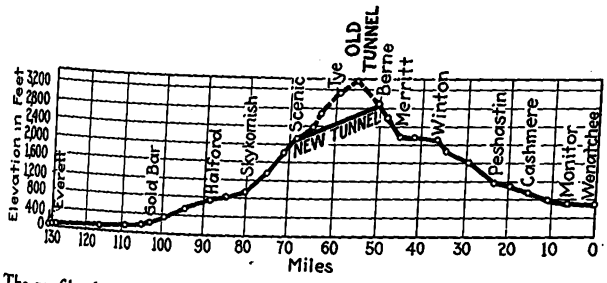
POWER OBTAINED FROM THREE SOURCES

Power for this 73-mile electrification is obtained both from the Puget Sound Light & Power Company's network and from the original power plant at Tumwater which supplied the 25-cycle, three-phase current to the old tunnel. The map of the electrified section and the line diagram show the sources and arrangement of power supply. The Puget Sound, 110-kv., 60-cycle, three-phase lines feed frequency changer stations at Skykomish and Wenatchee. The 60-cycle energy is converted by 7,500-kva. frequency changers, one in each station, to 25-cycle single-phase power. This is transmitted through two single-phase, 44-kv. circuits extending between Skykomish and Wenatchee. The Tumwater hydro-electric plant is connected to this 44-kv. line and feeds in 5,000 kva. to the system. The nominal total power capacity of the machines connected to the electrified section is therefore 20,000 kva. It is interesting to note that the original 25-cycle, three-phase generators at Tumwater are now supplying 25-cycle, single-phase power.



The electrified section of the Great Northern extends from Skykomish to Wenatchee. The sources of power also are shown

There are seven distribution stations which convert the 44-kv. power to 11,000-volt, supplying the trolley-rail circuit. These stations are shown on the line diagram and are located on an average approximately 10 miles apart. The total capacity of the converting transformers, including part of the three-winding transformers at Skykomish and Wenatchee, is approximately 30,000 kva. The distribution system is extremely simple in its layout, and each of the transformer stations is controlled from a station agent's office, and the stations have been arranged with a view to such control. All oil circuit breakers at the transformer and main substations are electrically operated, and are arranged for full automatic relay protection. The distribution transformers are all arranged with Inert-Aire equipment. From the capacity of the converting and distribution stations, it may be seen that the Great Northern is placing itself in an excellent position with regard to future possible increases in freight train size, with the accompanying increases in local power demand. A typical distribution station is shown in one of the views. The equipment is installed outdoors, while the station building may be seen at the rear.



The profile shows the severe grades on the electrified section, and the relief obtained with the new tunnel. The total distance on the electric division is now 8 miles shorter than that shown

SIMPLE CATENARY CONTACT SYSTEM USED

The success of the initial contact system between Cascade and Skykomish, where there is an unusual amount of curvature, much of which is 10 deg., has demonstrated the many economic advantages and satisfactory operating qualities of the simple inclined catenary system as installed.

The system used comprises a No. 0000 cadmium-bronze contact wire, supported by a composite messenger consisting of a bronze high-strength core surrounded by pure copper strand. The total equivalent conductivity is approximately 400,000 circ.mil. Hanger fittings and clamps to the messenger and contact wires are non-ferrous. On tangent track the contact wire is supported by flexible loop hangers, the messenger and contact wire being well bonded at 300-ft. intervals. On curved track up to 3½ deg., pure inclined catenary is employed which permits the elimination of all pull-off devices other than the hanger supports. On curves of shorter radius pull-off yokes are installed at the supporting poles, such curves employing arcs of 3½ deg. curvature with a maximum offset of 6 in.

On tangent track 150-ft. pole spacing is standard where the 44-kv. circuits are carried. The pole spacing between Winton and Leavenworth, where the transmission lines are not carried, is 180 ft. On curved track the pole spacing is reduced on curves sharper than 6 deg. to suit a 6-in. maximum offset of the contact wire. Where possible the contact wire height from the rail is retained at 24 ft. Through tunnels, and the limited number of snow sheds now existing, this height is considerably reduced.

Three standard Westinghouse insulators are employed to support the messenger on curves and on cross-span construction. Pin insulators were extensively used with the 44-kv. transmission circuit. In the construction of the new 8-mile tunnel provision was made by means of

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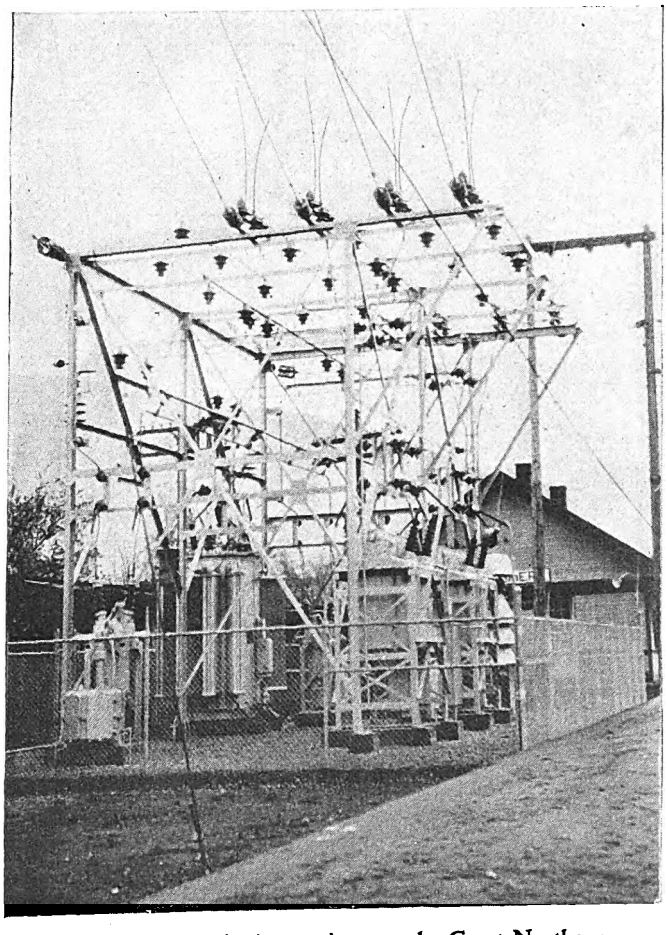


One of the distribution stations on the Great Northern electrification

inserts at 75-ft. intervals to provide ample suspension insulator clearance, so that, if necessary, a contact voltage of 22,000 eventually might be employed. By means of the inserts, maximum insulating distances are obtained without encroaching on the loading clearance of the tunnel. At suitable intervals, longitudinal troughs have been arranged in the tunnel for anchoring the messenger and contact wires so as to limit as much as possible any disarrangement of the catenary system.

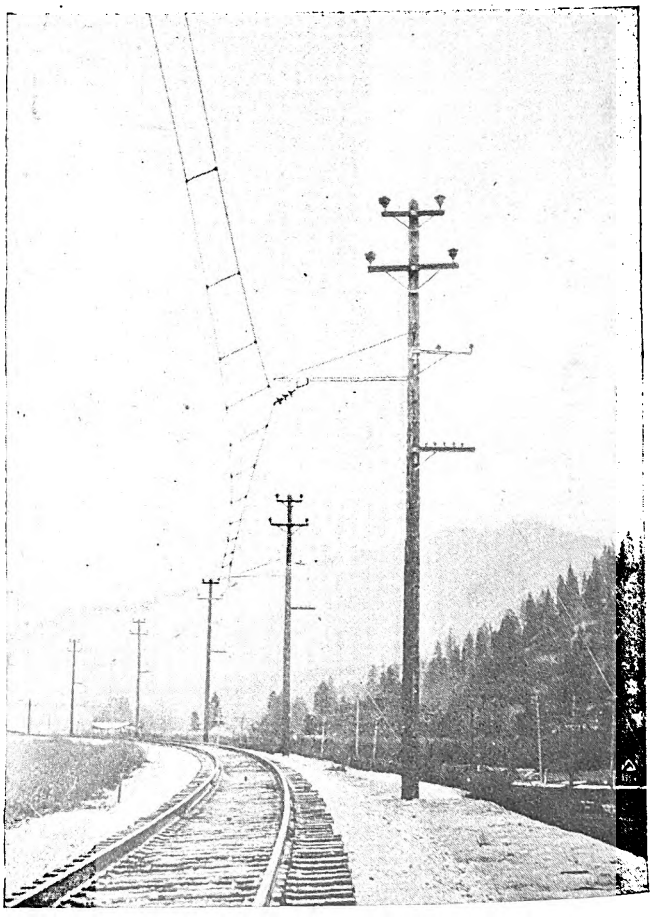
The tensions in the contact and catenary wires are so related that, with inclined catenary, all hangers are parallel. It is interesting to note that on the 16 miles of line extending between Winton and Peshastin, where there is considerable curved track of 3 deg. or less and where the structure spacing is practically uniform, there are no steady or pull-off devices attached to the contact wire on the main line.

Motor-Generator Locomotives Perform Well

The success obtained to date with this comparatively extensive application of the motor-generator type locomotive is the most interesting part of the electrification. These locomotives were described in this paper, issue of July 9, 1927, page 53. It is of interest to review briefly the two years of performance of the first two locomotives delivered to the Great Northern Railway by the Westinghouse Company early in 1927.

The single-phase contact system in the first instance extended between Skykomish and Cascade through the old 2¾-mile Cascade tunnel. The change from the 6,600-volt, three-phase contact system to the 11,000-volt single-phase contact system was made on March 5, 1927. Since that date all operation of trains over this limited length of track has been made with the motor-generator locomotives. The first two locomotives delivered maintained practically the entire service for nine months, and, in the first twelve months of operation, each locomotive covered more than 50,000 miles on the 2.2 per cent compensated grade. To date, these locomotives are approaching their 100,000-mile mark, and when the condition of grade and limited speed on this section is taken into consideration, it will be appreciated that this is a very creditable performance for a comparatively new type of locomotive in this exacting service.

With the extension of the electrification to Wenatchee, it becomes possible to exploit more fully the many inherent advantages of this type of locomotive. On the west slope of the mountain, the grade, as may be noted from the profile, consists of a steady 2.2 per cent (compensated) rise from Skykomish to Scenic. Through the new tunnel the grade is 1.56 per cent for 8 miles.



Catenary construction on curve with transmission line

On the east slope the grades consist of 2.2 per cent and 0.2 to 0.4 per cent, and a considerable stretch of track averaging approximately 1.3 per cent. With these varying grades, the advantages of being able to operate the locomotives at a constant horsepower output are apparent, both in the matter of the schedule speeds which can be obtained with limited maximum speeds, and in the matter of the maximum power demand resulting from a given schedule speed.

A locomotive starting at Wenatchee can, in either freight or passenger service, develop its rated horsepower on all grades exceeding 0.7 per cent. To obtain this desirable result, refinements in the control have been incorporated in these locomotives, which are of special interest. The locomotives can be operated with either

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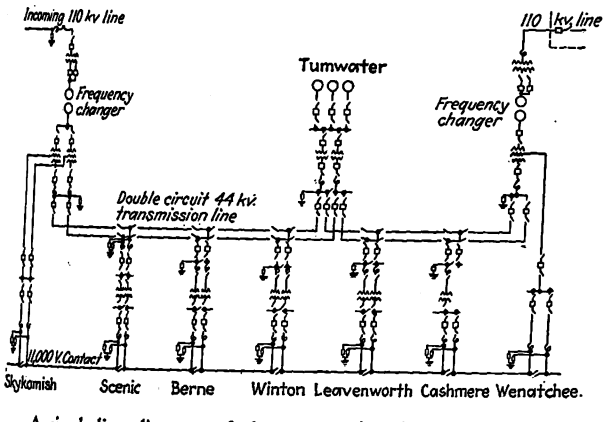
CHARACTERISTICS OF LATEST GREAT NORTHERN RAILWAY SINGLE-PHASE LOCOMOTIVES

Total weight	*742,200 lb.
Classification of wheels	1-D-1 = 1-D-1
Weight on drivers	569,600 lb.
Number of driving axles	8
Number of idle axles	4
Capacity at one-hour rating	4,330 hp.
Starting tractive effort, 25 per cent adhesion	142,000 lb.
Maximum starting tractive effort, 33⅓ per cent adhesion, limited by adhesion	189,000 lb.
Tractive effort—hourly rating	112,500 lb.
Speed—hourly rating	14.4 m.p.h
Tractive effort—continuous rating	88,500 lb.
Speed—continuous rating	15.5 m.p.h
Maximum speed	*45 m.p.h
Track gage	4 ft. 8½ in
Total wheelbase	62 ft. 10 in
Rigid wheelbase	16 ft. 9 in
Length over all (between faces of buffers)	94 ft. 4 in
Width over all	11 ft. 0 in
Height from rail to locked position of pantograph	15 ft. 10 in
Diameter of driving wheels	56 in.
Voltage and type of conductor	11,000-volt, 1-phase, 25-cycle, overhead
Number and type of motors	16—type 356A
Method of drive	Double flexible gear
Gear ratio	18:91
Number of this type of locomotive in service	5
Type of control	HBFR
Year placed in service	Two, 1927; two, 1928

*These figures for locomotives 5000-5001, 5002-A, 5002-B, 5007-A, 5007-B.

a series characteristic such as that of the conventional d.c. motor, or as separately excited motors with either a constant speed characteristic or a constant horse-power characteristic. These varying characteristics are obtained through a closed circuit transition which permits of



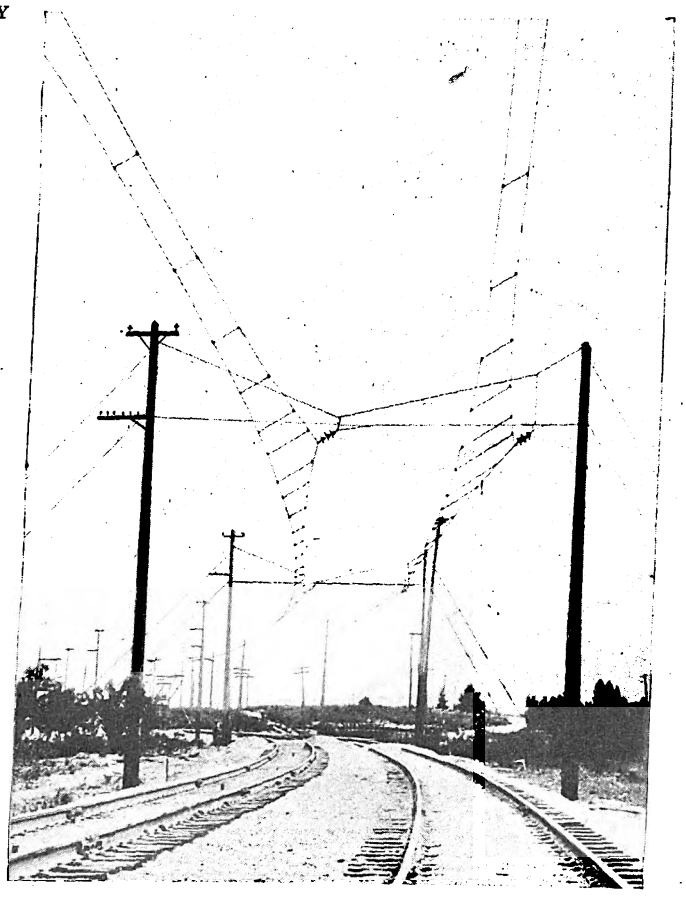
A single-line diagram of the power distribution on the Great Northern electrification

alteration in the circuits without any change in tractive effort or speed during the period of transition. The accompanying table represents the general weights, dimensions and rating of these locomotives.

Characteristics of Locomotives Chosen for Severe Grades

The locomotive units, which may be assembled to operate two or more in multiple, are each rated to haul continuously 700 tons trailing load on a 2.2 per cent grade. At present, the customary arrangement is a locomotive made up of two units. Two such locomotives can take a 2,900-ton train either east or west on the 2.2 per cent grade approaching the tunnel. Two to four full-tonnage eastbound freight trains are handled per day, with somewhat lighter trains westbound.

Normally, three through passenger trains go east and west per day, with many extra trains during the tourist season, and occasional express trains with silk shipments from the Far East. Each passenger train will have an



Cross-span construction on Great Northern electrification

automatic train-heating tender attached to the locomotive. The maximum weight of a passenger train will exceed 1,000 tons.

The locomotives described can be interchanged readily between passenger and freight service, and, although predominantly drag freight engines, they can perform a very creditable schedule in passenger service. For local service on this division a 50-ton locomotive and an electric motor car are being equipped.

The maximum power demand with one freight train is approximately 7,500 kw. This load may be increased to 9,500 kw., and it is expected to keep the maximum power demand for the system to approximately 13,000 kw. under present conditions of traffic. The local power demand of a 3,500-ton freight train will be 9,500 kw. This may be increased to 11,500 kw. with a 4,200-ton train, and the distribution system is laid out to handle even heavier loads economically when the railway management requires it.

The electrification as installed provides for the unrestricted development of railway operation on this important division, both in the matter of freight train size and speed and in the speed of passenger trains. The distribution scheme can also be readily adapted to further extensions of the electrification. With power supply from three independent sources the continuity of service is assured.

For this electrification the Westinghouse Electric & Manufacturing Company has furnished ten locomotive motive power units, the last two of which will be delivered in January; primary requisites of the distribution system, including transformers and switchgear; and important features of the overhead contact system.

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Methods Used in

BABBITTING BEARINGS

Have Marked Effect on Lubrication

By H. L. Kauffman
Denver, Col.

In an article in the Oct. 20, 1928, issue of ELECTRIC RAILWAY JOURNAL, *the author discussed the kinds and grades of lubricants suitable for use on electric railway equipment; kind of waste preferable for use; how to saturate the waste with oil; and modern practice in packing the "down-feed" motor. In a second article in the Nov. 17, 1928, issue data were given on modern-type motor lubrication; modern bearing oiling devices and causes of bearing lubrication troubles.*

The present article contains information on electric railway journal lubrication; on linings and lining metals and the rebabbitting of bearings; and proper methods of lubricating gears and pinions.

JOURNAL boxes of electric railway cars are packed with oil-saturated waste, like that used in the lubrication of motor bearings. Some companies, upon finding the waste in the journal box to be dry, merely add more oil to the waste already present; others repack with freshly saturated waste. The latter procedure is recommended since it insures proper oil distribution and, therefore, is the more efficient and economical practice.

Journal boxes should be packed by inserting a rope of saturated waste, which will reach around the bottom half of the journal. Then, this waste should be pushed tightly against the back of the box to insure lubrication of the fillet and the exclusion of any dirt, dust, etc., that might enter through the back of the box. Pieces of waste as large as possible—one piece only, if the design of the box permits—are then used in filling the remainder of the box. If only one piece of waste is used, it should be fed in gradually rather than in a ball. By following this precaution jamming, which would allow voids in the waste, will be prevented.

The waste should not be placed above the center line of the journal. By keeping the waste packed below the center line of the journal, dragging of the waste into the bearing is prevented.

Where track conditions are such as to cause the waste to work toward the front of the box, a good practice to follow is to twist the waste under the axle button. A box using a thrust plate between the box and the brass aids in keeping the waste in position, due to the fact that such a plate takes a large part of the lateral sliding motion. In applying new brasses and check plates, it has been found advantageous to smear the rubbing parts with oil before putting them in place.

Practice varies as to the length of time allowed to elapse before journals are oiled or repacked, much depending upon local conditions. One company whose tracks are very smooth, with few curves and with a relatively low equipment speed, packs journals only once a year; another punches up the waste to the axle after each 1,000 miles of operation and repacks with freshly saturated waste at the end of each 5,000 miles. Naturally, whenever journals are immersed in water as a result of flooding the streets by a storm, immediately thereafter the packing must be removed and replaced with new. Here, let it be emphasized that for efficiency in journal lubrication it is absolutely essential that dust-guards and journal-box covers be kept in prime condition in order to exclude dirt and water from the journal.

A novel oiling can is available for applying and measuring the quantity of free oil put into a journal. This can has an adjustable push handle, each stroke of which delivers a measured amount of oil through a perforated nozzle which, in turn, distributes the oil along the entire length of the journal. Several patented journal oiling devices are on the market, but information as to the success with which these devices are functioning is not available to the writer.

In so far as fit is concerned, tapered journals should not be tolerated, since such journals reduce the bearing areas and increase bearing pressures. When a brass has to be fitted to a badly tapered axle, often anchor holes are drilled in the face of the brass and then solder or some similar metal that will seat readily in service is run in. When this practice is followed, the anchor holes should be drilled well away from the center of the brass and the drill limited to $\frac{3}{8}$ in.

Confusion arises when brasses of different diameters are carried in stock. When the proper brass is fitted to the proper journal, the life of the brass is increased so as to more than compensate for the care required in keeping the brasses separate. It is self-evident that brasses that bear only on a line at the top center of the journal or on two lines at the edge will not be in service for any great length of time.

Linings and lining metals are closely related to the matter of lubrication. The armature linings are carried in motor housings which have waste pockets and drain pockets. The standard armature lining consists of a bronze shell, lined with babbitt and keyed in the housing. The babbitt is of such thickness that should the metal melt and run, due to accidental overheating, the armature is prevented from striking the pole pieces by the bronze shell and the armature shaft bearing surfaces are protected from injury. The linings are provided with an opening on one side to allow the oily waste in the

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pockets to come in contact with the bearing surface of the shaft.

The axle linings of a railway motor are generally of bronze for maximum axle sizes, but malleable iron lined with babbitt is sometimes used for smaller diameters of axle. The two halves are prevented from turning by a clamp fit and are either keyed or doweled. An opening provided in the lining on the low pressure side allows the oily waste in the bearing pockets to come in contact with the axle.

The edges of the openings in the linings are chamfered to assist oil in entering the bearing, and grooves are provided to insure the passage of oil from the bearing surface to the flange which must take the thrust. Every precaution is taken to exclude dirt from the bearings. The bearings are of ample size and with proper care and lubrication should give long life.

The material used for lining shells must offer the best bearing surface with the least amount of friction and have sufficient strength and ductility to withstand the severe operating conditions of railway service. The alloy used for brass or bronze shells is composed of copper, tin, zinc, and lead, the proportions of which have been determined after many years of exacting and exhaustive tests.

Alloy No. 4 is the equipment standard preferred by many railways for replacements on account of its general recognition as the highest grade bearing alloy obtainable. Alloy No. 80 has been standardized for replacements by many large operating companies and gives nearly as good service as Alloy No. 4 at a considerable reduction in cost.

The composition of these alloys is as follows:

Material	Alloy No. 4	Alloy No. 80
Copper	84.0 per cent	78.0 per cent
Lead	0.5	16.0
Tin	12.0	4.0
Zinc	3.5	2.0

Brass and babbitt linings are now almost universally used for armature bearings. This type is preferred to the straight bronze type for the following reasons:

1. A rough or uneven surface due to imperfect machining which might be barely detected will quickly wear out of the babbitt, thereby presenting a perfectly smooth bearing surface.
2. When grit or any cutting substance becomes lodged between the shaft and bearings, it imbeds in the babbitt without injury to the shaft, whereas in the bronze bearing, the grit powders and acts as an abrasive lap on both shaft and bearing.
3. All types of linings will run hot on either armature shaft or axle if not properly lubricated. When this trouble develops, the shaft is seldom damaged by the babbitt bearing. In fact, many cases have been noted where the babbitt after running hot and melting or becoming scored on the bearing surface took on a smooth glazed surface by the application of sufficient lubricant without causing the least damage to the shaft. Under similar conditions, the bronze unlined bearings were ruined and invariably damaged the bearing surface of the armature shaft.
4. The babbitt can be held more securely in a brass shell than in an iron shell, for the babbitt can be sweated in the brass in addition to being anchored by the usual dovetailed grooves. This permits the use of a very thin liner of babbitt or a thickness slightly less than the air gap between the armature and pole pieces. Therefore, in case the lining runs hot and the babbitt melts, the armature can not rub on the pole pieces without first wearing into the brass shell.

Cast or malleable iron shells lined with babbitt have been used quite extensively in old type motors. Where provision is made in a bearing for various sizes of shafts, it is customary to use bronze linings, either babbitt lined or merely tinned for maximum shaft sizes. For the smaller shaft sizes, where more bearing metal is required, malleable iron shells with a thick layer of babbitt cost much less than a straight bronze shell. It is standard practice to use bronze linings for axle bearings except where the thickness of the shell would exceed $\frac{5}{8}$ in., in which case malleable iron and babbitt are used.

Rebabbitting Bearings

In rebabbitting bearings, the bearing shell should be first rough bored, the dovetailed anchored grooves slotted and the grooves in each end turned. The bearing lining should be cleaned thoroughly, by removing all of the old babbitt and any foreign matter. to obtain a clean, bright surface to which the babbitt will adhere. After cleaning, brass linings should be tinned in a bath of half and half solder (melting point 178 deg. C.) and the babbitt poured while still hot from the tin bath. The best results are obtained by pre-heating the shell and jig to a high temperature nearly equal to that of the babbitt. The latter will then flow freely into anchored grooves and adhere firmly to the tin surface. The babbitt shell is then ready to be bored and reamed to size and finished outside.

Babbitt should be heated to a temperature of 500 to 550 deg. C., but to not more than 550 deg. or decomposition of the alloy will take place. The dross which rises to the top of the metal should be cleaned off with a ladle before dipping the babbitt from the kettle.

When pouring armature linings, new metal should be used. Under no circumstances should babbitt from old linings be mixed in the pot with the new metal. Babbitt melted from old linings may be used for journal or axle bearings.

A rough estimate of the temperature of the babbitt may be made by dipping a pine stick in the pot. If the metal is hot enough to be poured, it will set fire to the stick. However, the most reliable method is to determine the temperature with a pyrometer. When babbitting iron shells, it is essential that all of the inner surfaces to which the babbitt must adhere are cleaned thoroughly. Dovetailed grooves are provided in the flange as well as in the body of the shell to anchor the babbitt. Shells should be heated to the temperature of the babbitt and then placed in jigs for pouring the babbitt.

The babbitt used in General Electric railway motor bearings has a tin base composition, the proportions being $83\frac{1}{3}$ per cent tin, $8\frac{1}{3}$ per cent copper and $8\frac{1}{3}$ per cent antimony. This is known as Alloy No. 17. This alloy is the result of exhaustive tests over a period of many years.

Gear and Pinion Lubrication

On the average, trolley car gears and pinions are subjected to unusually hard wear. This is due either to the jerky operation of the car at starting or to the changing of motors from series to parallel. In addition to the objectionable noise feature of gear clashing, excessive wear—especially on the teeth of such gearing—will tend to shorten their period of usefulness and will make expensive replacements necessary. Too much wear of the gears have a detrimental effect on the life of the armature bearings, especially on the gear side, which condition subsequently may result in serious damage to the armature and field windings.

In order to prevent clashing and grinding of the gears, it is essential that the gears mounted on the axle, meshed with the pinion on the driving-motor armature shaft, be coated with a lubricant that will insure against excessive wear.

In the modern motor the gear and pinion are enclosed in a metal gear case. The purpose of this case is to

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retain the gear lubricant and to keep out any foreign matter that would tend to cause abnormal gear wear or would interfere with perfect contact of the teeth. In a few instances, some railway equipment is in operation in which the gears are unprotected by a gear case, and are exposed to dust, dirt, etc.

In giving consideration to the selection of a gear lubricant, the following points should be considered: (1) Ease of application, (2) amount required for initial lubrication, (3) amount required for subsequent lubrication, and (4) length of time product will lubricate efficiently. A lubricant meeting these requirements will reduce labor costs and other cost incidental to the maintenance of this type of equipment, as well as increase their life.

While special conditions may warrant alteration, ordinarily a sticky, adhesive mineral oil made from an asphalt-base crude oil, having a Saybolt universal viscosity of about 2,000 seconds at 210 deg. F. is a suitable lubricant for application to gears in winter; and one having a viscosity of about 5,000 seconds at 210 deg. F. for use in summer.

Locality of operation and the maximum seasonal changes in temperature have much to do with the grade of gear lubricant used, since it is of utmost importance that uniform results be secured throughout the entire year from the particular product employed. Consequently, where widely differing maximum and minimum temperatures are encountered, it is sometimes necessary to use special grades of lubricants in accordance with the season and temperature of operation. If a lubricant too thin for the service be used it will result either in leakage from the gear case or undue splashing therein or, if the gears are exposed, dripping therefrom. On the other hand, the use of too heavy a lubricant is apt to result in its settling in a semi-solid mass on the bottom of the gear case, in consequence of which the gears will likely merely "channel" through the lubricant without being properly lubricated. In general, the aim should be to select a lubricant, the viscosity of which in use will be the same the year round and, naturally, such as will cushion the gears properly.

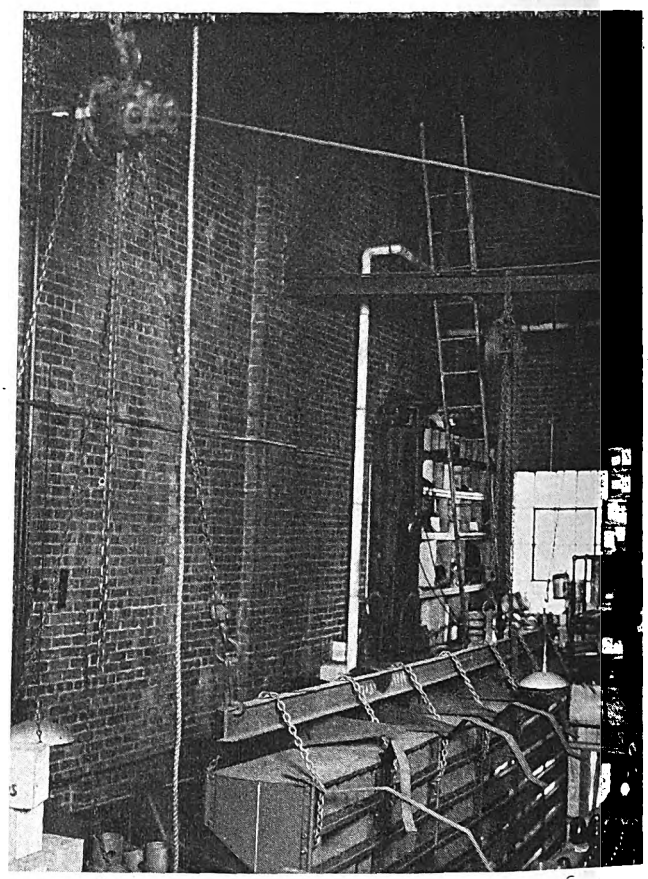
So far as the quality of the gear lubricant itself is concerned, for best results, it should be entirely free from acids or alkalies that would tend to cause any pitting of the highly polished metallic surfaces; should not tend to hold in suspension dirt and particles of worn metal that would produce an abrasive effect; should not harden or contain any residual matter of a non-lubricating character; should not be abnormally affected by heat or be reacted upon by water, acid or alkali; should possess marked adhesive properties, in order that it will neither drip nor flow excessively under abnormal temperature rise, and should not be rubbed off in operation or thrown off by the action of centrifugal force. The lubricant should be of sufficient body to withstand satisfactorily the high pressure at the point of tooth contact, thereby preventing any actual metal to metal contact regardless of the season of the year.

Generally, a gear lubricant of the straight mineral oil type is applied cold by stringing out about ½ lb. or more and feeding it into the mesh of the gears, whereupon the lubricant spreads over the entire tooth surface. More efficient lubrication of the gears is attained by frequent small applications than by a large application at longer intervals, the applications ordinarily being made at car-inspection periods. As would be expected, tight gear cases that exclude dirt and water make renewal of the lubricant necessary less often.

Cement Floor Laid Beneath Loaded Stock Bins

STEEL stock bins in the storeroom at the Kenmore Shops of the Northern Ohio Power & Light Company, Akron, Ohio, were originally placed on an ordinary wood floor. As this floor became worn it was decided to replace it with cement to be laid throughout the entire stockroom so that ladders and trucks could be used to advantage in handling the supplies stored at this point.

Instead of attempting to remove the stock to another location, pending the completion of the new floor, a plan was evolved whereby interruption of the routine of the storekeeping department was kept at a minimum and a considerable saving in time and labor on the job effected.



The bin sections were lifted by using an I-beam over which were looped short chains bolted securely to the bin frames below while a concrete floor was laid beneath

The bin sections are 18½ ft. long and 10 ft. high and with loaded shelves represent weights running into thousands of pounds. The presence of roof girders overhead in the storeroom made it feasible to undertake the elevation of these bin sections a distance above the floor level sufficient to permit the laying of the concrete directly beneath them, rather than going to the trouble of unloading and removing the contents of the bins to other quarters. An I-beam the length of the bin sections was brought into play. Held at short intervals with sections of chain bolted to holes already in the bin frames for adjusting shelf height, this I-beam was in turn secured by chain blocks to the roof girders. With care it was possible to raise each section of shelves without disturbing the supplies stored on them or in any way distorting the bin frames. The cement floor was allowed to harden for two days before the bins were lowered on to it.

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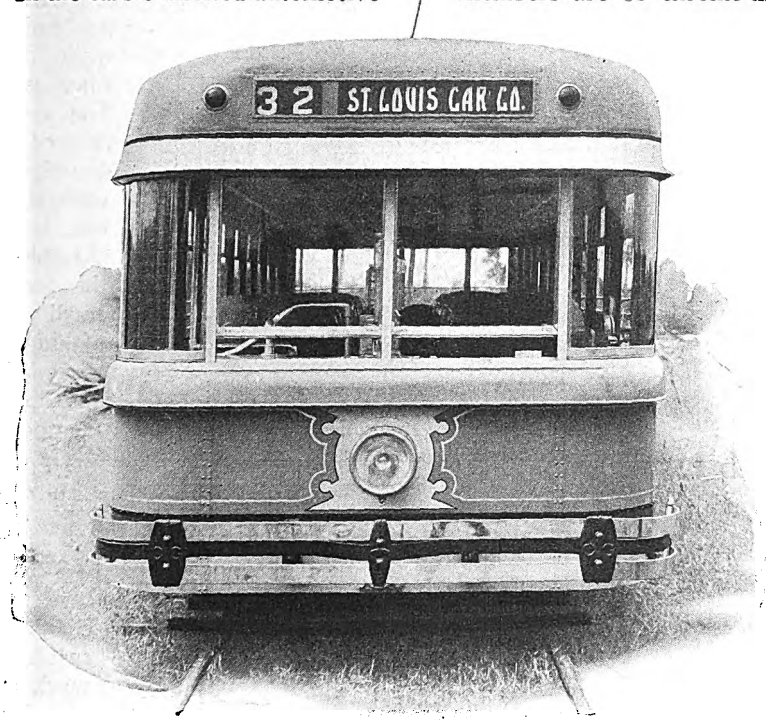
Construction Details of

The New Birney Car

By C. O. Birney
Superintendent of Car Construction
Stone & Webster, Inc.

WIDESPREAD interest was aroused throughout the local transportation industry by the new types of four-wheel cars exhibited at the last Cleveland convention. In the cars exhibited automotive running gear ideas were incorporated to give long wheelbase and flexibility for negotiating short radius curves. The general features of these cars were described in the Oct. 20 issue of ELECTRIC RAILWAY JOURNAL. In this article, which is based upon an address delivered by the author before the New England Street Railway Club, Mr. Birney supplies for the first time the full design details of this unusual progeny of the original Birney car. Designed to meet the most advanced ideas of what the modern electric car should possess, the new Birney has a maximum of power so that it can lead traffic and get away from a stop in front of other vehicles. Light in weight, it is economical for operation by one man. The horsepower of the motor equipments was detertmined by the requirement that they be large enough to spin the wheels with maximum load. The maximum acceleration is thus limited only by the adhesion of the wheels to the rails, and tests indicate that the quick getaway provided will permit this type of car to beat automobiles across street intersections and prevent cutting in and blocking of car movement.



With automotive type bumpers, floodlighted front and round corner glass the front end of the New Birney presents an unusual appearance

The car body is 31 ft. 10¾ in. long. This length was determined by the extreme overhang possible where two axles are used and spaced so as to permit operation around a 35-ft. radius curve without danger of splitting switches and without liability of shimmying or galloping. A minimum wheelbase for the truck centers was decided on as 147 in., and the spring base of the car fixed at 207 in. The car body is 7 ft. 10 in. wide, and measures 6 ft. 7 in. from floor to ceiling. Light weight consistent with rugged construction has been obtained by careful selection of materials. The main underframe members are of chrome-nickel steel, heat treated to have an elastic limit of from 90,000 to 100,000 lb. The cross sills are drawn steel shapes and the deep sides are of Plymetl. This was chosen because of its light weight, high resistance to shock, and heat and sound insulating qualities. The roof is plywood and was selected to provide stiffness and light weight. To reduce the blind space on the sides of the car to a minimum, 1¼x1¼-in. tees were used for the side posts. Both the ceiling and floor are of plywood, the latter being made in four sections joined with shiplap and steel plates. In the size and operation of the doors, particular attention was given to reducing the time necessary for boarding and alighting of passengers. The doors are equipped with National Pneumatic Company's devices under the direct control of the operator. The rear door is fitted with treadle control. All equipment is inclosed in cabinets. The controller is on the left side of the car, with lighting and compressor switches in a cabinet at the window sill height under the window at the left of the operator. The brake valve is in front of the operator while the hand brake handle is at his right. Other equipment selected includes the Oskelite signal system, bus-type ventilators, bowl-type lighting fixtures, aluminum grab rails, brass sash that lift 21 in. in the clear, back-up brake valve and control switch, window wiper, window guards, heavy type automobile bumpers, sun visor, dash floodlighting, drawbar and life guard.

Clear vision ahead for both operator and passengers has been obtained by keeping the equipment below the window sill line. A well is provided for the operator's

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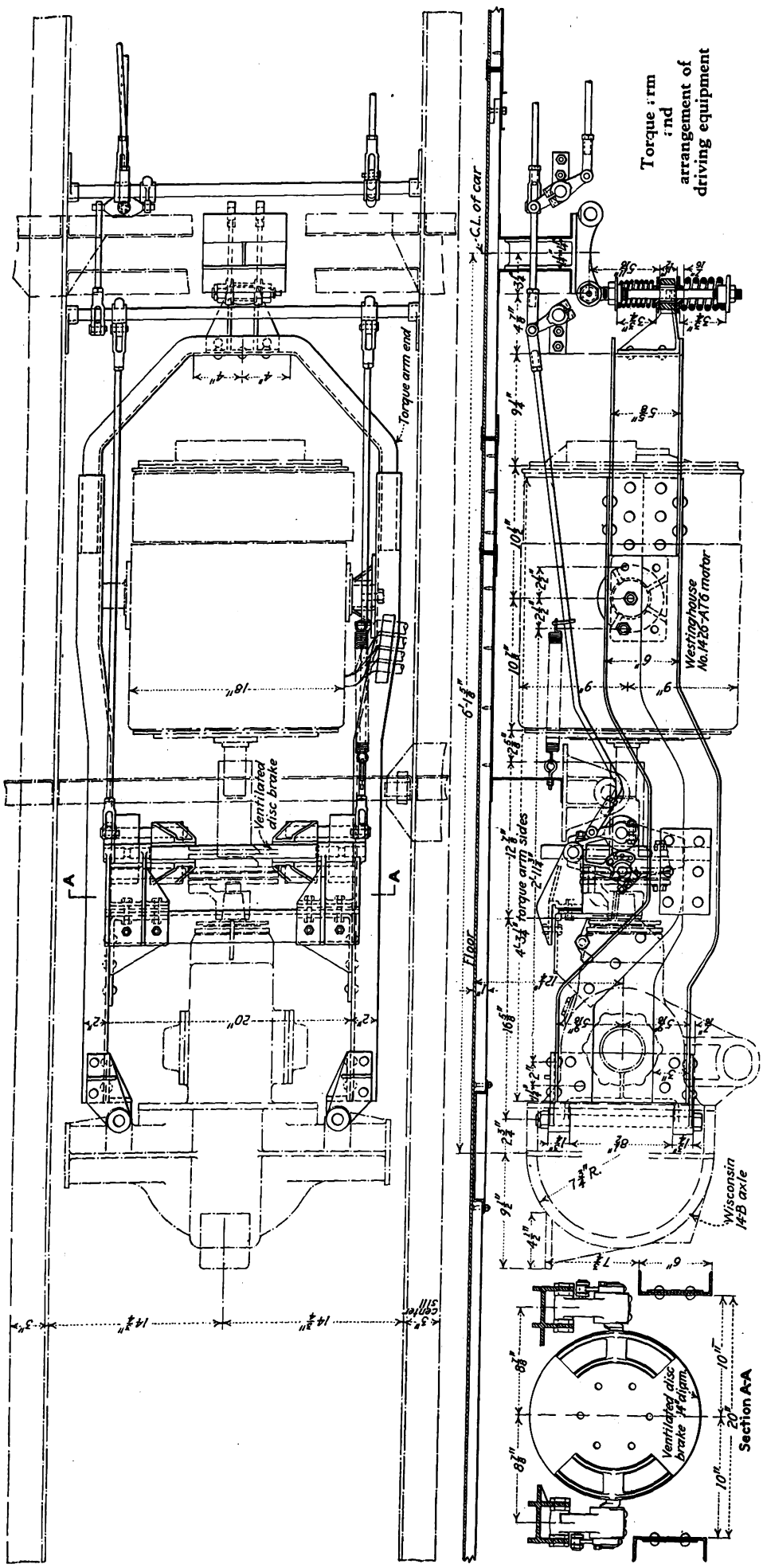

feet, and in this is all the foot-operated equipment of the car. Air connections are made with copper tubing and long compression fittings with standard S.A.E. and Briggs threads. Destination and route signs are special, being made by the Electric Service Supplies Company. The lights used for illuminating the signs and bull's-eye markers are also used for car lighting.

For the protection of the operator against reflections at night a double roller curtain is hung from a swiveling housing attached to the frieze above the window at his left. When the curtain is not in use the housing swings back against the frieze. It is enameled to match the inside finish of the car, so that while it is available instantly when needed it is inconspicuous. The curtain is made in two parts. One may be drawn down directly behind the operator, while the other, toward the fare box, is placed at an angle. A movable arm at the outer end of the curtain housing fits into a small socket on the ceiling, making the housing rigid. A pneumatically-operated Johnson fare box at the right of the operator, is lighted by a lamp set in a special fixture.

Two-Wheel Trucks of Unique Design

The truck frame consists of two steel castings and a forged channel section, to which the castings are riveted. This framework carries a bracket at one end for attachment to the car body through a swivel bolt and two springs. This type of construction permits longitudinal motion of the body and the car springs. The latter are adjusted so as to take the torque of the axle and act as a support at the same time. This arrangement irons out shocks due to starting or stopping. The end of the frame opposite the torque bracket is attached to the axle housing by two through bolts. The truck is attached to the body through the semi-elliptic springs. Chrome nickel steel U-bolts with S.A.E. threads and extra long nuts are used to attach the springs to the axle. At these points the axle is machined round, and cast-steel spring seat pads are machined to a smooth

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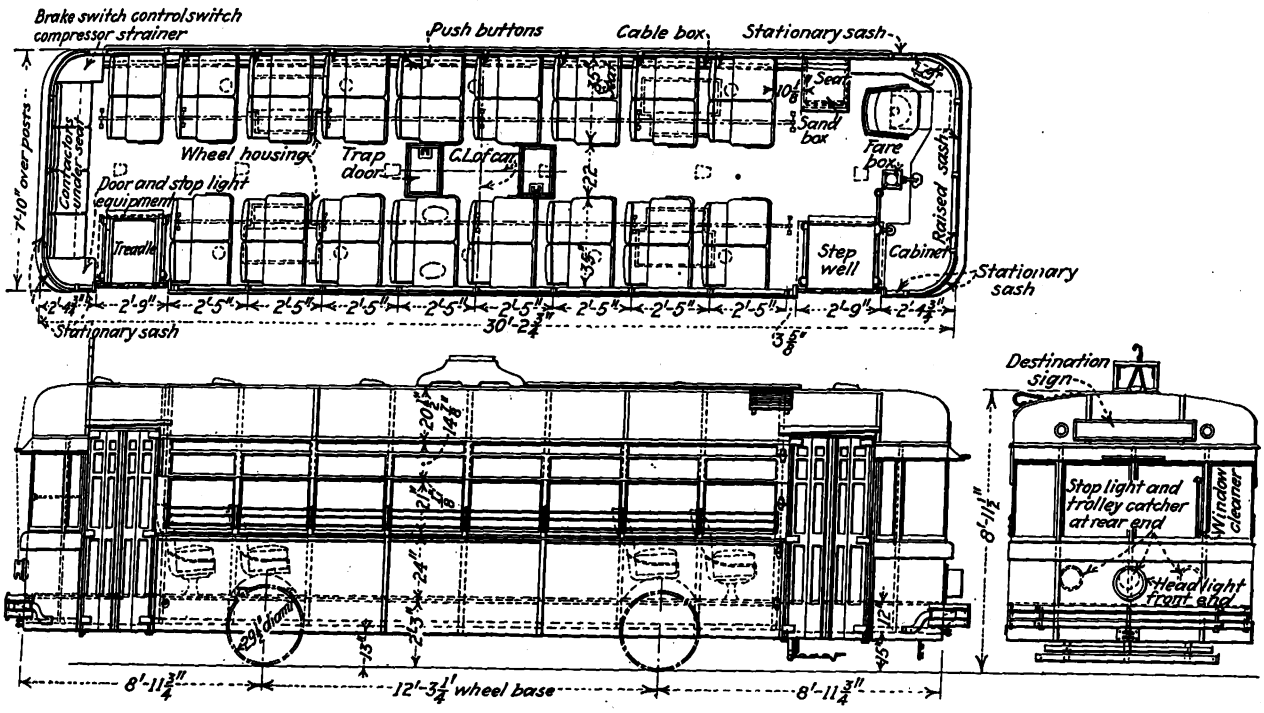


Plan and elevation of the car

turning fit. These are provided with Alemite fittings for lubrication.

At their trailing ends, the springs are attached rigidly to the body sills. The leading ends are attached through shackles which permit elongation under load. By placing the shackles on the leading end of the spring the car is pulled. This type of construction corresponds with the latest developments in heavy-duty auto trucks, and tends to avoid shimmying. The method of attachment is also intended to hold the axles parallel with each other, while the truck frame relieves the springs of all starting and stopping strains without interfering with the free motion of the springs and axles.

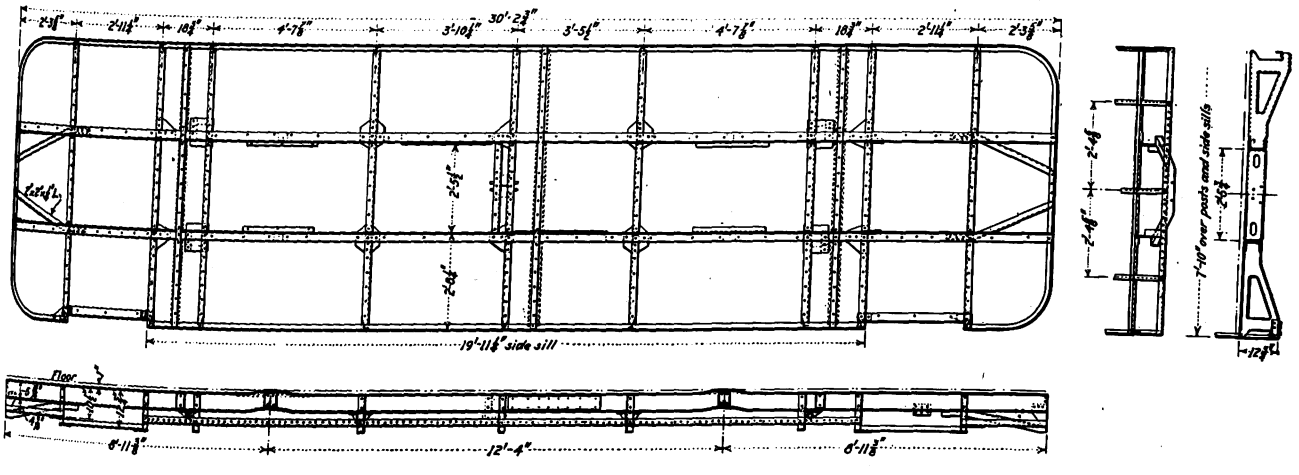
Hand Brake Construction

Stabilizing springs are used to keep the wheels in alignment. In addition to supporting the motor the truck frame supports an independent hand brake. This is a double-shoe, double-disk type made by the American Cable Company. It is attached to the coupling on the pinion and armature shaft, and owing to the 8.64 to 1 gear ratio of the axle, and the 5 to 1 ratio of the hand brake lever, it is possible to slide the wheels with ordinary physical effort. Full braking power can be applied in a single motion and with minimum loss of time.

Special Axle Construction Used

Driving motors are hung on trunnions, which permit free movement. They are connected to the pinion shaft of the axle with flexible joints which avoid the necessity of making and maintaining an exact alignment of the parts. All truck parts are designed with a view to their being maintained by the ordinary car crews, and parts are machined accurately so that they are interchangeable.

The axles of full floating construction are known as a double-reduction, driving-steering type. They have a gear ratio of 8.64 to 1. The primary drive is through a spiral bevel gear to a spur gear, which contains the differential. The bearings are Timken roller and New Departure ball types. All are proportioned for heavy service. Adjustment of bearings is provided for as on automotive trucks. The special feature of the axle is the steering driving knuckle and joint. The steering knuckle is designed as a single piece, with trunnions for



Construction details of underframe

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mounting the Timken thrust bearings which take the load due to the swiveling action of the wheels. Seats are turned on the steering knuckle for the heavy-duty Timken bearings that carry the wheel loads. The knuckle is bored to receive the live axle and the "Uniflow" joint. For this type of drive to the wheels, a standard universal joint could not be used on account of the variations in speed at which an ordinary universal joint makes the two half revolutions. For this reason a special "Uniflow" joint is used at this point. With this construction the torque is transmitted to the wheels without distortion, and all danger of a jerky motion being transmitted to the car body is eliminated. The body of the axle is a high-grade annealed steel casting.

Brakes are built into the axle. They are of the double shoe internal expanding type operated by a constant lift cam actuated by Westinghouse air cylinders. These insure a constant braking effort at uniform pressure, and provide a smooth stop which is under the operator's control at all times. Brakeshoes are removed by taking the heads off the axle and replacing the shoes at a bench. Removal of a bolt permits the withdrawal of two brake pins, so that the heads and shoes can then be slipped out.

The wheels consist of four principal parts. These are the steel tire with A.E.R.A. tread and flange, the sound and shock-absorbing tire, the hub, and the driving cap. The steel tire is made of standard rolled steel wheel material, bored to limits that insure interchangeability. It is pressed on the rubber tire with approximately 25-ton pressure. This rubber is a special compound prepared to take the loads that can be expected in electric railway service. It is cured to the inner and outer rims so that all parts of the material are stressed by the load, the lower part being in compression and the upper part in tension.

The hub is machined from a high-grade steel casting. It is bored to take two Timken bearings, both of heavy-duty railway type. It also carries the brake drum, which is attached with dowel pins and cap screws that make renewal an easy matter. The hub is machined for a press fit of 25 tons in the rubber tire, which is pressed home against a shoulder on the hub. Brake drums, Timken bearings, rubber tire and steel tire are all machined and mounted in relation to the wheel gage lines, which make it possible to make replacement that will not vary more than $\frac{1}{32}$ in.

Another steel casting machined to fit the hub and the live axle forms the driving cap. This is attached to the hub by studs, and is driven by the live axle through splines similar to those used in standard automotive practice. An entire wheel weighs approximately 450 lb. The steel tire can be replaced easily when it has reached its limit of safe wear.

Electrical Equipment of Light Weight Type

The car is equipped with two Westinghouse type I-426, 600-volt motors of 50 hp. capacity. They weigh 800 lb. each and are provided with dual ventilation, with one stream of ventilating air passing through the armature core while the other passes over the surface of the armature and around the field coils. Due to the fact that the motor is spring supported it is possible to use a light-weight high-speed type and so obtain economy in weight and space. Each of the motors drives one axle through a differential and the double reduction gears.

The control equipment is of the Westinghouse light-weight type with magnetic control. The main circuit connections are made by remote-controlled magnetic contactors. The direction of the car movement is governed by a hand-operated drum-type reverser. Overload protection is provided by means of a clapper-type overload trip. The plunger of this assembly carries insulated contact disks, and when an overload occurs the circuit to two of the contactor operating coils is broken, thus allowing two switches to open and interrupt power to the propulsion motors. The overload trip includes a pneumatic plunger assembly, called the knockout cylinder. The functioning of this is correlated with that of the safety devices handle assembled with the master controller, so that when the handle is released in an operating position air is admitted to the plunger and the overload trip is knocked out, thus disconnecting power from the motors in the same manner as when an overload occurs.

Reduced Voltage for Control Circuits Obtained Through Resistance

Energy for operation of the magnetic contactors is taken from shunt taps on a high resistance connection between the trolley and ground. In this manner higher voltages are kept from the control circuits. The control energy for the contactors is taken from the shunt taps through several of the operating coils to the master controller, and from the master controller through the remaining coils to ground. The potential of the master controller and the grouping of the coils between the shunt taps is such as to balance voltage on all circuits and at the same time maintain low voltage throughout.

The action of the hand operated reverser is not interlocked with that of the master controller. However, the reverser includes an electric interlock which drops out the line switch before the main circuit is broken on the reverse fingers. This eliminates burning of the reverser fingers and contacts. The control circuits are arranged so that it is necessary to close the line switch on the first position of the master controller and hold it closed by its own "In" interlock on all other positions. This insures that power cannot be applied to the motors in case the reverser is thrown with the master controller on any operating position. The possibility of jerks from this source is eliminated and the resistance will again be inserted in circuit with the propulsion motors when the power circuit is again re-established.

Most of the operating devices are located in a neat cabinet at the front of the car, and the switches are under the rear seat in an inclosed structure. The only device under the car is the main motor resistor. This is the Westinghouse type M, which offers the advantages of lightness, weighing only about a third as much as do the grid types.

The electropneumatic safety car devices included were developed to perform all the functions of the ordinary safety car equipment. They give quick application and release of the brakes. The control may be in the controller handle or in the brake valve handle. The cab appearance is improved by the reduction of pipes, and the duty on the compressor is reduced on account of lessened pipe leakage. Door operation is improved by the elimination of any lag in bringing about the opening or closing movement.

A variable load braking device is provided to give uniform braking regardless of load. This has the usual air compressor, reservoirs, two governors, four air-brake cylinders, (one per wheel), air-operated sanders, and National Pneumatic Company's electro-pneumatic equipment for operating doors and treadle.

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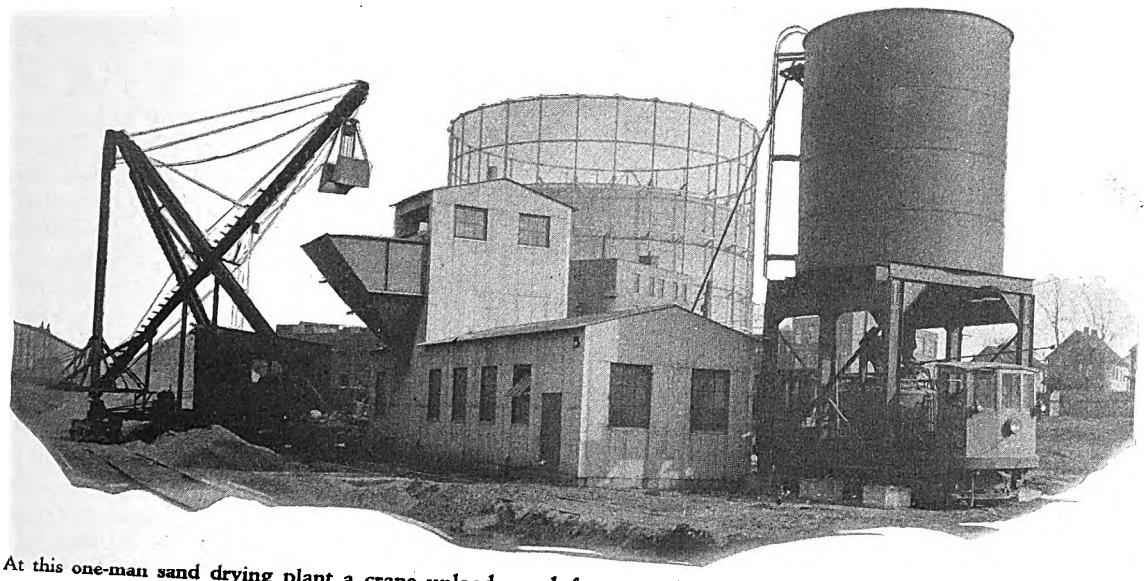
I.R.C. Builds One-Man Sand Drier

Plant of 10,000 tons per year capacity built for $17,000 is operated by a single man. The cost of receiving and drying sand is 89 cents per ton



At this one-man sand drying plant a crane unloads sand from canal barges, railway flat cars and motor trucks. The sand car is loaded by gravity underneath the dry sand storage tank which has itself received the sand under air pressure from the drying plant

NOT content with one-man operation of all local cars in the three cities of Buffalo, Niagara Falls and Lockport, the International Railway has sought further economies through application of the one-man principle to other phases of its business. A sand-drying plant of 10,000 tons per year capacity has been designed and is now in daily service, operated by one man. The operator unloads the sand from the barges in which it is delivered, runs the plant, maintains a reserve supply of sand, assists in loading a pneumatic sand car specially designed by the company, loads all sand and gravel required for construction work, and bags the sand for delivery by flat car. During October and November he received and stored a reserve supply of 4,500 tons of wet sand. Although the present annual consumption of sand on the system is about 6,000 tons, so that 180 days of operation will meet all requirements, in designing the new plant provision was made for possible future expansion. The economies under present normal consumption, it is estimated, will pay the entire cost of the plant, $17,000, within 2½ years.

All sand used on the transit lines, as well as all sand required by the company for construction purposes, is supplied by this one-man plant. Although there are few grades in the 415 single-track miles of the International Railway, the sand consumption is relatively high, particularly during the winter months, because of snow and ice conditions. Furthermore, the trainmen have been encouraged to make a liberal use of sand for the sake of safety.

The one-man sand-drying plant has an actual daily capacity of 28 to 38 tons of sand. The variation is due to difference in moisture content. Daily cost of operation is $15.27, and the average operating cost per ton, including unloading from barges, is 46 cents.

Gas is used for fuel in the drying plant. Although somewhat higher in cost than coal or other fuels, it requires no attention, eliminates necessity for handling the fuel and the ashes, and saves the cost of fire box repairs and renewals. The usual high costs of maintaining conveying equipment have been reduced to a minimum, since the plant has only one seven-foot pan conveyor. These are the principal factors reducing labor and making possible one-man operation.

The plant was developed as the result of a thorough study by company engineers of the problem of obtaining a sufficient quantity of dry sand delivered at the lowest cost. Originally each carhouse maintained its own sand-drying equipment, consisting essentially of a series of steam coils supplied by the heating boiler of the carhouse and placed inside a sheet-iron hopper. Wet sand was distributed to the carhouses from storage by flat car and fed into the hoppers by hand. After being dried it was screened into storage piles by hand.

New Plant In Service Several Months

The new plant, which replaces all other sand-drying equipment, has been in daily service for several months. Its location on Scajaquada Creek, in the city of Buffalo, was chosen in order to facilitate delivery of wet sand to the plant and of dry sand to carhouses, street boxes and other points of use. This location permits direct unloading from sand barges into the plant's wet sand storage bin, with deliveries of wet sand by flat car or by motor truck also if possible.

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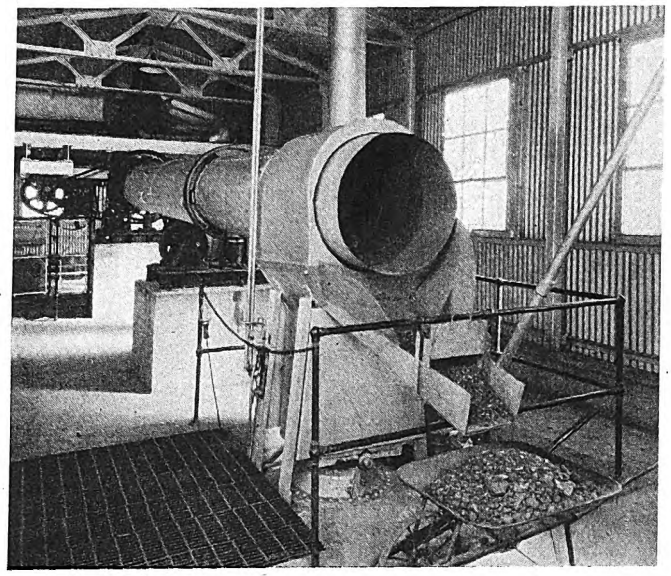


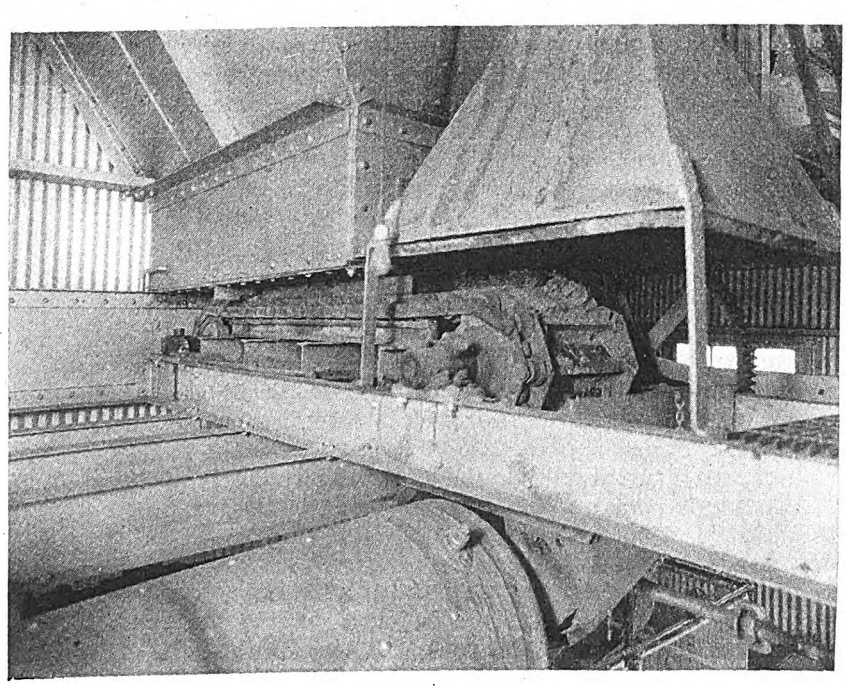
Discharge end of one-man sand drying plant. Sand passes through screen in drier shell to accumulator bin or to dry sand elevating tank at pit bottom. Compressed air hoists sand from elevator tank to outside dry sand storage bin through 3-in. pipe

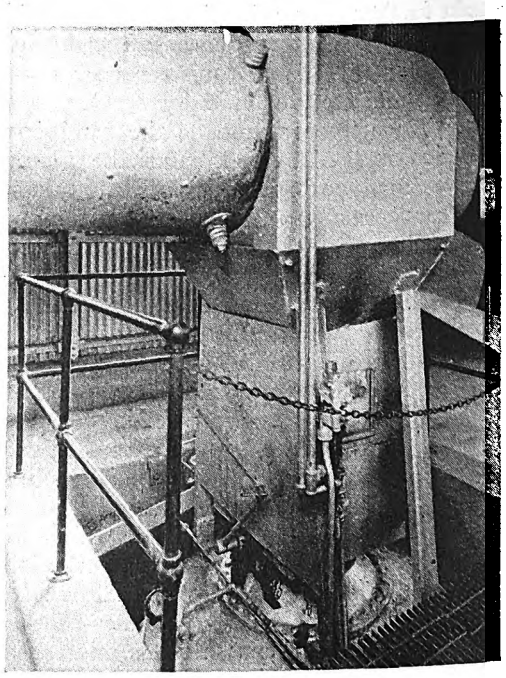
The structure is entirely fireproof and consists of a wet-sand storage bin, from which the sand is fed by gravity into a wet-sand pan conveyor, a gas-heated rotary Harmor drier, a pneumatic dry-sand elevating tank and accumulation bin, and a dry-sand storage tank from which the sand is delivered by gravity to a pneumatic sand car or to flat cars for bag loading.

Sand sucked from Lake Erie or from the Niagara River is purchased on contract and is delivered directly to the plant by barge, being unloaded by means of a crane and clam-shell bucket directly into the wet-sand storage bin or into storage heaps as desired. The storage bin, which has a capacity of about 45 tons, is so built that three of its four sides are steeper than the angle of repose, thereby preventing arching of the wet sand, a source of frequent difficulty in many plants. The sand is carried from the bottom of this storage bin by means of a seven-foot pan conveyor, which delivers the sand directly into the burner end of the gas-fired rotary drier. The speed with which the sand is fed into the drier can be varied by a gate controlling the height of the sand delivered to the conveyor, or by means of a Reeves variable-speed transmission controlling the speed of the conveyor.

The drier drum is 30 in. in diameter and is inclined 18 in. in its 30-ft. length. It is rotated at a speed such that the passage of sand through the drier consumes about ten to twelve minutes. Flights are attached to the outside of a central mandrel 10 in. in diameter and to the inside of the outer drier shell in such a way that, as the sand passes through the rotating drier, it is continually cascaded from one set of flights to the other and thereby is uninterruptedly exposed to the drying effect of the hot gases passing through the drum. A high-pressure gas burner fires the drier, the flame passing through the central mandrel to the discharge end of the drier where the hot products of combustion are reflected through the outer drum and outside the mandrel, discharging into the atmosphere at the wet-sand end of the drum through a hood and stack. A cylindrical screen built into the discharge end of the drum automatically screens the sand as the drier rotates. The dry, screened sand then falls through an accumulator bin directly into a pneumatic sand elevating tank of five tons capacity, while the screenings are delivered by a short chute to a wheelbarrow, which is adequate to provide for one day's screenings.

When the dry-sand elevating tank has been filled, a foot valve is closed, shutting off this tank from the rest of the system and permitting the plant to continue operation by delivering the dry sand to the accumulator





Interior Appearance of Sand-Drying Plant

A 7-ft. pan conveyor transports wet sand from receiving hopper to burner end of dryer. The hood to the right carries off the products of combustion after they have passed through the mandrel and returned between it and the outer dryer shell.

Closeup of discharge end of drying plant. When elevating tank at pit bottom is to be emptied, a foot valve shuts off the tank from the rest of the system and sand coming from the dryer is received in an accumulator bin above.

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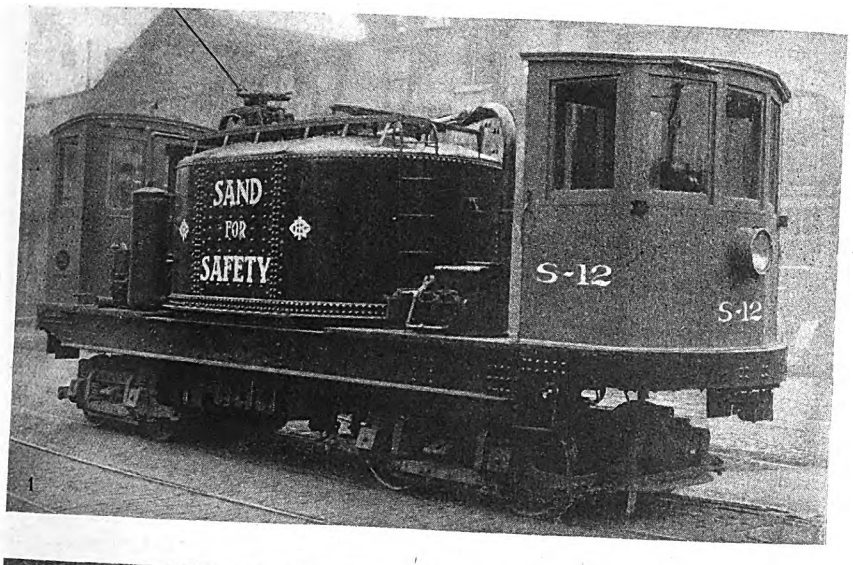
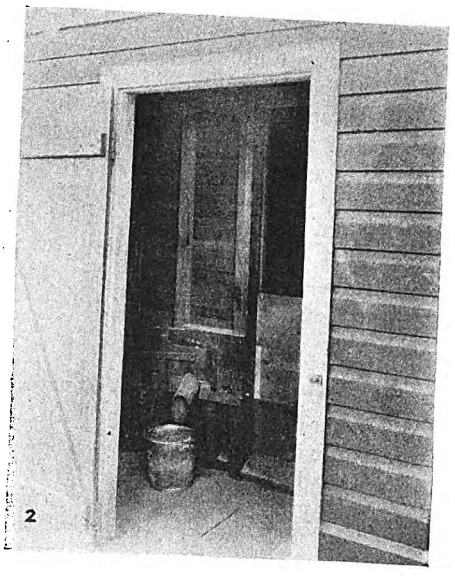
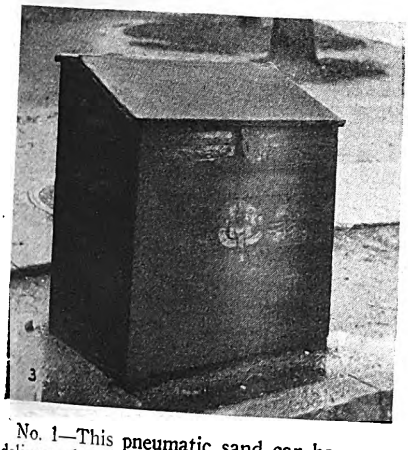
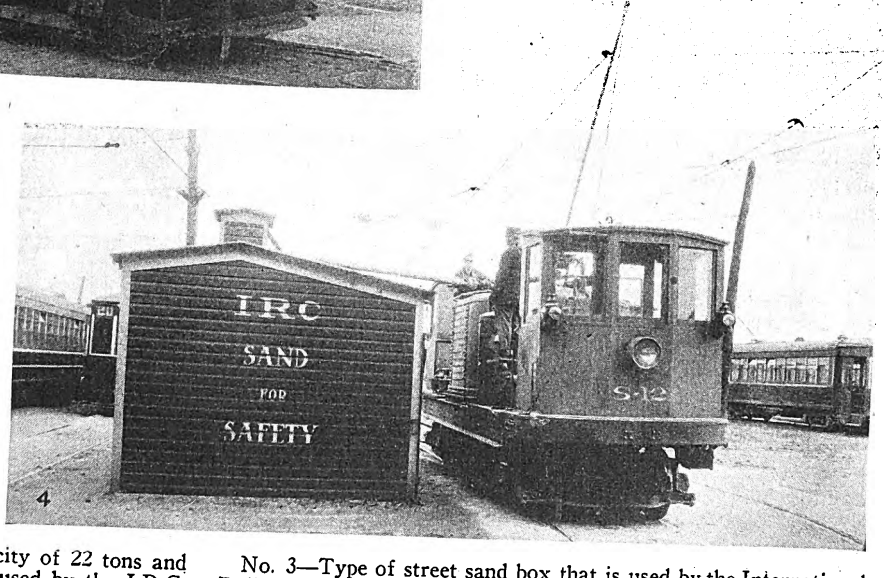
Equipment Used by International Railway in Delivering Sand









No. 1—This pneumatic sand car has a capacity of 22 tons and delivers about three quarters of the dry sand used by the I.R.C.
No. 2—Vestibule of sand house; gravity feeds sand to pails used in replenishing car supplies.
No. 3—Type of street sand box that is used by the International Railway.
No. 4—The pneumatic sand car is used to fill carhouse and street sand boxes.

bin above the pneumatic elevating tank. Compressed air from a compressor having a capacity of 120 cu.ft. per minute is then admitted to the pneumatic sand elevating tank, and lifts the sand through a three-inch pipe to the top of the dry-sand storage tank of 225 tons capacity, outside the building—a distance of approximately 30 feet. A pressure of 50 lb. will empty the dry-sand elevating tank in about seven minutes. This compressed air system replaces all mechanical dry-sand conveying apparatus, with its operating difficulties, delays, loss of time, and higher maintenance costs.

Sand Delivery Next Studied

Not content with the development of a highly efficient and economical drying plant, the methods of delivery and storage of sand throughout the system were next studied by the company's engineers. The purpose of the study was not only to secure the most economical delivery of sand to the point of use, but also to safeguard its quality. A pneumatic sand car was especially designed and built which could be moved directly under the dry-sand storage tank at the central drying plant, and loaded by gravity. Delivery of sand from the car to the car-house bins and to sand houses located at the ends of the street car lines is made by compressed air through a 4-in. pipe. The sand car, which has a capacity of about 22 tons, delivers about three-quarters of the dry sand used on the system, the remaining one-fourth for convenience being delivered in bags by flat car to the small street boxes.

The pneumatic sand car is used not only in the city of Buffalo, but throughout the International Railway system, thus almost entirely eliminating hand labor in the delivery of sand to the sand houses, each of which holds about 25 tons. Two-thirds of the capacity is live storage from which the sand falls through a chute into a vestibule, where are kept pails for expediting the delivery to the street cars.

Although the sand houses in some cases hold a supply sufficient for one month's service, there are many places where houses of such capacity cannot be built, but where it is necessary for trainmen to replenish the sand supply on their cars quite frequently. At these points, small,

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neatly painted, but unlettered boxes having a capacity of one to three tons are placed—usually set between the curb and the sidewalk. It has not been found practicable to fill these sand boxes from the pneumatic sand car because of the frequent trips necessary and because the unloading of sand via the discharge pipe would cause some delay to traffic. These boxes, therefore, are replenished from flat cars or motor trucks carrying sand in bags filled at the central plant by means of a special arrangement of discharge pipe and valve designed for this purpose.

Accomplishments Summarized

A summary of the accomplishments resulting from the I.R.C. one-man sand-drying plant, the pneumatic sand car and the company's method of distribution and storage of dry sand follows:

The daily operating cost of the plant is $15.27—made up of ten hours labor at 65 cents; 9,650 cu.ft. of natural gas at 65 cents per 1,000 cu. ft.; electricity $1.50; and lubrication, inspection and repairs $1. These figures (on the basis of 180 days of operation—sufficient to meet present demands), give a weighted cost of 46 cents per ton for receiving and drying the sand. The cost of the drying plant was $17,000. A charge of 15 per cent for interest, depreciation and taxes, amounting to $2,550,00 (43 cents per ton on the basis of an annual 6,000 tons of sand handled), added to the operating cost per ton of sand of 46 cents brings the cost of receiving and drying sand to 89 cents per ton.

The pneumatic sand car can be loaded, run to a carhouse 11 miles away and unloaded inside of three hours at a labor cost for two men of $3.75, or delivery cost per ton of 17 cents, which added to the 89 cents cost of sand at the plant bring the total cost of receiving, drying and delivering sand to the car-houses to $1.06 per ton. It is difficult to arrive at a cost comparable to that on any other system because of the variations in the method of delivery and of the quantity of sand used at various locations. However, the figure of $1.06 is a fair approximation for the carhouses located within the city of Buffalo.

The cost of the sand car was $8,153, and the annual economy resulting from its use is computed at $3,667. The cost of 20 sand houses was $6,000, and this investment produces an annual economy of approximately $1,866 by decreasing the number of delivery trips and the labor item. The anual operating economy through the use of the $17,000 sand-drying plant is an estimated $7,000, so that the total economy resulting from the new system of drying and distributing sand amounts to $12,500. In addition the company now has the assurance of thoroughly dependable deliveries of a uniformly high quality of dry sand—the cheapest and most effective of all safety materials.

Uniform Traffic Code Prepared for Wisconsin

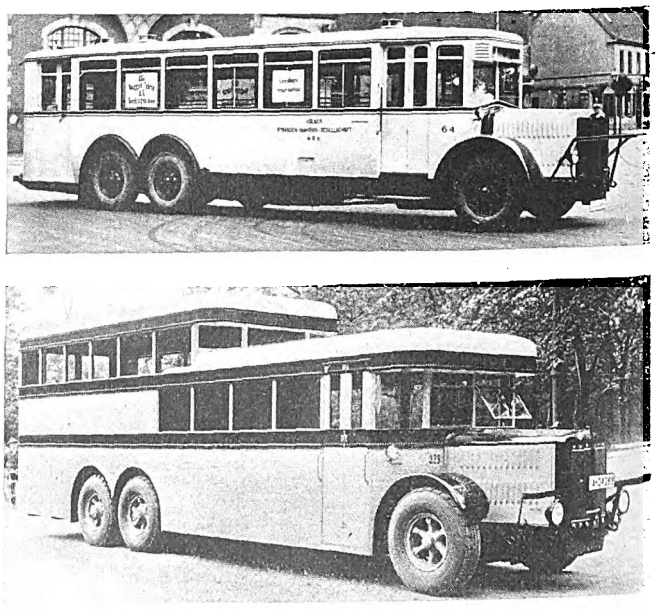
RECOMMENDATIONS for a uniform state traffic code have been made by the Wisconsin Highway Commission. The proposed code imposes a speed limit of 45 m.p.h. C. N. Maurer, traffic engineer of the commission, said that if county traffic officers were responsible to a central department instead of to county officials the recommendation would be to "set no speed limit whatever because under certain conditions one can drive more recklessly at 25 m.p.h. than at 45."

Louisville Grade Crossings Eliminated

ELIMINATION of the grade crossings at Fourth and G Streets in Louisville not only has removed a great accident hazard but also has speeded up street railway service materially. Both the Louisville & Nashville and the Southern Railroad cross the streets at this point, and a viaduct was constructed to carry their several tracks. Under the terms agreed upon by the three interested parties, the city paid 14 per cent of the total cost of $320,318, the Louisville Railway paid 21 per cent and the steam railroads 65 per cent.

New Buses Exhibited at the Berlin Automobile Show

SEVERAL new types of buses were on exhibition at the International Automobile Exposition at Berlin held last November. Two exhibited by the Büssing Automobile Works are typical of the output of the German manufacturers and are illustrated herewith. The upper view is of a six-wheel single-deck bus built for the Strassen-Omnibus Gesellschaft of Cologne. It is designed to seat 29 passengers and has standing room for



Types of buses shown at the Berlin International Exposition of 1928

an additional 21 passengers. There are both front and rear doors, and the wheel base is shortened by setting in the front wheels. Features claimed for these buses are their low weight, because of the use of light metals in their construction, reduction of noise in operation, low floor combined with ample clearance under the bus, a six-wheel air brake with two mechanical auxiliary brakes and a six-cylinder motor.

The lower view is a "one-and-a-half-deck" touring bus, with baggage compartment below the rear upper deck. This bus has room for 21 seated passengers, and the general principles of construction follow those mentioned in connection with the Cologne bus. A considerable percentage of this company's bus output is now six-wheel buses, of which it has built some 1,200.

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Helpful Suggestions for the Electrical Repair Department

Removing Armature Wire Bands

WHEN removing wire bands in preparing an armature for stripping, it is quite easy to injure the underlying core, insulation or leads. Bands often have to be removed from armatures that are not to be stripped, so it is quite necessary that they be removed properly.

A center-cutting cold chisel of the form illustrated, is the best tool to use in cutting the bands. The chisel should be placed across the band and just over the edge of a core tooth, as shown in another illustration. It is best to cut the wires one or two at a time. When severing the last turn of

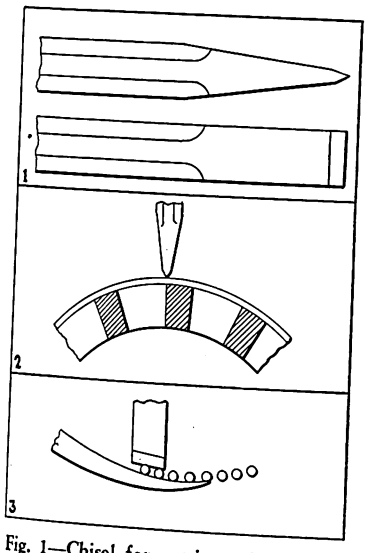

Fig. 1—Chisel for cutting wire bands
Fig. 2—Method of cutting center bands
Fig. 3—Using a curved drift to support end bands while cutting

a band the repairman should stand at one side to avoid being struck by the recoiling end.

When cutting the end bands the procedure must be modified because the foundation under these bands is more yielding. A curved chisel or drift, as shown in Fig. 3, is helpful in this work. Since the drift is used for driving under the bands and not for cutting, it can be drawn to a taper ending in a sharp edge, making it easier to drive under the bands. The edge of the cutting chisel is held parallel to and just over the side of the curved drift, so that in the cutting, its edge is sheared along the side of the drift into a clearance. This clearance is caused by some of the band wires being lifted from the bedding.

With the drift forced a short distance under the wires a few wires are cut. The drift is then driven further and a few more wires cut. When cutting the last wire, the operator should stand aside as advised when cutting core bands.

It is not customary to use a chisel in cutting wire bands that are run onto the leads behind the commutator. Instead, the flaps of all clips are cut off, one end of the band released and the band removed by pulling it off turn by turn while the armature is rotated by hand.

Checking for Armature Defects

WHEN the armature of a railway motor is received in the shop for repairing, it generally bears a tag that indicates the nature of the trouble for which it was sent in, as far as the maintainer was able to diagnose it. When armatures are received in numbers, some of the tags may be missing, some may have become interchanged and others may be marked with the effect rather than with the cause of the trouble. It is customary, therefore, to go over the armatures carefully and check them. To assist the man who does the checking, a list similar to the one following will be found valuable in making certain that no possible defects are overlooked.

1. Grounded front mica V-ring.
2. Rough commutator.
3. Loose commutator bars, detected by tapping all the bars with a small hammer.
4. Commutator struck or rubbed by a brush-holder or foreign object.
5. Broken tangs.
6. Open-circuit, indicated by diametrically opposite pairs of commutator bars being burned.
7. Core rubbing pole-pieces, indicated by areas rubbed smooth on core or on banding clips.
8. Armature coil grounded to core or to a band wire on the surface where it can be seen.
9. Roasted armature coils, caused by a short in the commutator and evidenced by discoloration of two top coil legs diametrically opposite each other.
10. Armature winding rubbed on rear end, due to excessive end play in bearings.
11. Missing band wires.
12. Loose band wires, determined by trying to displace them laterally with a hammer and drift and noting the resistance offered to displacement.
13. Hot bearings.
14. Tapered bearings.
15. Bearings under the standard size.
16. Condition of keyway.
17. Condition of pinion fit.
18. Condition of pinion nut thread.
19. Condition of shaft centers, as to depth and trueness.
20. Armature shaft bent, core wobbly or core sleeve loose, detected by swinging in lathe. Armatures whose shafts can not be replaced without removing the winding, should be detected at an early stage of inspection.
21. Armature should be tested for grounds at high voltage.
22. Commutator should be cleaned, the slots raked and the armature tested for short-circuits and poor connections.
23. Depth of slotting to be gaged.

Removing Commutator Leads of Strap Wound Armatures

IN STRAP wound armatures, great care should be taken in removing the leads from the commutator. The leads extend to a considerable depth and the tang walls at the bottom of the slots are often very thin, even when the milling is truly radial. When the slot is not milled truly radial, the walls offer a more serious problem. It is necessary, therefore, in stripping an armature whose tang walls are thin to use an air-gas torch for loosening the leads before attempting to lift them. The leads cannot be driven out safely with a drift because of the almost certain danger of breaking a tang wall.

The air-gas torch should be mounted permanently on an adjustable stand, so the flame can be directed and its hottest point focused at will. The hottest part of the flame should not be focused exactly on the bars, but on a point beyond them and

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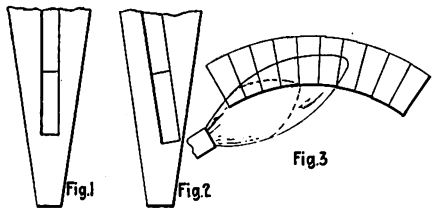

Fig. 1—An armature slot milled truly radial

Fig. 2—Thin spot caused by milling the slot at an angle

Fig. 3—Method of directing the torch flame to heat the tangs properly

at an angle permitting the flame to heat the entire side of a tang. The method of directing the flame on the commutator bar is illustrated in Fig. 3. When the solder begins to melt, a mild lifting effort should be exerted to see that all the leads of that particular coil are thoroughly loosened from the tangs before attempting to lift any lead with force. When all the leads of any particular coil are thoroughly loosened, the whole set of leads can be lifted bodily.

While the flame is being directed to any particular bar, and is heating it to the sweating point, it heats the bar next to it appreciably, so that after the first bar has been heated, less time is required to heat the succeeding bars to the required temperature. The procedure, therefore, consists in turning the armature sufficiently after a coil has been lifted to permit the hottest part of the flame to be directed on the next bar.

As each set of leads is lifted from the commutator, it is advisable to clean the vacant slot with a piece of heavy, dampened cotton tape. This cleaning can be conducted while the next bar is being heated to the proper temperature.

Aligning Distorted Banding Grooves

IN ASSEMBLING new armature cores, the banding grooves are not likely to need attention further than straightening their sides. When a core has been down on the pole pieces, however, and it has been necessary to reduce the length of the expanded teeth by laying back the tooth part of the laminations and driving them back into place, the alignment of the banding grooves may become distorted. If this occurs, the widest band that can be used will be considerably narrower than any individual banding groove would accommodate.

When the grooves are only slightly out of line, the sides of the grooves can be driven back into place with a hammer and a drift of the shape shown in Fig. 1. If the displacement is too great to be overcome by this method a safety file can be used for aligning the sides of the distorted grooves. For very badly distorted grooves, it is customary to drive hard wood sticks the full length of all the slots to support the teeth against the pressure of the cutting tool, and then to true the banding grooves in a lathe.

It is quite essential, in any event, to check the alignment before proceeding further. An effective way of doing this is as follows:

Cut a piece of tin, measuring one-fourth of the armature circumference in length and a little narrower than the width of the standard banding groove. Ignore the grooves that are displaced to a considerable extent in either direction and select several grooves that are of average displacement and which are equally spaced around the core. Align them with the file or drift until the test piece, when laid on the core as indicated in Fig. 2 and moved around by hand, will check the several equally-spaced grooves that have been trued. One side of the extremely displaced banding grooves can then be straightened up or filed back until the grooves come within the limit allowed by the side of the test piece. A band of maximum width can then be applied.

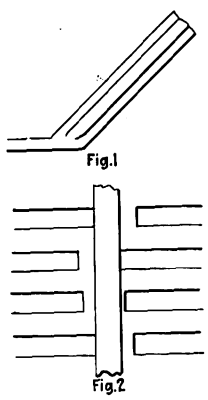

Fig. 1—Drift for straightening sides of banding grooves

Fig. 2—Distorted grooves prevent the use of full width bands

Straightening Core Tooth Laminations

WHEN an armature is new, the ends of the core teeth are perpendicular to the center line of the shaft. Frequently, however, an armature is rubbed by the pole pieces and the laminations are fanned out, especially on the pinion end. When the laminations are rubbed hard a fin is formed at the top, as shown at *b* in Fig. 3. As a result the armature coils cannot be installed safely, and so it becomes necessary to straighten up the core.

The first step in the straightening process is to lay back the laminations, several at a time, as far into the tooth as the deflection extends. A long wedge or drift is the proper tool to use for this work. The type of drift to use and the method of using it in laying back the laminations are illustrated in Fig. 1.

When all of the affected laminations have been laid down they are driven back into their normal position, one at a time, as indicated in Fig. 2. The side of the drift is struck as close to the core as possible in this step. When all laminations have been driven back into position the tops of all teeth will be of their original length.

Spreading the laminations and driving them back into position one at a time, as described, serves to straighten out the fins which form at the top of each lamination when the surface of the core lamination is rubbed on the pole pieces. These fins hold the laminations apart and cause the core teeth to assume a fan shape. The straightening procedure also flattens any curved laminations, as shown at *A* in Fig. 2.

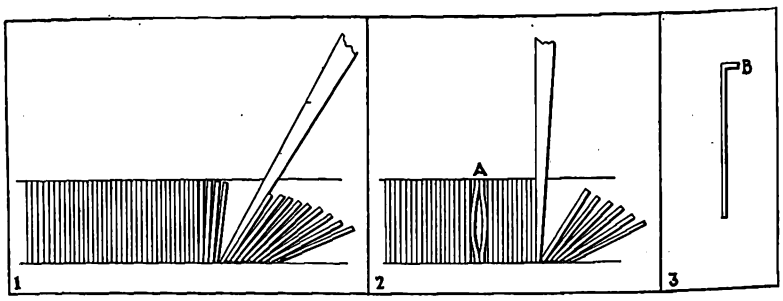

Fig. 1—Type of drift to lay back the laminations, and how it is used

Fig. 2—Driving the laminations back to their original position, one at a time

Fig. 3—A fin on one of the laminations, caused by the pole pieces rubbing

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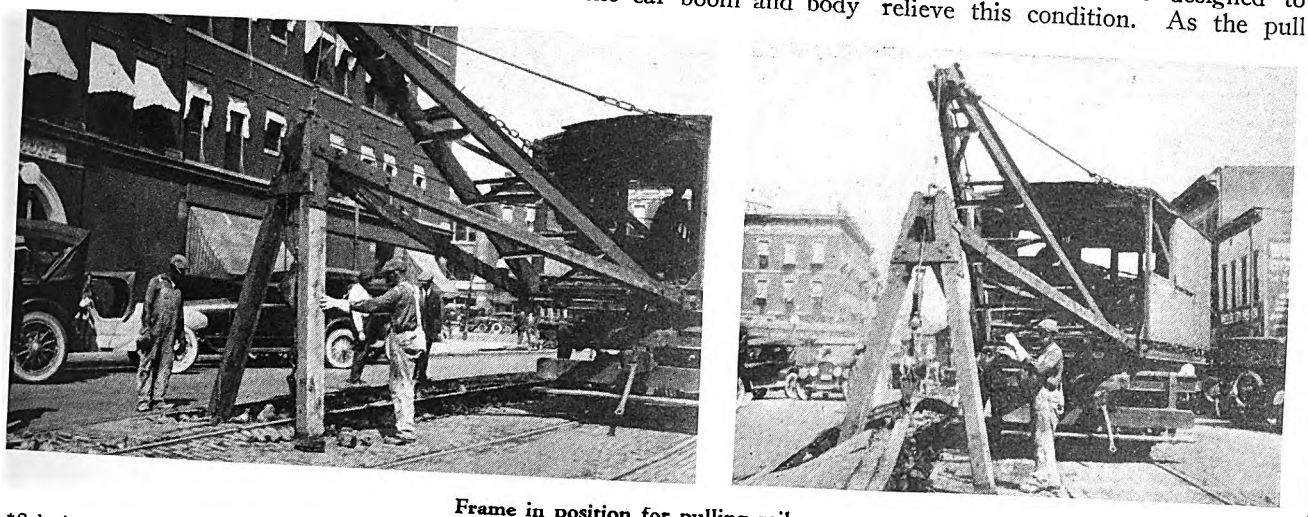
Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT—41

Special Frame Takes Strain in Track Removal*

By T. H. David
Chief Engineer Indianapolis Street Railway, Indianapolis, Ind.

For several years old track on lines of the Indianapolis Street Railway was removed from the street by a direct pull of the boom of a derrick car. This car is equipped with a double drum hoist operated electrically. The direct pull was injurious to the car boom and body and produced a severe strain on the king pin of the body. Several years ago an A frame was designed to relieve this condition. As the pull



Frame in position for pulling rails

Submitted in Electric Railway Journal Prize Contest.

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Electric Railway Journal Maintenance Data Sheet

LINE DEPARTMENT—10

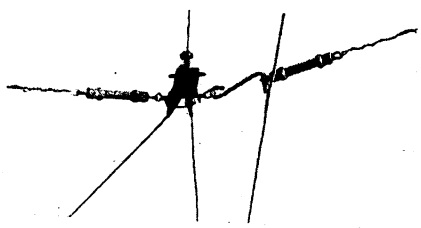
Straight Trolley Wire for Through Cars Prevents Dewirements*

By John L. Spencer
Foreman Duluth Station
Twin City Lines, St. Paul, Minn.

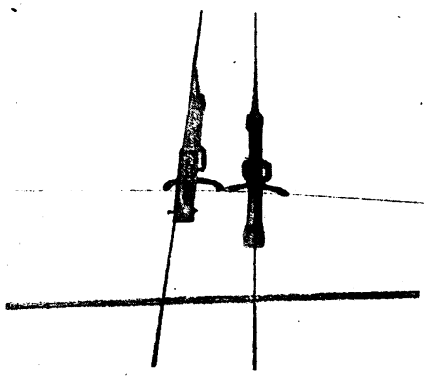
Damaged overhead with wire often torn down resulted from frequent dewirements at the car yards of the Duluth Avenue station, Twin City Lines, St. Paul, Minn., until a second straight wire was installed. Now main-line suburban and local cars use the straight wire without frogs, and cars entering or leaving the yards use the other one. There are 32 tracks and fourteen overhead frogs at this point. Trolley wheels of cars pulling out of the yard and carhouse do not touch the main-line wire until they leave the last track at the end of the yard. At that point a going out switch is installed for satisfactory operation.

The additional straight trolley wire is supported to the wire with the frogs at each frog by an 8-in. insulated gooseneck. This holds the two wires 8 in. apart all along the distance of 400 ft. The main-line straight wire is also supported by span wires which lead to iron side poles on the street. The wire with the frogs is supported by span wires leading to the iron poles in the yard.

Regular wooden hangers are used on both wires. These are the same as are used on all lines of the company. This type of construction has now been in use for over a year, and trouble from dewirements has been entirely overcome.



The main-line straight wire is supported at each frog of the second wire by an 8-in. insulated gooseneck



Standard wooden hangers supported from span wires are used on both wires

Submitted in Electric Railway Journal Prize Contest.

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Electric Railway Journal Maintenance Data Sheet

TRACK AND WAY DEPARTMENT—41

Special Frame Takes Strain in Track Removal—Continued*

necessary to remove old track was indeterminable, the members of the frame work were designed to withstand strain equal to the tensile strength of a $\frac{5}{8}$-in. cable. The two posts of the A-frame are made of 7x9-in. white oak ties with a band of iron around the base of each to retard brooming. These posts are capped with $\frac{1}{2}$x6-in. iron plates to which a single hoist line is attached for raising and lowering the frame. Two 6x6-in. yellow pine struts are secured to the $1\frac{1}{4}$-in. boom pin with a clevice and cotter pin to resist the load. A heavy-duty sheave with extra strong load hooks and rail tongs completes the unit.

The A-frame is hauled to the job on a small flat car by the derrick, which is self-operating. The equipment can be set up in 30 minutes. Holes are dug on each rail to attach hooks and the pulling is done alternately on the two rails. Usually the rail leaves the ties, but where the spikes hold it lifts the ties and paving. In the job illustrated, very few spikes held, but the pavement broke up readily so that it was removed easily. After removal, the rails are cut up by a torch. The A-frame is removed and the derrick is used for loading the scrap. The effective lift in pulling the rail is about 2 ft., it being limited by trolley clearances. The machine operates after midnight when the tracks are not used for service. One thousand feet of track can be pulled in a night so that a shovel can start excavating the next morning. This method usually destroys the rail except for scrap purposes, but by careful pulling the rail can be saved, if desired, for further use.

**Submitted in* ELECTRIC RAILWAY JOURNAL *Prize Contest.*

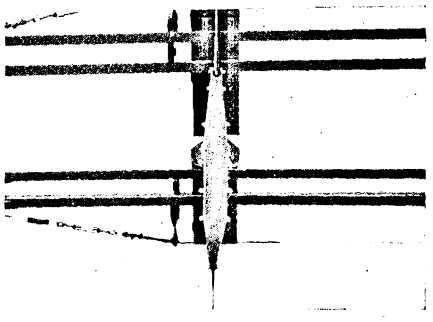
Electric Railway Journal Maintenance Data Sheet

LINE DEPARTMENT—11

Trolley Pan on Drawbridge Prevents Delays*

By C. B. HALL
Chief Clerk Mechanical Department
Virginia Electric & Power Company, Norfolk, Va.

DURING the construction period of a drawbridge over which one of the suburban lines of the Virginia Electric & Power Company operates in Norfolk, boats with high masts were not permitted to pass through the draw. With a considerable increase in boat traffic, however, it became necessary to permit the passage of such boats, and on these occasions it was necessary for linemen to cut and repair the trolley wire. As this caused considerable delay to service as well as increased maintenance cost, J. C. Newman, engineer maintenance of way, arranged a device using a trolley trough. The pan is made of $\frac{1}{4}$-in. sheet copper about 6 in. wide in two pieces, each 1 ft. long. It is suspended from the steel trestle work attached to the draw and which runs upwards from the floor. The trestle work is held in position by wooden stringers, each 7x14 in., which are placed beneath the floor of the bridge. The pan is constructed so that it opens with the draw, and when it closes the pan parts are brought together so as to form full contact. The cost of the installation was approximately $450 but more than this amount has been saved, as previous to its installation each cutting of the trolley wire involved a cost of $25. A five-minute schedule is now maintained across the bridge without serious interruptions.



Trolley pan and suspension as used by the Virginia Electric & Power Company

**Submitted in* ELECTRIC RAILWAY JOURNAL *Prize Contest.*

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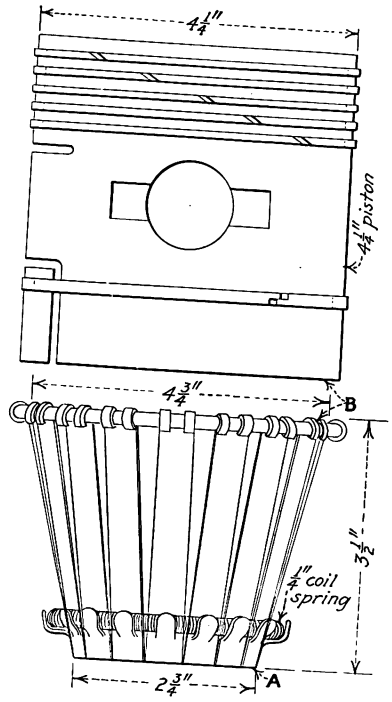
Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—20

Piston Ring Compressor a Handy Tool*

By Charles Herms
General Foreman San Diego Electric Railway
San Diego, Cal.

INSTALLING piston rings in the cylinders of bus engines is always a tedious job, and unless proper tools are used with care breakage of rings is quite common. A variety of piston ring compressors have been tried in the garage of the San Diego Electric Railway, but the one which has proved most satisfactory and is now used is called the "Stevens Piston Ring Compressor." With this tool all sizes of bus engine pistons can have the rings applied. In operation the bottom of the piston, *B* in the sketch, is slipped into the large end of the ring compressor and is pushed down until the bottom end of the piston is flush with *A*. In this position, the ring compressor at *A* is larger in diameter than the cylinder bore, and consequently will set on top of the cylinder bore. The piston is then ready to be pushed into the cylinder. The ¼-in. coil spring around the arms of the compressor is strong enough to compress the rings as the piston is forced through, and there is no loss of time as the piston can be pushed into the cylinder in a few seconds.



Piston ring compressor used in the shops of the San Diego Electric Railway

*Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet

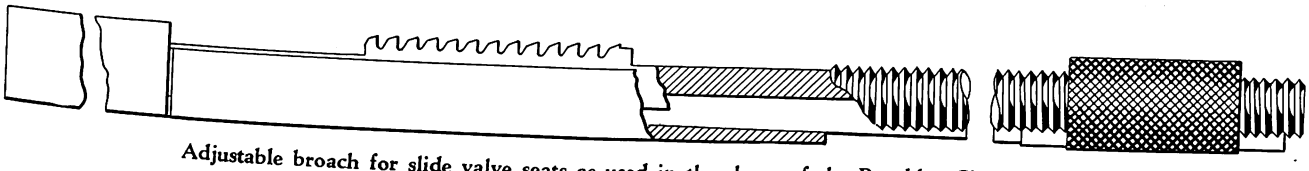
ROLLING STOCK—MISCELLANEOUS—53

Adjustable Broach for Slide Valve Seats*

By R. H. Hensler
Foreman Air Brake Department,
Brooklyn City Railroad, Brooklyn, N. Y.

COMMON practice when overhauling emergency and relay valves is to file the slide valve seats in the brass bushings before spotting and grinding in the valves. The job is a tedious and difficult one and takes from 15 to 25 minutes. This practice has been discontinued in the shops of the Brooklyn City Railroad and an adjustable broach, developed in the shops, has been substituted. As a result the time now taken for the work is from two to five minutes and the accuracy of the work has been increased considerably.

The tool used consists of an adjustable broach which has four parts. These are (1) the broach body having the cutting teeth; (2) the guiding sleeve turned on the outside to fit the bore of the bushing to be broached and machined on the underside to fit the broach body and the tapered key; (3) the threaded nut, and (4) the tapered key. By screwing on the threaded nut the tapered key is forced in, thus raising the cutting teeth. The depth of the cut is governed by the position of the tapered key as controlled by the nut.



Adjustable broach for slide valve seats as used in the shops of the Brooklyn City Railroad

*Submitted in Electric Railway Journal Prize Contest.

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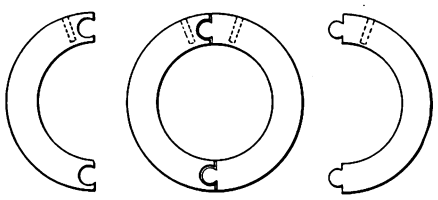
Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—21

Clutch Brake Disk for Buses*

By John McKenzie
Garage Foreman Boston Elevated Railway, Boston, Mass.

TO SAVE labor and time in the installation of clutch brake disks for buses, at the Arborway garage of the Boston Elevated Railway, an improved type has been devised. A complete circle disk is used on many different types of trucks and buses. Those previously used by the Boston Elevated Railway were complete circles of varying thicknesses, depending upon the type of clutch in which they were used. Replacement required four hours labor on 13-plate clutches and six hours labor on 26-plate clutches. With the type previously used, the transmission had to be removed and the clutch dismantled and reassembled in order to apply the clutch brake disk. It was felt that this required too much labor,



Clutch brake disk for bus equipment

and the cost was excessive, so a new type was devised, which has resulted in a material saving in time and cost.

The new disk is made in two parts, which form a complete circle the same as the one-piece disk previously used. It is applied by removing the hand plate between the transmission. Two wires are inserted in the drill holes, as shown in the accompanying sketch. The wire is for the purpose of dropping each half of the disk around the clutch and spindle, and to regulate it so that the male and female halves engage. Then by shoving the clutch pedal out the two parts are pressed together. The time taken for this operation is ten minutes, as compared with four and six hours with the old type.

The workmanship is as good as with the type previously used, and the life of the new disk is as long as that with the old. The cost of the old is 36 cents, and the minimum labor cost for installing it is $3.50, making a total cost of $3.86. The new-type disk costs 60 cents and the labor cost for installing it is 15 cents, which makes the total cost 75 cents. There is thus a net saving of $3.11.

*Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet

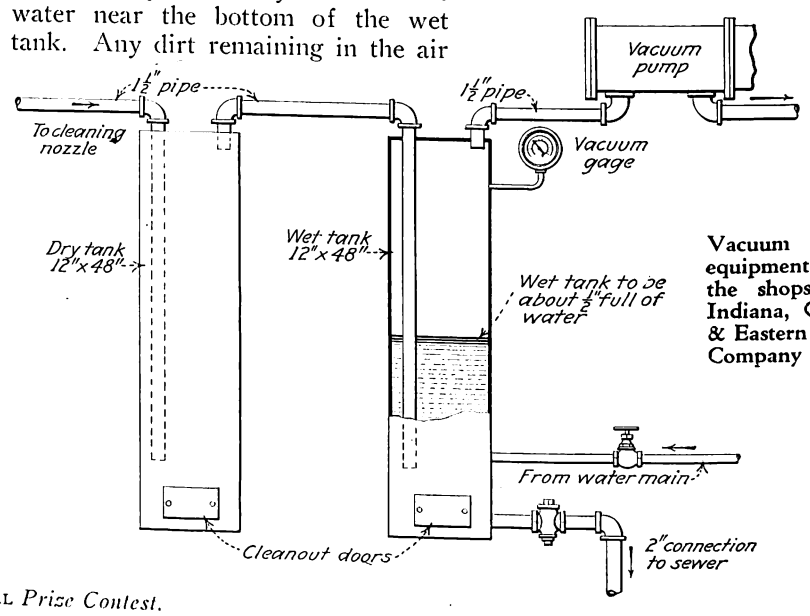
ROLLING STOCK—MISCELLANEOUS—54

Vacuum Cleaner for Car and Bus Seats*

By F. J. Foote
Superintendent of Motive Power and Equipment
Indiana, Columbus & Eastern Traction Company, Springfield, Ohio

TO KEEP plush seats in sanitary condition a stationary vacuum cleaner has been built in the shops of the Indiana, Columbus & Eastern Traction Company, from material on hand, and has been doing good work for years. The vacuum produced is about 10 to 15 in. as measured on a mercury gage. The vacuum pump is simply a 25-ft. air compressor arranged to draw air through the cleaning nozzle and tanks and discharge it to the atmosphere. To prevent dirt from being drawn through the compressor two tanks are used. One is called a dry tank and the other a wet tank. By these dirt from the air is removed before it reaches the pump.

In operation air from the cleaning nozzle is drawn into the dry tank near the center and the bulk of the dirt which it contains drops to the bottom of the tank. Air is drawn from the top of the dry tank into the water near the bottom of the wet tank. Any dirt remaining in the air is washed out by passing through the water. The air then goes to the vacuum pump practically clean. Occasionally it is necessary to clean the dirt out of the tanks, doors being provided to insure easy access to the tanks for this purpose.



Vacuum cleaning equipment used in the shops of the Indiana, Columbus & Eastern Traction Company

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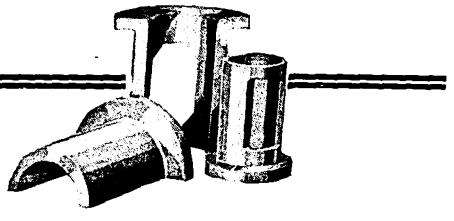

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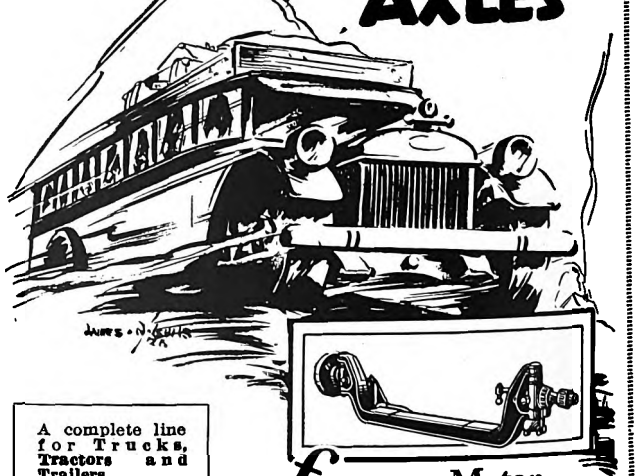

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Electric Railway Journal Maintenance Data Sheet

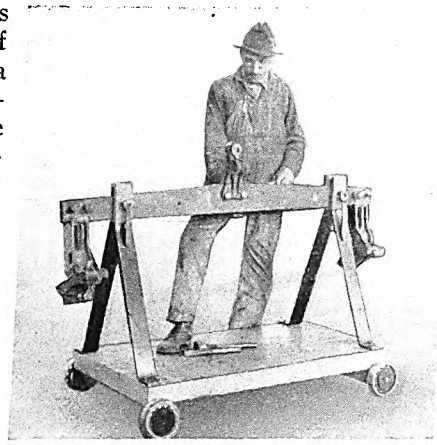
ROLLING STOCK—TRUCKS—36

Making Overhauling of Brake Rigging a One-Man Operation*

By W. J. Hicks
Master Mechanic Virginia Electric & Power Company, Richmond, Va.

WHEN brake beams for trucks were rigged up on the floor of the shop, it was necessary to use a mechanic and a helper because difficulty was encountered in fitting the various parts into position. To permit this operation to be carried out by one man a device was designed in the Richmond shop of the Virginia Electric & Power Company to hold the brake beam in a convenient position.

Any size brake beam can be taken care of on this portable bench. The base of the bench is 29½ in. wide x 48 in. long. An angle iron 3x4 in. extends lengthways on each side. The base or floor is made of 2¾-in. oak boards, which are flush with the side angle irons. The device is provided with four wheels which consist of second-hand Gurney No. 412 ball bearings. These were used previously on the pinion end of GE-258 motors. They are mounted on a wooden axle turned down to fit snugly into the raceway of the bearing. The iron supports are ½x3 in. material and are 30 in. high. Where they come together at the top there is a recess 1½x6 in. to receive the brake beam. This recess for holding the brake beam is fitted with a ¾-in. set screw with a hinged handle. This gives all the advantage of a vise and holds the material in any position.



Portable bench for assembling shoeheads and brake castings to brake beams

Submitted in Electric Railway Journal Prize Contest.

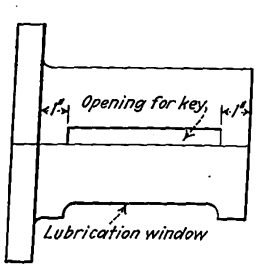
Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—61

Key for Axle Bearings Reduces Troubles*

By C. C. Holt
Machinist Bamberger Electric Railroad, Salt Lake City, Utah

HAVING had considerable trouble in keeping axle brasses in place, a key has been adopted by the Bamberger Electric Railroad, Salt Lake City, Utah, instead of the two dowel pins in axle caps. The keys used are ½x½ in. and as long as possible, keeping the ends 1 in. from the end of the brass. The keys are welded in place on one of the half bearings at the edge where the two brasses meet. This method has proved satisfactory for keeping the brasses from turning in the box and shutting off lubrication. Also, breakage of brasses because of loose or worn dowel pins is overcome. A carbon templet is made to fit in the proper place for locating keys, so that when they are put on by electric welding the brasses are interchangeable. An opening on both edges of one of the half brasses is made to accommodate the key, so these are interchangeable.



Method of installing key on axle brasses followed on the Bamberger Electric Railroad

Submitted in Electric Railway Journal Prize Contest.

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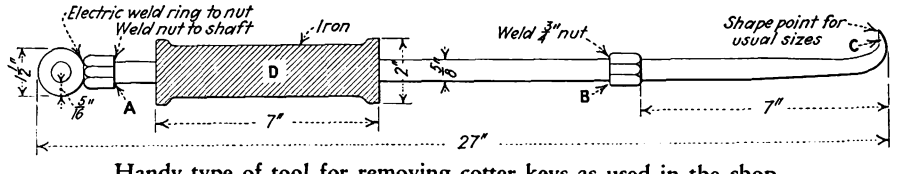
Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—TRUCKS—37

Cotter Key Extractor*

By Farrell Tipton
Electrician San Diego Electric Railway, San Diego, Cal.

COTTER keys, especially the larger sizes, often prove difficult to extract. To facilitate this work the truck department of the San Diego Electric Railway has added a cotter key extractor to its kit of handy tools. This was designed by the foreman of the mechanical department. The tool will do the job in one operation. The hook *C* shown in the accompanying illustration is placed in the eye of the cotter key and the handle *D*, which is free to slide on the shaft, is placed against the stop *B*. A quick jerk on the handle slides it from *B* to *A* and the shock as it comes in contact with the stop at *A* removes the most difficult cotter key. The handle *D* is knurled with shoulders at each end to keep the hand of the workmen from slipping. The neck of the hook *C* is made long enough to reach any cotter key on the trucks. This tool weighs 7 lb. assembled and is used to advantage.



Handy type of tool for removing cotter keys as used in the shop of the San Diego Electric Railway

**Submitted in* Electric Railway Journal *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

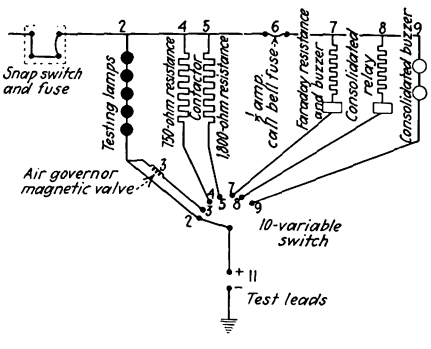
ROLLING STOCK—ELECTRICAL—62

Simple Tests for Electric Car Auxiliaries*

By H. J. Beadle
Electrical Engineer Dallas Railway & Terminal Company, Dallas, Tex.

FOR duplicating conditions as they exist in actual service a panelboard for testing parts of railway car apparatus is used in the shops of the Dallas Railway & Terminal Company. The board has seven circuits with various resistances and equipment installed in each. These include a circuit with testing lamps, another with an air governor magnet valve, two others with resistances for different types of contactors, and three others for buzzers.

For example, in testing a Faraday buzzer, it is installed between the contacts at 11, as indicated on the accompanying sketch. The variable switch No. 10 is changed to point 7. In service there are two buzzers on our cars, one at each end, and in the test as conducted by the board there are two buzzers. One, the permanent buzzer and resistance on the board, and the second, the one under test.



Circuits of electrical test board as used in the shops of the Dallas Railway & Terminal Company

Another example of testing is furnished by the type DB-976 line breakers. They have a 750-ohm resistor in series with the contactor coil when the contactors are first closed. In the test equipment a 750-ohm resistor is a permanent part of the board. The contactor to be tested is connected in the test circuit at 11. There is a difference of potential of 600 volts between the trolley and ground, so the contactor coil can be tested as in actual service. This test board is used frequently in the shops of the Dallas Railway & Terminal Company, and has proved of particular advantage.

**Submitted in* Electric Railway Journal *Prize Contest.*

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More Suggestions for

IMPROVEMENTS in Railway Equipment

RECOGNITION is general that a higher standard of maintenance is necessary to carry out economically the various maintenance operations. Improved tools are needed. Many suggestions for improvements in existing equipment, and for new devices for track line and car maintenance were made in the Nov. 17 and Dec. 15 issues of ELECTRIC RAILWAY JOURNAL. Many more suggestions have been received since that time and some of them are presented here. These suggestions are made as a result of the campaign for better equipment advocated by the executive committee of the American Electric Railway Engineering Association.

To obtain greatest benefit from these suggestions, manufacturers are particularly invited to tell of any equipment which they have that can be adapted to the needs as outlined in these suggestions. Where equipment is not available, manufacturers are urged to develop devices that will supply the want. The men actually confronted with these operating problems are anxious to co-operate in the development of the needed equipment. Suggestions will be published in these columns and maintenance men and manufacturers are invited to enter the discussion. Letters are requested from anyone who has ideas regarding needed improvements in existing equipment, or new devices that should be brought out.

Some Needs for Special Shop Machines

Suggestions by A. T. CLARK
Superintendent of Rolling Stock and Shops
United Railways & Electric Company, Baltimore, Md.

NO DOUBT production in huge quantities by machines has given this country a great advantage in the manufacture of items at such low cost as to make them quite cheap in price. If we think back a few years we will recall the famous dollar watch and today we have before us evidence in the low priced automobile. Both of these products are the result of large production through special machinery. At the present time the American mechanic receives the highest wages of all workers. The reason for this can be found in the use of these ingenious machines that can reduce the cost of manufacture, and permit mass production of the items to compete on most favorable terms with low priced labor. In watches and automobiles, we have but two of the thousands of things where it is possible ot use high priced labor and make low cost articles. The steady rising cost of labor must be offset by improved methods and equipment for performing many of the tasks with labor saving machinery.

IMPROVED SPRAY GUN NEEDED

In reviewing the program of work that is laid before the average superintendent of equipment there are certain items the daily repetition of which could be handled by properly designed machines. One of these is car painting. Already the use of spray guns to apply the paint is meeting with more or less marked success, and it is believed that the time is not far distant when the application of paint materials to surfaces by the old hand method with brushes will be practically discarded. There are, however, certain features with this application of paint by the air gun method that need serious consideration. Spraying of paint by air pressure requires the paint to be atomized highly and then blown upon the surface. The result is that the paint operator works in an atmosphere of finely divided paint that requires that he must be protected from these paint vapors, especially if the paint contains deadly lead fumes or even if it contains the less noxious nitrocellulose vapors.

Already considerable attention has been given to this problem and one prominent electric railway has developed an arrangement whereby cars that are being painted are handled in a portion of the building especially prepared with equipment, whereby air is emitted from the floor and caused to flow upward along the sides at the outside of the car to a suction hood located just above the roof line. In this scheme there is involved considerable costly apparatus and the further limitation that work of this kind cannot be done other than at the particular location provided. If it is necessary to work on a number of cars at the same time large space must be provided and equally large investments must be made for the carrying out of the work.

The writer believes that there are possibilties in a scheme for preventing these vapors from escaping to the surrounding air and that an air gun should be developed that has two air pressures. The lower or inner pressure of the gun would serve to atomize and force out the paint, while the higher or outer pressure would form a conical envelope to keep the paint from spreading by the area predetermined by the design of the gun. Such an arrangement would be simple and the device could be handled easily. It would prevent the paint spray from reaching nearby workmen and parts not to be painted. Also, it would be extremely flexible for the work could be done wherever compressed air was available. It would give an impetus to the use of the spray painting because of the removal of the difficuties encountered with the paint fumes and vapor.

SPECIAL MULTIPLE TOOL LATHE NEEDED

Another problem that officials of electric railways have constantly before them is that of keeping car axles true and to definite size. The usual method in the past has been to turn the axle parts requiring attention in a standard lathe, using but one tool. The standard electric railway car axle, however, has four different points requiring attention from time to time, namely, two truck journals at either end and two center portions where the motor axle bearings are fitted. In addition to this, many companies have a practice of not removing gears until they are entirely worn out. Therefore, when the axle has to be trued, it is necessary to do so with the gear still mounted upon the axle. The writer believes there is a large field for the development of a lathe that will turn the four portions of the car axle simultaneously, thereby reducing greatly the labor involved, and making possible the turning of an axle at $\frac{1}{3}$ to $\frac{1}{4}$ of the present labor cost.

IMPROVEMENTS IN GRINDING AND POLISHING MACHINES NEEDED

In the study of improved car lubrication our company has found that the surfaces subject to contact should be of

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the very highest grade of finish, since lubrication can be improved by using lighter viscosity oils. The ordinary surface as it comes from a machine tool has a succession of fine ridges produced by the cutting tool. It is true that cuts can be made very fine and rather close together, thus avoiding to some extent the rougher surface, but under the microscope even these fine ridges are pronounced and their practical elimination means a much better bearing. Therefore, there should be a very large field in the production of machines, either for grinding or polishing, that will produce surfaces having a higher degree of finish without recourse to the present old fashioned methods of turning and subsequent polishing. This is true also of machining the bearings to fit the surfaces. There is a need for machines that will provide a method of turning out bearings for both motors and trucks with a higher degree of finish.

Axles and bearings with a finish of the very highest grade and with improved lubrication, together with the use of lighter oils, will lower power consumption and will, because of the lighter oil and lower friction, result in less bearing wear and cost.

Welding and Grinding Machines for Steel Wheels Should Be Developed

Most large city railways use rolled steel wheels and experience a rapid wear of the flange portion that requires frequent turning of the wheels in special lathes to bring the flange back to standard. This turning reduces the wheel diameter until no more tread material to produce a new flange remains and the wheel must then be discarded. In recent years, the practice of welding and building up the flanges has been developed. Manufacturers have produced welding outfits and have given particular attention to the development of automatic electric welding machines. These have started with a single welding head and through successive developments have increased to four heads. The four-head outfits seem to be the best for welding flanges for a maximum of work can be done with it, consistent with doing satisfactory welding. Several railways have developed grinding equipment to be used with these automatic welding machines. However, there is need for further development by the manufacturers.

Manufacturers!

WE INVITE you to discuss the various suggestions for improving maintenance equipment. What have you to say?

Efficient Car Maintenance Requires Many Improved Devices

Suggestions by R. S. Bull
Superintendent of Equipment Pittsburgh Railways, Pittsburgh, Pa.

THERE is need for further development of chemical cleaning tanks for cleaning gear cases, axle caps, truck parts and air brake equipment. Many home made cleaning tanks are in use but manufacturers could develop equipment which would be much better suited for the purpose. Our company could save a great deal through the use of improved tanks.

Improvement in Gear Cases Needed

The present gear cases for railway motors are not satisfactory because they allow dirt and grit to enter between the halves, particularly where they fit around the axle. It seems possible that a dust-proof gear case could be developed which would increase the life of the gears and pinions and exclude the possibility of gear grease getting into axle bearings at the pinion end.

Portable Sand Spray for Removing Rust on Car Bodies

A small portable sand blast which would take care of the exhaust feature by an attachment on the nozzle of the sand spray would facilitate the removal of rust at points on the car bodies where they are scraped or torn while in service. Such equipment would insure better touch-up work in the paint department.

Spray Painting Mask for Car Bodies

An inexpensive, practical method of masking car bodies during spray painting should be developed to speed up the striping operation. Particular attention is being given to facilities for more efficient spray painting by railways and many new devices are needed.

Further Improvements Needed in One-Man Safety Car Equipment

One-man operation of cars provides a field for many improvements. There is a particular need for satisfactory foot-operated, air and electrical equipment for one-man safety cars to relieve the operator of his hand functions.

Equipment for Testing Brake Rods

Suggestions by H. Cordell
Master Mechanic Chicago, North Shore & Milwaukee Railroad Highwood, Ill.

THERE is a particular need for equipment to test brake rods of cars before they are put into service. This would include a tension device which would assure that the rods have proper strength and that welding is without flaws.

There also is a need for a reseating tool for compressor head valves. The tools now manufactured do not do the work accurately.

Many Car Improvements Needed

Suggestions from Frank H. Miller
Vice-President and General Manager, Louisville Railway, Louisville, Ky.

THIS is a time in the street railway industry when the executives and operators must be alive to changing conditions. Existing equipment and facilities in other fields must be applied to the electric railway industry and new facilities and equipment developed, to reduce operating expenses and maintenance and to give to the people the improved service which they demand, and which is due them in return for the higher fares that are now being paid.

Support from the entire electric railway industry should be given to this campaign and its efforts to carry out the suggestion of the executive committee of the American Electric Railway Engineering Association to secure suggestions for needed betterments in methods, practices and equipment.

There are many things that can be improved in car equipment. Car heating, ventilating and lighting is deservedly receiving more attention. Headlights should be made more effective, so as to give proper lighting outside the well illuminated business district. Car painting should be developed, so that it can be applied to either wood or metal and withstand the necessary daily cleaning and still retain its lustre and life. Car motors must now accelerate so that in traffic conditions of the present day, the private automobile will not have too great an advantage.

Great credit should be given the manufacturers for the work done and improvements they have made in these and other items. In certain climates much trouble has developed from the freezing of air brake lines and some satisfactory device other than the present alcohol container should be developed to prevent this interference of service. The present paint spraying machines are not entirely satisfactory, as they waste a great deal of material and the control of the spread is not all that it should be. The street car gong formerly operated by the foot has been replaced to some extent by a gong operated by air. The air gongs now on the market are not entirely satisfactory as the maintenance is high and dependability of the present types is uncertain.

What each railway company really needs is comfortable low-hung, light weight, low priced standard car units, operating as noiselessly as possible along well maintained track and overhead construction, with sufficient passengers at a reasonable fare to permit of proper wages, maintenance and depreciation and return on investment.

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Moderately Priced Portable Asphalt Plant Recommended

Suggestion by W. McK. WHITE
President White Manufacturing Company
Elkhart, Ind.

REFERRING to the need for a small paving mixer for producing cold material, as outlined in the Dec. 15 issue of ELECTRIC RAILWAY JOURNAL by Louis T. Botto of the San Antonio Public Service Company, it has been the experience of many users of cold mixed materials for repairing asphalt that this type of mixture will not stand vibration, variations in temperature and heavy traffic as satisfactorily as a hot mixed asphaltic formula, such as a Topeka mix or asphaltic concrete, or a sheet asphalt.

As the San Antonio Public Service Company has to maintain 250,000 sq.yd. of paving, which is growing older and which does not justify an expensive paving plant, I believe that this amount of yardage would justify the use of a moderately priced portable asphalt plant which other users have found can produce hot mixed material very economically. The White Manufacturing Company has a portable asphalt plant which several users have found will save its own cost in from 6,000 to 7,000 sq.yd. of maintenance work, as compared with the prices charged by independent contractors or by municipal plants which sometimes do the work for street railways at about the same price or a higher one than is charged by contractors.

This machine is a complete asphalt plant with rotating sand dryer, pug mixer, measuring devices for all ingredients, oil burners and a bin for storing material. It is mechanically operated with a Continental four-cylinder engine, is self propelling and is mounted on rubber-tired steel wheels. It is a unit made for operation on the streets with a minimum amount of noise and dirt, and does not interfere with traffic; yet it turns out a genuine hot asphaltic mix.

Production costs show that with this machine it is possible to repair asphalt pavements at a cost of from 84 cents to $1.25 per sq.yd. of 2-in. mix, including all labor, material, supervision and other operating costs of the machine. The city of Washington, D. C., and the city of El Paso, Tex., both report costs of 84 cents per sq.yd. Cincinnati averages $1.25 per sq.yd. on hit and miss patching and repair of utility cuts. Little Rock, Ark., saved the cost of its machine in two months, and with a total repair yardage of 8,744 sq.yd. If these machines established records as mentioned, it appears quite economical to employ such equipment where there is an aggregate amount of pavement to care for of 250,000 sq.yd. The machine sells for $6,400 which is about the price of a good motor truck.

Some railways have endeavored to make a hot mix in a concrete mixer with a separate tar kettle and a separate aggregate drier, but the cost of the various units required and the higher costs incurred in operating the separate units and in hauling the hot mix cause the total cost to run higher than that with a compact self contained unit, which will do this work right on the streets and which involves only the hauling of additional stone and sand to refill the storage bins.

Our company also has furnished some electric railway maintenance departments with double-deck heating pans for making a hot mix by hand, using kerosene torches for drying and warming the material, and with separate tar kettle, but this arrangement has been found slow and unwieldy as compared with the use of a unit machine.

Cold Mixed Rock Asphalt Found Satisfactory

Suggestions by LOUIS T. BOTTO
Superintendent Maintenance of Way
San Antonio Public Service Company
San Antonio, Tex.

THE San Antonio Public Service Company needs a small mixer to produce a cold mixed asphalt, as outlined in the Dec. 15 issue of ELECTRIC RAILWAY JOURNAL, rather than for a machine to turn out a hot mix. For several years this company has been using cold rolled Uvalde Rock Asphalt in its track area with excellent results. This material is mined within 100 miles of San Antonio and is sold there by mine owners and paving contractors.

We can buy three grades of this material on the local market which we classify as follows: (1) Finely ground rock with 10 to 13 per cent asphalt, flux oil added, ready to lay at $9.00 per ton. (2) Finely ground rock with 7 to 10 per cent asphalt, flux oil added—ready to lay at $7.50 per ton. (3) Rock Asphalt screenings, ⅜ in. to dust, with 15 per cent asphalt—at $5 per ton.

In our new track work we usually lay the pavement in two courses and when finished this is 1½ in. to 2 in. thick, all of the No. 1 type rock. On maintenance work we often lay a 1-in. course of the No. 2 material and then top it off with a ½-in. layer of No. 1 material. For our regular patch work throughout the city, we use different combinations of Uvalde rock asphalt, trap rock or limestone, and Mexican oil, mixed by hand. This constitutes the bulk of our paving repair work and for this purpose we need a small paving mixer very much.

As an illustration of our method of mixing, we spread out on a board, 1 ton of limestone screenings, 1 in. to ⅜ in. Over this is sprinkled 8 gal. of hot Mexican crude oil of 12 gravity. This is covered with 1 ton of rock asphalt screenings, ⅜ in. to dust. All the ingredients are then mixed thoroughly. The total cost of this mixture is $3.50 per ton. It is tamped to within ½ in. of the surface and then is topped with a ½-in. layer of the $9 mixture.

Operators!

SEND in your suggestions for new devices that are needed to raise maintenance work to a higher plane. What improvements in present equipment are desirable? If you have experienced difficulty in any line of maintenance work let us know what equipment will help you.

Equipment to Determine Exact Location of Open Circuits

Suggestions by DWIGHT L. SMITH
Electrical Engineer
Chicago Rapid Transit Company
Chicago, Ill.

THE majority of electric railways operating on 600 volts use five lamps in series for their car and station lighting. To locate a bad order lamp in a circuit it is necessary to use the cut and try method of unscrewing one lamp after another until the defective one is found. It appears that it is possible to develop a testing device on the general order of an electroscope, which would show the bad order lamp without the necessity of removing it from the socket.

Somewhat along the same line but of different application is the need for a testing device which would locate the open circuits in the individual wires of lead covered telephone cable. Such a device would be of great assistance.

SPLICING DEVICE FOR LARGE CABLE

To the best of my knowledge there is no device available for splicing stranded cable for overhead use. These sizes are 500,000 circ.mil. and larger. The device should provide full strength of the cable, 100 per cent conductivity and be arranged for application at a cost to compete with hand splicing. Such a splicing device is extremely desirable.

REEL BRAKE FOR STRINGING TROLLEY WIRE

A satisfactory reel brake combined with a tension device, so that trolley wires can be strung at proper tension, has already been suggested by F. McVittie of the New York State Railways. Our railway also finds a particular need for a device of this kind.

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News *of the* Industry

Fares Lowered in Illinois Cities

Permission was granted the Illinois Power & Light Corporation by the Illinois Commerce Commission on Jan. 9 to lower the rate of its fares on cars and buses in Bloomington, Normal and Decatur. This petition was filed with the commission after the company had been granted permission to raise its rates in those cities among others, whereupon citizens protested and filed with the commission a petition for rehearing. Before the petition for a hearing was acted upon, the company came to an agreement with representatives of the people of the cities in question, the people's petition for rehearing was withdrawn, and the company entered a petition for reduced fares.

Before the rates were raised early in the winter, the fares in Decatur were 6 cents cash with nine tickets for 50 cents; in Bloomington and Normal 7 cents cash with four tickets for 25 cents, cash fare on owl cars 10 cents, books of 100 for $6 and books of 40 for school children at $1.50. In both instances, the rates were raised to 10 cents cash and three tickets for 25 cents.

The new lowered rate, effective Jan. 19, provides that seven tickets can be purchased at the office of the company for 50 cents and 15 tickets for $1.00. Cash fares and tickets purchased on the cars remain at the new increased rate. The company is required to prepare and submit to the commission quarterly reports showing the number of passengers carried under the various rates charged.

In the commission's order it is stated that the supplemental schedule is to be considered temporary and experimental and that the petitioner (the company) should not be prejudiced in bringing "said schedule to the attention of the commission at any time after six months operation from the effective date thereof." It further stated that "the commission especially reserves jurisdiction over the petitioner and the subject matter hereof and the right to reopen this proceeding and to enter such further orders herein as the public interest may require."

Increase on Ohio Interurban—Means Similar Classification

Electric interurban transportation companies have been placed on the same rate level with steam railroads for rate purposes, in a decision just rendered by the Public Utilities Commission of Ohio in granting permission to the Cleveland, Southwestern & Columbus Railway to increase its fares from 3 to 3.6 cents per mile. Steam railroads were permitted to increase fares several years ago, but interurban lines were placed under a separate classification, under which they were denied the right to charge more than 3 cents a mile for passenger service.

In granting the increase the commission declared that unless some immediate relief is extended to the interurban companies, the witholding of the right to collect increased fares and charges will merely hasten the abandonment of the properties of this class. The increased rate allowed the Cleveland company is the same assigned by the Interstate Commerce Commission for all steam railroads.

$20,000,000 Plan for Seattle

Subways, elevated, open-cut lines suggested for articulation with surface lines and buses in effort to give Coast city adequate transportation

IN A COMPREHENSIVE report, which represents two years of general study and one year of intensive engineering research on the part of a group of business men of Seattle, the Seattle Traffic Research Commission recently presented to Mayor Frank Edwards, the City Council and heads of city departments, its plan for giving Seattle a rapid transit system.

The report provides for the expenditure of $15,062,515 for the construction of permanent ways, to include subways, elevated lines and necessary platforms and transfer accommodations and $5,321,400 for rolling stock and rehabilitation of existing lines and street cars. Two general methods of finance are suggested: First, through the operating department by the passengers; and second, through the city, by property owners. The commission found that it was not practicable to expect to meet construction costs from operating revenues.

Subways, elevated lines, depressed lines and many of the present surface car and bus lines would be linked into one vast network of rapid transit facilities with four principal rapid transit routes, to connect with existing feeder lines, as the backbone. These, however, are only the first stage of a wider development which the committee suggests as necessary to bring railway transportation in Seattle to its highest efficiency.

The four routes planned would emanate from a central loop station near the railroad stations at Fourth Avenue and King Street. In addition to the four routes advised, the commission also suggests a line to serve the Rainier Valley district, dependent upon the city's taking over the railway serving that part of the city. This would add approximately $1,200,000 to the estimated cost of the rapid transit system.

The choice of the four routes was based upon four fundamentals: (1) Each unit first into a complete comprehensive city-wide system; (2) they do not disturb existing realty values; (3) they follow natural traffic channels without arterial diversion; (4) they are feasible from an engineering and operation standpoint.

C. D. Pollock, engaged by the commission to conduct detailed studies forming the basis of its suggestions, states that the rapid transit system proposed could be carried to consummation within one year from the letting of contract, and with relatively slight interruption of surface traffic. He advises that the proposed Second Avenue subway be provided by process of steam shovel excavation instead of by driving a tunnel, and so handled that only one block of the street surface would be torn up at a time. He states that a year would be necessary to complete the under-surface work of installing tracks and electrical equipment, constructing stations, etc., but that this part of the program would not interfere with surface traffic.

Under the proposed rapid transit plan, the longest ride from the outlying district to the downtown business section would be 30 minutes, the commission declares. At present the 40-minute zone, which would be done away with, embraces 36 per cent of the city's total area.

The commission's conclusion is that the city has entered into a contract for the purchase of its municipal railways that is "impossible of fulfillment under existing conditions"; that measures looking toward the rehabilitation of the present lines are at best only temporary relief. On this latter point, the report points out that the major part of the rolling stock owned by the city is obsolete and unfitted for modern transportation needs; that while much of the track is in good condition and of a type to permit faster service, a considerable part will have to be rebuilt with heavier rails if satisfactory service is to be maintained. In this connection A. W. Leonard, president of the Puget Sound Power & Light Company, declares his company's willingness to co-operate with city officials in rewriting the purchase contract. He states that he did not

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think the company would agree to cutting the annual payments from $833,000 to $300,000 as proposed, but that he could see no obstacle to a figure between these two extremes.

According to the findings of the research commission, the bus, as a city-wide transportation factor, would not be a success in Seattle, on the basis of operating costs alone. The commission estimates that it would require from 1,000 to 1,300 buses to handle the present railway traffic of the city. To substitute buses for street cars would require an immediate capital expenditure of more than $10,000,000; it would be necessary to replace the buses every five years, making a depreciation charge of more than $2,000,000 annually, according to the report. Moreover, the commission believes the traffic congestion problem would be complicated enormously by the use of buses instead of street cars. It recommends that they be considered only as feeders for other forms of transportation into the city, or for cross-city service.

Assessments on District Basis

The commission has also outlined a purely tentative assessment system that would provide a working basis for citizens to consider. To this end the city has been divided into nine districts with estimated average assessment per square foot for financing as follows:

District 1, $0.0058	District 5, $0.1390
District 2, $0.0202	District 6, $1.2620
District 3, $0.0682	District 7, $0.0561
District 4, $0.0794	District 8, $0.0335
District, 9, $0.0145	

Bonds bearings 5 per cent interest could probably be sold at par, the commission believes, to provide funds to carry out the program.

The report also quotes figures showing an estimated saving of $891,742 a year in operating costs with the installation of the rapid transit system. These figures are based on the assumption that the Rainier Valley lines will be taken into the municipal railway system. Under the proposed plan, it is estimated that the rapid transit lines would operate a total of 1,848,730 miles a year at a cost of 24 cents a mile, making a total operating cost of $443,695; to this is added the cost of operating feeder lines a total of 3,900,575 car-miles annually at 30 cents a mile, a total of $1,170,172, or a grand total for the entire system of $4,123,759.

Under existing conditions, the Seattle Municipal Railway and the Rainier Valley Railway operate 16,932,283 car-miles a year, at a cost of 29.6 cents a car-mile for the municipal lines and 30 cents a car-mile for those privately owned, making a total operating cost of $5,015.051, or $891,742 more under the present arrangement than the estimated figure under the rapid transit plan.

Within two days after the report was made public, mass meetings had been arranged for every evening during the following week to examine the plan and discuss its workings. Civic clubs, community organizations, organized groups of business men and property owners are all clamoring for speakers from the commission to explain the system to them.

The report covers 57 pages and contains 60 maps, graphs, blueprints and sketches. The commission held more than 100 meetings to consider the problem and engaged a research engineer, and now has an attorney working on the legislative phases of the plan.

The commission is composed of business men and property owners representing retail merchants, the Central Property Owners and the Seattle Clearing House Association. It is headed by F. A. Ernst as chairman. The commission worked not only without salary, but financed the cost of the research work, purely as a public service, in an endeavor to solve the complex problems of transportation in Seattle.

New York's Militant Police Head Tackles Traffic Tangle

Theater district to be scene of experiment it is hoped will serve as laboratory of observation. Military tactics to be applied

LEND YOUR WEIGHT, BIG BOY!

As the New York American's cartoonist sees it

POLICE COMMISSIONER WHALEN of New York on Jan. 16 began to work out the details of the plan to relieve traffic congestion in the theater zone, originally described as the area bounded by Sixth and Eighth Avenues, 42d and 50th Streets. He discovered that three important revisions were necessary for its smooth operation when it becomes effective on the night of Jan. 21 for a fortnight's trial.

The commissioner said that even then other emergency alterations might be made by himself or any of the twelve police officials he has assigned to help him start the new system, when actual operation of the plan gives them an opportunity to observe its defects.

Revisions in Regulations

Important changes in the plan suggested on Jan. 16 follow:

1. The zone is extended to include the territory between 38th and 52d Streets and Fifth and Ninth Avenues, but only in so far as the no-parking rule and the ban against commercial traffic are concerned. The rule against turning will be enforced only in the originally designated area and then only during the peak of the evening theater rush. The old traffic regulations will be in effect at all other times.

2. The hours during which the no-turning rule will be enforced in the zone between 42d and 50th Streets and Sixth and Eighth Avenues were redefined as from 8 to 9:30 p.m. and from 10:30 to 11:30 p.m. No commercial traffic and no parking of any sort will be permitted in any part of the enlarged zone between 7:30 and 9:30 or 10:30 and 11:30.

3. Buses, originally banished during the congested hours, will be permitted to enter at all times, but during the rush hour will be required to discharge their passengers at the curbstone and continue on out of the section without turning or backing into their terminals. In the hiatus between rushes they may come and go at will. In the late rush they will be allowed to leave at 11:30 or earlier if conditions warrant.

The mapping out of this strategy and the advancing of Mr. Whalen's "anti-jaywalking" bill, which he has said he will ask the Municipal Assembly to pass at an early date, occupied most of the commissioner's day on Jan. 16.

Telephones and Dispatch Riders

The plans adopted by Mr. Whalen for installing the new system of traffic regulation in the theater zone which he expects "to serve as a sort of laboratory in which we can make observations that will be useful in correcting congestion in other parts of the city," savor of military science and tactics.

In the base of the traffic tower at Broadway and 45th Street, Commissioner Whalen will be directing affairs as a sort of field marshal of traffic. Assisting him will be Chief Inspector John O'Brien, as chief of staff. Telephones and dispatch riders on motorcycles will keep them informed of conditions throughout the entire section in which all the traffic experts of the Police Department will be concentrated.

Twelve police booths in addition to the control headquarters where Mr. Whalen will be in command will be set up on the sidewalks at crucial points. Each will fly a police flag, and each will be commanded by an inspector with a corps of assistants and reserves to untangle possible snarls and make emergency regulations as necessary.

Explaining the revisions in the original plan as agreed upon on Jan. 14 at a conference with representatives of the theater and various city departments, at which it was decided to open musical shows at 8:30 and dramatic offerings at 8:50 to "stagger" the peak of the rush,

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the commissioner said he had concluded after a more through study that certain details of the scheme were impracticable and would lead to confusion.

If delivery trucks and parking were permitted on the fringe of the congested area, he said, entrance and exit from the experimental zone would be hampered seriously. He thought it unnecessary to enforce the rule against turning, however, except in the territory originally decided upon.

The hours in which the new rules are to be enforced were changed, he said, to allow greater leeway for the going and coming of the crowds and would be more or less flexible, according to conditions.

LUMBERING BUSES CAUSE TROUBLE

He had decided, he said, that most of the trouble caused by the lumbering buses developed from their turning in and out of their terminals. For the present he thought it unnecessary to bar them entirely, although he said such action would follow if it were found that their mere presence interfered with the smooth flow of traffic or if their operators failed to give the co-operation they have promised.

$91,000,000 Subway and Dips Proposed

Detroit Street Railway and Rapid Transit Commission suggest high-speed rapid transit and surface car subway systems. Proposals may go before voters April 1

IN response to requests from Mayor Lodge and resolutions from the Common Council, the Street Railway Commission and the Rapid Transit Commission at Detroit, Mich., have presented a joint report representing their conclusions relative to a proposed rapid transit system for the city of Detroit, recommending the so-called Vernor-Mack subway line for rapid transit with a downtown subway for street cars.

Members of the commissions conclude that the unfavorable economic situation, which caused the withdrawal from the ballot of the last proposal offered by the Rapid Transit Commission, has righted itself and that the city is in a position favorable to the consideration of the new project to be submitted to the voters on April 1. It is the further belief that the rapid transit system should be financed on a pay-as-you-go program, under which all who receive benefits should be made to pay in proportion to the benefit.

The proposed Vernor-Michigan-Gratiot-Mack subway is for train-operated rapid transit on a line 13.3 miles long. It would start at Coolidge Highway west of the Fordson plant of the Ford Motor Company as an elevated line and would continue east on the main street of the Ford plant to Salina Avenue, where it would turn southeasterly to Vernor Highway, west at Woodmere Avenue, continuing thence as a subway in Vernor. After passing the Michigan Central Station, the line would turn southeasterly in Michigan Avenue and proceed thence down Michigan to Campus Martius, crossing under Woodward Avenue to Monroe Avenue, to Randolph Street, to Pingree Square, where it would turn into Gratiot, to Mack Avenue, where it would turn and proceed in Mack to Connors Avenue. There would be 27 stations on this line.

In addition to the Vernor-Mack line, it is proposed to construct a short section of subway 1.16 miles long in Woodward Avenue from Woodbridge to Temple Avenue, to be used for the present street car operation, with portals at Woodbridge and Temple at which the street cars would come to the surface.

This short section of subways and another proposed for Grand River Avenue are designed to remove most of the street cars from the surface in the congested half-mile area downtown. The Grand River section of subway, to be built according to rapid transit specifications, but to be used for street car operation, would be 0.87 miles long, extending from Grand River Avenue West and Elizabeth Street, where one of the portals would be built, in Grand River Avenue to Grand River East and Randolph Street, thence in Madison Avenue east to St. Antoine Street to the proposed easterly terminal portal.

For this Grand River downtown subway, underground loading stations would be built at Capitol Park and at Library Park, connected with each other and with stations on the Vernor-Mack line at Michigan and Shelby Street and at Monroe and Farmer Streets by underground passageways.

It is stated in the report that, by putting underground those lines that are most seriously interfered with by the movement of other rail and motor traffic in the half-mile circle, there will be a double benefit, namely the street car lines that are given an exclusive underground right-of-way free from surface traffic interference, as well as to all surface traffic using the streets from which those street cars are removed.

The estimated cost of the Woodward line constructed on rapid transit specifications with portals at Temple Avenue and Woodbridge Street is $7,500,000; of the subway for street car operation on Grand River, with the underground loading stations, $7,100,000; of the rapid transit lines for rapid transit operation, known as the Vernor-Mack subway, $51,000,000. The equipment for the Vernor-Mack line is estimated to cost $25,400,000, making the total for the proposed systems $91,000,000.

Singly, the proposed rapid transit line would serve about 30 per cent of the entire industrial population and about 22 per cent of the residential population. In combination with the routes of the surface rail system directly connected with it, it would materially better the service now offered to fully 50 per cent of the industrial and residential population of the entire transportation area, the report states.

While awaiting the return of a more favorable economic situation, the Rapid Transit Commission has been engaged in the preparation of a new plan of rapid transit financing. The purposes it has sought to accomplish have been:

1. To bring about a change in the New York Savings Bank Law so as to remove the 7 per cent limitation upon the issue of Detroit's faith and credit bonds, thereby making it possible to borrow on the city's credit temporarily to finance construction.
2. To defer collection of such charge as may be made by the city for special benefit until the end of the construction period, so as to levy upon known enhancement instead of expected enhancement.

The Rapid Transit Commission engaged legal counsel in New York and materially assisted in the drafting of the present New York Savings Bank Law, known as the Mastick Law, which removed the 7 per cent limitation and now permits Detroit to take advantage of those powers under the Michigan State Law formerly denied to it by the New York Law.

The Michigan Rapid Transit Act permits any city to issue faith and credit bonds to the extent of 2 per cent of the total assessed valuation of the city for rapid transit purposes and without regard to any other obligation of the city. Based upon the 1928-29 assesed valuation, this means approximately $70,000,000 available as it may be needed over a five-year construction period. With this amount, permanent way construction may be undertaken on a rapid transit system of approximately 20 to 25 miles of two-track line or lines.

Under the new rapid transit construction plan, it is proposed to build a line or lines within a five-year period from the date of public approval, using the credit of the city, specifically available for rapid transit purposes, in the form of faith and credit bonds, a portion of which may run for 15 years, and to repay these bonds by:

(a) Direct taxation upon the city at large, spread over a ten-year period; beginning upon approval of the line or lines.

(b) A charge made by the city of part of the enhancement in value upon specially benefited property, levied on the ascertained fact that the improvement has increased the selling price of the land; spread over a ten-year period; beginning upon completion of the construction.

Electrification of Lines at St. Paul Proposed

Electrification of the lines of the St. Paul road in Minneapolis and St. Paul and the extension across the Mississippi River from the Ford plant to Minneapolis of its branch railroad line is planned. The proposal will be submitted to city officials of both municipalities this spring.

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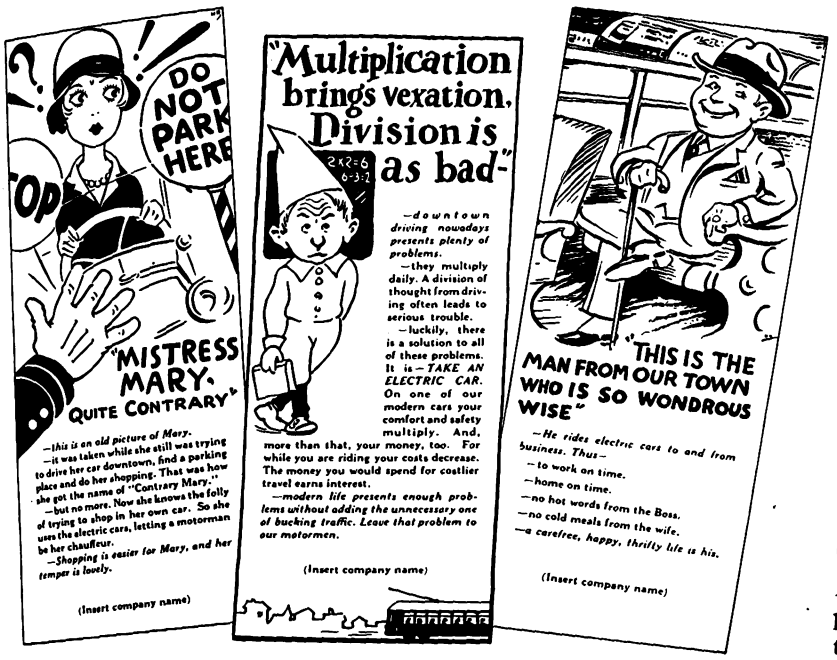

Three snappy ads from a recent collection—the creation of Labert St. Clair, A.E.R.A. Mats are obtainable

New York Fare Case Again Before Supreme Court

Reargument of the 7-cent fare case was begun before the United States Supreme Court on Jan. 14, when Irwin Untermyer, son of Samuel Untermyer, appeared for the New York State Transit Commission.

This is the second time that the case has been argued. Chief Justice Taft requested the filing of new briefs, and a reargument on the ground that the briefs and arguments submitted last year were too lengthy and were irrelevant. Succeeding briefs have been somewhat shorter, but approximately the same time was allowed for argument.

The Interborough Rapid Transit Company, which sought in the lower courts the right to increase its fares, claims that the contract is confiscatory and therefore in violation of the Constitution.

Baltimore Fare to Go to Court of Appeals

The Maryland Court of Appeals is again to take action in the fare case of the United Railways & Electric Company, Baltimore. Judge Joseph N. Ulman, in Circuit Court, Baltimore, has refused to sign an injunction sought by the United which would vacate and set aside an order of the Maryland Public Service Commission fixing or limiting fare schedules. On another occasion the case was before the Court of Appeals and was remanded to the commission on the valuation issue. The commission fixed the rate of fare at 10 cents cash or four tokens for 35 cents, denying the United's request for a straight 10-cent fare. The company then took the case into court again and dismissal of the supplemental bill of complaint followed. As a result of the latest action the United will carry the case to the Maryland Court of Appeals.

Relief of Burdensome Obligations in Kansas City Proposed

Following a meeting of the industrial committee of the Chamber of Commerce to consider the proposed 10-cent fare of the Kansas City Public Service Company, Kansas City, Mo., it was apparent that that body was averse to the increase, and that it felt the solution lay in relieving the company of some of its special burdens. The committee agreed that such unfair burdens as paying street-cleaning charges and viaduct rents should be lifted. The committee also was favorable to the proposed discontinuance of trunk bus lines, and to the introduction of a speedier and more economical service by reducing the number of stops.

An analysis of the local situation has been made by H. C. Smiley of the Chamber's industrial department, and the report mentions a fare basis of 10 cents with three tokens for 25 cents as the only increase justified at this time.

Hearing on Shop Hour Fares on New York State Line

A further hearing will be held by Commissioner Brewster of the Public Service Commission at the court house in Herkimer on Feb. 4, relative to the recently fixed fares for travel on the New York State Railways between Utica and Little Falls. The hearing will be on the petition of residents of Mohawk, employed in Ilion, asking for a 5-cent fare between Ilion and Mohawk during shop hours.

Fare Consideration Likely

Cleveland Railway succeeds in exacting promise from local council. Subway matters discussed

THE Cleveland Railway, Cleveland, Ohio, has withdrawn its demand for arbitration on establishment of a fare zone system in Cleveland upon a promise of the City Council to consider the proposal made by the company last June to experiment with a zone system for a period of not less than 90 days.

Fortified by legal rulings, the Council was ready to seek an injunction restraining the company from holding the arbitration. The company offered to withhold action on arbitration or an increase from a 7-cent fare to 8 cents for a period of 30 or 60 days, but the Council replied it would not consider a zone system until the company withdrew its demand for arbitration.

While the result appeared to be a victory for the Council, the railway at least succeeded in getting the Council to promise to study a proposal which had been gathering Councilmanic dust for seven months.

Meanwhile a study is being made of the Lakewood franchise to determine if there is any way in which the fare provisions, apparently iron clad, can be broken and Lakewood put in an outer zone, along with East Cleveland, Cleveland Heights and parts of Cleveland.

The Lakewood franchise fixes the rate of fare for a through ride at the lowest rate of fare charged for a ride on any part of the Detroit Avenue line in Cleveland.

But the Lakewood franchise also contains broad provisions for an arbitration on any difference which may arise between the company and suburb. There appears to be no limitation whatever on the subjects which may be arbitrated. Several Cleveland councilmen believe that if a zone plan was adopted so that part of Cleveland bordering Lakewood would be in the outer zone, a sufficient difference as to the rate of fare to be charged in Lakewood would arise to send the matter to arbitration. Much of the opposition to zoning in the Cleveland Council would disappear if Lakewood could be put in an outer zone.

M. F. Bramley, president of the Cuyahoga Subway Company, announced during the week ended Jan. 12 that he did not intend to have any further dealings about subways with Charles H. Hubbell, who recently filed petitions for an initiated subway ordinance in the name of the Cuyahoga Subway Company without Mr. Bramley's consent. Mr. Hubbell announced that the People's Subway Company had been incorporated by some stockholders of the Cuyahoga Subway Company for the purpose of acquiring control of the latter company and obtaining a franchise for it.

Mr. Bramley said that he did not intend to go through with subway plans if the Cleveland Railway and Van Sweringen interests succeeded in arranging their proposed $100,000,000 merger of surface, subway and rapid transit lines.

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Varied Program for Central Association

Distribution has just been made of the printed programs for the annual meeting of the Central Electric Railway Association to be held in the Claypool Hotel, Indianapolis, Ind., on Jan. 24-25, 1929. The subjects selected and speakers scheduled are as follows:

THURSDAY, JAN. 24, 1929
CENTRAL STANDARD TIME
9:00 A.M.
Meeting of the Executive Committee
9:30 A.M.

Address of Welcome, by Hon. L. Ert Slack, Mayor City of Indianapolis, Ind.

Address of President, by W. S. Rodger, general traffic manager Eastern Michigan Railways, Detroit, Mich.

Address by J. P. Barnes, president American Electric Railway Association.

"Regulation in Relation to Economic Law," by R. N. Van Doren, vice-president and general counsel Chicago & Northwestern Railway.

2:00 P.M.

"Report of Committee on Pick Up and Delivery of Freight," by H. A. Nicholl, chairman, general manager Union Traction Company, Anderson, Ind.

"The Trend in the Development of Pick Up and Delivery Freight Service," by L. G. Tighe, Northern Ohio Power & Light Company, Akron, Ohio.

Discussion, led by J. M. Pogue and F. D. Norviel.

"Advantage of Freight Consolidation," by D. R. Thomas, president Electric Railways Freight Company.

Discussion, led by G. K. Jeffries and A. H. Gossard.

7:00 P.M.
Association Dinner and Dance Riley Room, Claypool Hotel (Dress Optional)

Address by Hon. Huston Quinn, vice-president Louisville Trust Company.

FRIDAY, JAN. 25, 1929
9:30 A.M.

"Traffic Analysis and Schedule Making," by J. R. Ong, transportation engineer Cincinnati Street Railway, Cincinnati.

"Signals on the South Shore Line," by B. L. Smith, superintendent of signals Chicago, South Shore & South Bend Railway, Michigan City, Ind.

"Interurban Operations—Possible Economies and New Methods," by C. T. Dehore, president Indianapolis & Southeastern Railroad, Indianapolis, Ind.

REPORTS OF COMMITTEES

Safety—James Harmon, chairman.
Finance—H. A. Nicholl, chairman.
Power distribution—J. O. Pennisten, chairman.
Membership—J. M. Pogue, chairman.
Supply men—E. H. Arnott, chairman.
Auditing—Tudor W. Jones, chairman.
Track and roadway—R. J. Custer, chairman.

REPORTS OF AFFILIATED ASSOCIATIONS

Central Electric Railway Master Mechanics Association, by F. J. Foote, president.

Central Electric Railway Accountants Association, by F. A. Healy, president.

Central Electric Traffic Association, by L. E. Earlywine, chairman.

Election of Officers.

Meeting of the Executive Committee.

The Accountants Association, which meets jointly with the parent association Friday morning, will continue its sessions in the afternoon and on Saturday, the 26. Special features scheduled for these sessions follow:

FRIDAY, JAN. 25, 1929
2:00 P.M.

Address of the President, by F. A. Healy, auditor Indiana, Columbus & Eastern Traction Company, Springfield, Ohio.

"Facts and Figures," by James P. Longon, vice-president and treasurer Franklin Bond & Mortgage Company.

The Agenda.

SATURDAY, JAN. 26, 1929
9:00 A.M.

REPORTS OF COMMITTEES

Election of Officers.

Selling the Service Topic for New York Association Meeting

Many interesting subjects are scheduled for the midwinter meeting of the New York Electric Railway Association to be held in the Hotel Commodore, New York, Jan. 22, as follows:

"Custom Built, Ready to Use Service," by R. R. Hadsell, general superintendent of transportation New York State Railways, Rochester, N. Y.

"Service Worth Buying," by W. E. Wood, president Virginia Electric & Power Company, Richmond, Va.

"Modern Equipment Convinces the Public," by George Frey, general sales manager J. G. Brill Company, Philadelphia, Pa.

"Redesigning Present Equipment," by J. B. Hayes, general superintendent transportation Virginia Electric & Power Company, Norfolk, Va.

"Electric Equipment and Brakes," by A. J. Manson, traction apparatus manager Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.; J. C. Thirlwall, General Electric Company, Schenectady, N. Y., and John F. Craig, assistant eastern manager Westinghouse Traction Brake Company, New York, N. Y.

"Efficient Employees and a Satisfied Public," by R. S. Tompkins, assistant to the president United Railways & Electric Company, Baltimore, Md.

"Relations with Public Authorities," by Hon. Norman A. Boyd, Mayor City of Binghamton, N. Y.

Buffet luncheon will be served at the Commodore at noon and the annual dinner will be held there also at 7 p.m. William E. Thompson, president of the association, will act as toastmaster and the speaker of the evening will be Hon. Arthur E. Sutherland.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Jan. 22*—New York Electric Railway Association, midwinter meeting and dinner, Hotel Commodore, New York, N. Y.**

***Jan. 23-25*—Electric Railway Association of Equipment Men, Southern Properties, and Southwestern Public Service Association, Mechanical Division, joint meeting, Houston, Tex.**

***Jan. 24-25*—Central Electric Railway Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 25-26*—Central Electric Railway Accountants' Association, Claypool Hotel, Indianapolis, Ind.**

***Jan. 28-Feb. 1*—American Institute of Electrical Engineers, annual convention, 33 W. 39th St., New York, N. Y.**

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Local Transportation Discussed in Kentucky

An electric railway man succeeded an electric railway man as president of the Kentucky Association of Public Utilities at the twelfth annual meeting ended Jan. 16, when W. H. Harton, general manager of the Cincinnati, Newport & Covington Railway, was elected president to succeed Samuel Riddle, vice-president of the Louisville Railway. Mr. Harton was elevated from the vice-presidency.

In his annual address, President Riddle discussed among other things electric railway and bus operations, quoting the figures of the Department of Commerce through Dec. 31, 1927, on growth and development of utilities, showing reduced mileage of street railways, but increased car-miles. Mr. Riddle held that there had been but little change in Kentucky other than the addition of bus departments to electric railways. He also told of the work of a committee headed by Lieut.-Gov. Breathitt, under a resolution of the last State Legislature to make a survey of the utilities of the state, and suggest remedial legislation if needed. Information for the use of this committee is now being compiled. A new service bulletin for the use of the press was abandoned on Feb. 1, 1928, and Robert Montgomery of the Louisville Gas & Electric Company made chairman of a special committee to issue utility statements when and as wanted.

Other officers elected were: First vice-president, L. B. Herrington, president of the Kentucky Utilities Company, Louisville; second vice-president, M. C. Funk, Kentucky & West Virginia Power Company, Ashland, Ky.; treasurer, A. A. Tuttle, vice-president and treasurer, Kentucky Utilities Company; secretary, E. F. Kelley, secretary to president Louisville Railway.

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Recent Bus Developments

Taxis Sold by Twin City Rapid Transit

The Yellow Cab Company, for two years a subsidiary of the Twin City Rapid Transit Company, Minneapolis, Minn., operating 300 taxicabs in the Twin Cities and Duluth, Minn., has been taken over by a new company headed by Paul W. Tibbetts, of the Twin City & Southern Bus Company. An unusual feature is that two well-known women of Minneapolis are on the new board of directors. Among the other members of the board are C. E. Wickham, president of the Northland Transportation Company, bus operator for the Great Northern Railroad; John Junell, attorney for the Twin City Rapid Transit Company; Ivan Bowen, former member of the Minnesota Railroad & Warehouse Commission and counsel for a bus company, and C. B. Goodsell, who has operated the Yellow Cab Company for the street railway.

T. Julian McGill, vice-president of the Twin City Rapid Transit Company, indorsed the statement by Mr. Tibbetts that, when the Twin City Company bought all the larger taxicab companies, the intention was to put operation of transportation facilities under one directing head, but it was found the taxicab business was not essentially a competitor of street railway service. "Furthermore," said Mr. Tibbetts, "due to a chaotic condition of the taxi situation in the city, it involved attention, effort and financial hazard out of all proportion to the value of the service as an auxiliary to the railway business."

Prospects Appear Good for Interstate Bill

Indications are that the interstate commerce committee soon will recommend the interstate bus bill to the House for action. A report has been received from the Interstate Commerce Commission, approving the main features of the bill but recommending certain changes in the measure. Despite this it is the opinion of Representative Parker of New York, chairman of the committee, that these modifications can be agreed upon without the necessity of further hearings.

Mr. Parker added that the only section of the bill over which there is still not an entire agreement among all interested parties, is the so-called "Grandfather clause." This provides that all interstate motor carriers in service on Nov. 1, 1928, shall receive certificates as a matter of course under the operation of the act.

The report on the bill received from the Interstate Commerce Commission was written by Commissioner McManamy. It lays special emphasis on the advisability of establishing basic principles for the guidance of the commission in deciding when public convenience requires bus service between interstate points. In this connection, the report states:

The question as to whether public convenience and necessity require the operation of a motor passenger line between points already adequately served, in so far as steam railroads or street or interurban electric railways are fitted to render adequate service, involves what are to us entirely new principles. In view of the direction that reasonable consideration shall be given to existing available transportation agencies and service, a construction should be adopted which would exclude motor competition in a field already enjoying good railroad or electric railway service.

The report also recommends that the language of the bill referring to the matter of reasonableness of rates be clarified to show whether or not it is intended to have the commission make decisions on rate matters. Under section two (e) it is suggested that the point be cleared up whether or not decisions rendered by the board will have to be unanimous.

Substitution Situation Reviewed

Interesting review of transportation situation in New Jersey contained in report of utility commissioners

IN ITS report for the year ended Dec. 31, 1928, to Harry Moore, Governor of New Jersey, the Board of Public Utility Commissioners explained at some length the status of electric railway and bus operation in that State. The board says extensive traffic checks and surveys in the railway field have been made from time to time, both on the board's initiative and on the investigation of complaints, and appropriate action has been taken on all these matters. The experiment of rehabilitation by several of the companies of a number of cars to provide greater comfort and a more attractive appearance has been continued with good results both with the public and the operators. In addition, the board lists several other improvements made by railways in connection with this equipment. A feature of considerable importance from the standpoint of safety was introduced by the Public Service Co-ordinated Transport on the viaduct connecting Jersey City Heights with the Hoboken terminal. Here an automatic signal system provides for the fixed spacing of cars operating in both directions, thus providing a considerable factor of safety in operation.

On the substitution of bus service for electric railway service, the report refers to the efforts made by the Public Service Co-ordinated Transport on several of its routes and also the Morris County Traction Company and the substitution by the Trenton & Mercer County Traction of buses on two of its routes of lighter traffic. The Five-Mile Beach Electric Railway was authorized to substitute buses for the entire railway service. The Public Service Rapid Transit Company, formerly the North Jersey Rapid Transit Company, and the Atlantic City & Shore Railroad are also mentioned, and the Coast Cities Railway is substituting buses for trolley service on one or more of the routes. Considerable space is taken up in the report with the explanation of bus situation and the authority of the board to supervise and regulate the operation of quasi-public enterprises, commonly called public utilities and specifically so defined in the acts creating the Board of Public Utility Commissioners which was amended in 1911. The board says it has been its aim to assist in the legitimate development of bus traffic and to prevent unnecessary and uneconomic operation. In doing this it is frequently necessary for approval of the local consent to be accompanied by restrictions imposed on operation in parts of territories already adequately supplied with transportation facilities. The extent of the development of the bus traffic is evidenced by the fact that nearly 2,800 buses are in operation on approximately 360 routes.

The number of independently owned auto buses has decreased. The Public Service Co-ordinated Transport continues to be the largest operator of buses in the State. This company has in scheduled use more than 1,400 buses.

The use of the de luxe or parlor car type of bus has been extended to a considerable degree.

The bus has been substituted for the trolley in a number of instances. Some of these cases were where the condition of street railway tracks has been such that extensive repairs were needed, and in others the substitution was made because of light traffic. An example of complete substitution of service by bus for street railway service on local lines in a city of more than 150,000 is to be found in Paterson.

The board mentions as another reason for the substitution of buses for trolleys, the development of larger types of buses which appear to handle the traffic more adequately.

A survey of the state indicates that the operation of buses has been a means not only of furnishing service through a comparatively small investment in newly developed territory, previously without adequate means of transportation, but has assisted in many instances in the development of the municipalities themselves.

The report indicates the unsatisfac-

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tory conditions surrounding the operation of interstate buses. These are due to the limited scope in which authority of the State may be exercised over interstate commerce. The board has joined with the commissions of other states in urging Congress to enact a law which would subject interstate bus operators to regulation similar to that to which other interstate operators are required to submit.

Hearing on Equitable Coach Goes Over

The committee of the whole of the board of estimate of New York held a hearing on Jan. 14 on the Equitable Coach Company-B.-M. T. bus merger, but took no action. Mayor Walker left for Washington before that item was reached on the calendar, so consideration of the Equitable petition for an amendment to its franchise was put over until Jan. 21.

Cornelius M. Sheehan, former deputy commissioner of water supply under John F. Hylan, denounced the merger as illegal, asserted that the Equitable had forfeited its franchise by not complying with its terms and called for denial of the petition for an amended franchise and for reopening of the entire subject.

A. H. Merz, a representative of the Harvey non-Partisan Taxpayers' Association of Queens also assailed the project. Herman A. Bayern, vice-president of the Union Bus Corporation, which was an unsuccessful bidder for the franchise, attempted to get a hearing for his own company. Aldermanic President McKee, presiding for the Mayor, suggested that it was not the time for such discussion.

Leonard M. Wallstein, counsel for the Citizens Union, was on hand with a memorandum calling for forfeiture of the Equitable franchise but he delayed submitting it. Counsel for the Equitable and the B.-M.T. were also present but had nothing to say.

The franchise, if amended, would provide for splitting up the original franchise and permit the merger with the B.-M.T. whereby the B.-M.T. would take over the Brooklyn and Queens routes. The routes in the borough of Manhattan would be handled by a new company controlled by the Equitable.

Improved Service on Buffalo Line

Through bus service was started recently by the International Bus Corporation, a subsidiary of the International Railway, Buffalo, N. Y., on the Delaware Avenue-Kenmore-Tonawanda line, thus eliminating the transfer junction at the Kenmore Village line. Heretofore, the Tonawanda buses stopped at the Kenmore Village line and connected with the city buses of the Delaware Avenue line at that point. No change is made in the rate of fare or the fare limits.

Financial *and* Corporate

Improvement in Youngstown

Earnings of the Youngstown Municipal Railway, Youngstown, Ohio, for the eleven months of 1928 are the best the company has enjoyed since the service-at-cost franchise was adopted ten years ago. According to Traction Commissioner Engle, the railway earned an average of 5.18 per cent for the first eleven months of 1928 and 6.13 per cent in November.

Gross revenue for November was $177,198, an increase of nearly $28,000 over November, 1927. The net profit was $23,533 which failed by $3,331 to produce the full 7 per cent return to which the company is entitled, if earned.

There were 2,633,072 passengers carried, an increase of 213,000 over the previous November. The mileage of street cars and buses was 472,521, an increase of 10,000 over November, 1927.

Missouri Electric Acquired by St. Louis Company

The Missouri Public Service Commission on Jan. 12 authorized the St. Louis Public Service Company to take over all of the assets, franchises and property of the Missouri Electric Railroad operating between Wellston and St. Charles, Mo. The St. Louis Public Service Company owns all of the $1,000,000 stock issued by the Missouri Electric and holds all of its $700,000 in outstanding bonds, with a claim for accrued interest totaling $361,666. All other liabilities of the Missouri Electric will be assumed by the St. Louis company. The claims of the St. Louis Public Service against the Missouri Electric will be concelled.

Another Liquidating Payment by Toronto Railway

According to the Canadian *Financial Post,* the Toronto Railway, Toronto, Ont., expects to make a final payment of 50 or 60 cents a share within the next month or six weeks. A total of $115.50 per share already has been paid.

The railway has had $60,000 tied up with the Niagara Park Commission. The commission refused to release the money until a claim against it by the city of Niagara Falls had been settled. The suit was settled and a city by-law passed last November relieving the commission of the claim. The formalities are expected to be cleared away within a few weeks.

The Electric Development Company, a subsidiary of Toronto Railway, years ago made a deposit with the commission guaranteeing the commission against damage to concessions in the process of some electrical work going on within the park area. The time for filing the claims expired ten years ago, but the case of the city of Niagara Falls has been hanging fire since.

The Toronto Railway has been in process of liquidation since the purchase of its lines some years ago by the city of Toronto.

$2,500,000 Montreal Issue Offered

Aldred & Company, Ltd., and a syndicate including Wood, Gundy & Company, Ltd., Hanson Brothers, Inc, and Greenshields & Company are offering $2,500,000 series "C" 4½ per cent general and refunding mortgage sinking fund gold bonds of the Montreal Tramways at a price of 90½ yielding more than 5.15 per cent.

The Montreal Tramways serves a population of about 1,200,000. It operates under a franchise with the city of Montreal which provides that the company is entitled to an annual return, alter all operating expenses, maintenance and depreciation, of at least 6 per cent on the capital value of the company's property as fixed through the franchise contract. After these allowances to the company, the city of Montreal receives an annual rental of $500,000 and a stipulated percentage of surplus earnings. For the fiscal year ended Dec. 31, 1928, (December estimated) gross earnings are shown at $13,940,000, and after operating expenses, taxes and maintenance, net earnings of $3,693,000 are equivalent to about 1.7 times interest requirements on all bonds of the company outstanding, including the present issue.

Under a special arrangement made with the city of Montreal and approved by the Montreal Tramways Commission, the company in the year 1925 started bus service and now operates over thirteen different routes. This service has proved very successful and there are now in operation 96 buses, 28 of which were placed in service during the past year. The number of passengers increased from 5,370,475 in 1926 to 14.-197,992 in 1928 (December estimated).

Co-ordination in Indiana Effective

Co-ordination of the operations of the Interstate Public Service Company, subsidiaries of the Midland Utilities Company and subsidiaries of the Central Indiana Power Company through centralized supervisory management was announced on Jan. 2. The railway companies involved are the Indiana Service Corporation, Chicago, South Shore & South Bend Railroad, and Gary Railways, subsidiaries of the Midland Utilities Company, operating in the northern part of the state, and the Interstate Public Service Company, operating chiefly in the southern part of the state.

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Operation of these companies will be co-ordinated under centralized management through the Midland Utilities Investment Company of Chicago. The operating companies will not be merged but will continue to be run as units.

E. Van Arsdel, president of the Interstate Public Service Company, and L. B. Andrus, president of the operating subsidiaries of the Central Indiana Power Company, will continue in charge of the operations of the respective properties.

Co-ordination of the operation of the Interstate Public Service Company and the subsidiaries of the Central Indiana Power Company, previously controlled by the Middle West Utilities Company, will be effected under the direction of Samuel Insull, Jr., president of the Midland Utilities Investment Company and Robert M. Feustel, president of the Indiana Service Corporation, Fort Wayne. Subsidiaries of the Midland Utilities Company will continue to be operated as in the past under the direct supervision of Mr. Insull, Jr.

Charles W. Chase, president of the Gary Railways, commenting upon the re-allocation of the properties, said that there would be no change in the local situation as it relates to the Gary Railways. He added that, by considering the state as a whole, a more comprehensive program could be developed.

$300,000 West Towns Issue

There was offered for subscription in December, 1928, by the Harris Trust & Saving Bank, Chicago, Ill., an issue of $300,000 of Chicago & West Towns Railway first gold 6's series B. The bonds, dated July 1, 1927, and due July 1, 1932, were priced at $96.75. They are secured equally with $1,500,000 Series A 7's, due 1932, by a direct first mortgage on the entire property.

8,600,000 on Chicago-Joliet Line

The Chicago & Joliet Electric Railway and its subsidiary, the Chicago & Joliet Transportation Company, last year carried 8,600,000 passengers, according to the annual report of W. H. Heun, general manager. Since its start on Aug. 15, 1928, the Chicago-Joliet bus line carried 23,419 passengers and the Joliet bus lines 913,488 passengers. City railway lines in Joliet carried 5,410,804 passenger and interurban lines, 2,317,673, a total electric line traffic of 7,728,477 passengers. The totals show a decrease of 390,967 from 1927.

Negotiations Under Way for Springfield Property

It is understood that the Cincinnati, Hamilton & Dayton Railway, Dayton, Ohio, in connection with its recent acquisition of the Indiana, Columbus & Eastern through Springfield, Ohio, is looking into the possibility of acquiring the Springfield Street Railway. Nothing definite has resulted and it is still unsettled whether or not anything will be done.

Traffic Increases in Alliance

New records were established by the Stark Electric Railroad, Alliance, Ohio, during 1928, with an increase of more than 250,000 car-miles and approximately 400,000 passengers compared with 1927. Last year, according to officials of the company, cars operating between Canton and Salem, Ohio, a distance of 35 miles and over a 2-mile city route in Alliance, traveled 1,294,574 miles, carrying 2,932,012 passengers. In 1927, cars traveled 1,028,941 miles and carried 2,555,506 passengers.

In this distance, there was not an accident fatal to either passengers or employees. A few minor accidents resulted in slight injury to employees.

Loss on Rochester's Subway

That operation of passenger service by the New York State Railways on the city-owned subway in Rochester, N. Y., is detracting from the revenues of the surface lines is shown in an analysis of the annual report of Commissioner Charles R. Barnes. The first seven months' operation of the subway showed an operating deficit of $8,123, more than double the original estimate. The report bears out estimates that only 10 per cent of the subway passengers would be new riders, the other 90 per cent drawn from users of the surface cars.

It is estimated that in the first seven months of operation, approximately 697,000 former surface line passengers used the subway, representing a loss of about $55,800. The three surface lines whose territory interlaps that of the subway—the Monroe, Park and Goodman—showed the greatest decrease in patronage. On the other hand, lines farther from the subway were unaffected.

Slight Decline in Passengers Carried in Springfield

Electric cars and buses of the Springfield Street Railway, Springfield, Mass., were operated more than 7,150,000 miles in the fiscal year 1928, an increase of about 50,000 miles over 1927. Passenger traffic declined about 4 per cent, the decrease, however, being only one-third as great as in the preceding year. Payrolls in 1928 represented a cash outlay of approximately $1,600,000, compared with $1,700,000 in 1927. Equipment at the close of the fiscal year 1928 included 153 cars and 47 buses, as against 165 cars and 38 buses a year ago.

Decrease in Ten Months' Net in Providence

A decrease of slightly less than 11 per cent in the net income for October, compared with October, 1927, is shown in the report filed with the Public Utilities Commission by the United Electric Railways, Providence, R. I. Net income for last month was $38,839, while for October last year it was $43,532. Total operating revenue of $617,314 for last October and total operating expenses of $497,630 were reported, showing decreases of about 4 per cent in comparison with the figures of a year ago. Addition of $5,858 non-operating income brings the total income for the month to $125,542, or 5½ per cent below the figure for October, 1927.

Increased Needs of Puget Sound Subsidiary

An increase in the capitalization of the North Coast Transportation Company, a subsidiary of the Puget Sound Power & Light Company, Seattle, Wash., from $60,000 to $600,000, is explained by F. W. Brownell, comptroller of the two companies, as signifying an effort to bring the capitalization of the company more in line with its investment in transportation equipment. Mr. Brownell states the company has grown until its investment in equipment now approximates $1,000,000, covering both bus and track lines. Increased bus service between Seattle and Tacoma since the closing of the interurban of the Puget Sound Electric has demanded additional equipment, he states. The North Coast Company has also established a half-hour stage service between the two cities, increasing the number of trips between Tacoma and Seattle from 17 to 30 a day.

Questions Financial Move in St. Louis

Judge Henry S. Priest, counsel for minority stockholders of the St. Louis Public Service Company, filed a brief with the Missouri Public Service Commission at Jefferson City on Jan. 12 in opposition to the application of the City Utilities Company of New Jersey for permission to buy and hold more than 10 per cent of the stock of the railway. He charges that the New Jersey company is owned by two New York corporations, the North American Company and Newman, Saunders & Company, Inc. He based his statement on information furnished to the state commission by one of its accountants who was permitted to examine the books of the New Jersey corporation after attorneys for the company had declined to present the records at a public hearing for examination by Judge Priest.

City Utilities now owns 10,725 shares of the preferred stock of the St. Louis Public Service Company and 28,772 shares of common stock and has agreements to purchase 84,265 more shares of common. The company would then hold 38 per cent of the outstanding stock.

Judge Priest has questioned the motives of City Utilities Company in seeking to provide managerial and financial service and advice to the railway. City Counselor Muench has filed his final brief opposing the City Utilities application.

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Personal Items

B. J. Jones Resigns from Lima Properties

At the annual meeting on Jan. 8 of the Lima-Toledo Railroad and the Lima City Street Railway, Lima, Ohio, the resignation of B. J. Jones as president of the former property and vice-president of the latter was made final. This change was occasioned by the sale of the properties to the Cincinnati, Hamilton & Dayton Railway. Other changes were effected by the election of the following:

John L. Cable, attorney of Lima, president of both companies;

F. A. Bundy, vice-president;

C. E. Baker, secretary-treasurer;

J. H. McClure, general manager of the Cincinnati, Hamilton & Dayton, director.

Mr. Jones was appointed receiver of the Ohio Electric Railway System on Jan. 25, 1921, and, since the receiver's sale in 1922 to the bondholders, the companies have been operated under his direction as general manager. Under the planning of Mr. Jones, more than $500,000 has been spent in rehabilitating the properties, and in the purchase of modern city cars for use in Lima—freight equipment, track and overhead line construction, also physical connection with the Community Traction Company at Toledo, so that interurban passenger cars could operate to the uptown union passenger station and freight business be exchanged with interurban lines for Detroit, Cleveland and other points. This business has grown from a few cars of freight to 55 and more loaded freight cars each week day. The improvements have resulted in earnings from operation of $1,330,000 during the past eight years. They offer tangible tribute to the sagacity of operation under Mr. Jones and reflect alertness on the part of both the management and the men to the opportunities which intensive cultivation of traffic of this kind affords.

New Assignments in Alliance

The appointment of Everett W. Sweezy, former general manager of the Stark Electric Railroad, Alliance, Ohio, to be vice-president of that company and the Alliance Power Company to succeed Howard Morris, New York, is listed in a group of changes. Other changes are as follows:

C. E. Sperrow, general manager of the Suburban Light & Power Company, assumes the duties of general manager of the Stark Electric and the Alliance Power in addition to his other work.

O. K. Ayers, auditor of the Stark Electric and the Alliance Power, becomes treasurer, succeeding Mr. Sweezy.

W. H. Grimes becomes auditor, succeeding O. K. Ayers.

Ralph Miller, formerly in charge of overhead and equipment, has been named general superintendent of the Stark Electric, in charge of transportation and roadway.

Attorney C. M. Shelter, Canton, who has been representing the Stark Electric in its court battles, has been named general counsel for the Suburban Light & Power Company, the Utilities Service Company and affiliated organizations which include the Stark Electric and the Alliance Power. He will maintain an office in Canton, the county seat, and will devote his entire time to legal affairs of the organization.

A. W. Robertson Made Westinghouse Chairman

Head of Pittsburgh Utilities is chosen to succeed Guy E. Tripp. Has been president of Philadelphia Company since 1926

A. W. Robertson

ANDREW WELLS ROBERTSON, Pittsburgh, was elected chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, at a meeting of directors held in New York on Jan. 16. He succeeds the late Guy E. Tripp. Paul D. Cravath has been acting chairman pending the election. Mr. Cravath will remain a director of the company.

Mr. Robertson is now president of the Philadelphia Company of Pittsburgh. He will withdraw from this and other business activities and devote his entire time to the Westinghouse Company. His official headquarters will be in Pittsburgh, for the present, where he has long been prominent in public utilities.

Mr. Robertson was elected president of the Philadelphia Company in 1926, after serving for several years as vice-president of that company in charge of public relations, and has been at the head of the institution since it was acquired by the Standard Power & Light Corporation early in 1926.

Certainly Mr. Robertson was well qualified, both by training and experience, to head the utility companies serving Pittsburgh and vicinity when he was designated for that post in 1926. A resident of Pittsburgh for twenty years, he has been in close touch with the development of the greater Pittsburgh district. His experience as an executive of the Philadelphia Company dates back to 1913. As vice-president in charge of public relations he had been in touch with nearly all operations and in direct charge of the general service departments, which maintains all relations with domestic customers of the company, the adjustment or claims department, the advertising department, and relations with the public service commission. And this very experience makes him unusually conversant with all phases of the public utility industry, from which the Westinghouse Company derives the bulk of its business.

A statement issued by the executive committee of the Philadelphia Company, with reference to Mr. Robertson's retirement as president follows:

Mr. Robertson is leaving our organization with our entire good-will and our sincere wish for the greatest of success as chairman of the board of the Westinghouse company. His long association with the Pittsburgh utilities has been most valuable in the upbuilding of these great properties and their management. We regret to lose him, but are glad that the opportunity now presented for the wider exercise of his ability will not take him away from the city with which he has been so closely identified. As president of the Pittsburgh utilities, Mr. Robertson has filled a position of great responsibility, and he will go to the Westinghouse company splendidly equipped for new achievements in the career of one of Pittsburgh's foremost industrial enterprises. A successor to Mr. Robertson will be elected at a meeting to be held in the near future.

The new Westinghouse chairman is only 49 years old. He is of Scottish parentage, and was graduated from Allegheny College, Meadville, Pa., in 1906. He received the degree of LL.B. from the Law School of the University of Pittsburgh in 1910, and after practicing law in Pittsburgh became general attorney of the Philadelphia Company, which, with its affiliated companies, operates all of the electric light and railway properties and most of the gas properties in the Pittsburgh district.

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L. S. Storrs Named Executive Chairman of Baltimore Board

Managing director of American Electric Railway Association selected by directors of United Railways & Electric Company for important post there. Expected to accept

TO LUCIUS S. STORRS, managing director of the American Electric Railway Association, has been tendered the position of executive chairman of the United Railways & Electric Company, Baltimore, Md., operating 437 miles of city and suburban railway. Announcement to that effect was made in Baltimore on the afternoon of Jan. 17. No other changes in the existing Baltimore organization are contemplated.

It is understood that Mr. Storrs is disposed to accept the appointment, but only on the condition that an arrangement be made under which the work he is now doing for the association shall be not interrupted pending the selection of a successor to him with the association. Naturally the directors of the company at Baltimore would prefer to have him devote his full time and attention to the problems of their company at once, but it is understood they are prepared to defer to this reservation, knowing full well the obligation of Mr. Storrs to the association and appreciating that a man in his position has commitments which can not well be laid down at once. Mr. Storrs put the matter this way:

I have been in conference with the Baltimore people, and I am much attracted by their offer. I am going West now, to be away five weeks, to carry out an engagement made some months ago to survey some properties for the Southern Pacific Railroad.

Frankly, I am attracted to the position by the obviously great future of the city, the excellence of the property and the problems before the railway in Baltimore. That city is growing rapidly. Its industrial development in recent years has been remarkable. Within the last few weeks the Western Electric Company has decided to locate a plant there which will employ men sufficient in number to comprise a small city in itself. I also understand many other industries contemplate the location of plants in Baltimore. All this means growth in the need for adequate transportation facilities.

If I can make the necessary arrangements in my affairs I am strongly inclined to accept. At the earliest possible date I shall make a further statement of my plans.

Four years ago next April Mr. Storrs began to apply to the work of the American Electric Railway Association as managing director his vast experience in electric railway executive positions and the management skill which the directors of the company at Baltimore so signally recognize now. To that post he went from the Connecticut Company, in the direction of which the problems he met are not different from those which now confront the United Railways & Electric Company. This is plain since the special committee of the

Lucius S. Storrs

Advisory Council of the American Association that selected Mr. Storrs for the position he now holds made its choice largely on the basis of the fact that he had been successful in giving expression in his own company to furthering the recommendations of the Federal Electric Railway Commission, which by appointment of President Wilson had thoroughly investigated the changed economic status of the electric railway industry growing out of the war-time conditions. The outstanding recommendations of the commission were that the companies deal frankly with the public, that they improve their service and that the public on its part see that the companies were accorded a return on their investment that was fair. In his own company Mr. Storrs was successful in giving expression to these recommendations, and it is to this end that he has worked unremittingly and to good effect since he has been managing director of the association.

No Precedent for Work He Did With Association

Precedent, even if he had needed it, was lacking in the office to which Mr. Storrs was appointed with the association. No man knew better than he that no one man could attempt to solve the manifold problems the transportation industry faced when he took hold as managing director, but he did feel that all the men in the industry working together could solve them. And it is to that end he has devoted himself. Qualified as is Mr. Storrs to deal with almost any railway situation that might arise, the managing director has, on the other hand, been conscious of his own limitations. And the success that has attended his work with the association, never spectacularly acclaimed, can be attributed to habits of mind of the man that are ineradicably a part of him. As a matter of fact, it bothered him not a little that upon coming into office some of the daily papers were disposed to refer to him as a czar. Any such attitude is foreign to the man. In fact, his work illustrates strikingly that the sine qua non of accomplishment is not necessarily a dominant demeanor.

Kindly, courteous, ready to listen to the other man's point of view, and withal having a keen insight into human nature, Mr. Storrs has been a big brother to the men in the industry and many a success scored on individual properties, if public acknowledgement were proclaimed, could be traced to the quiet man at association headquarters who, no matter how busy he might be, never was too busy to offer counsel and advice. These are among the characteristics which led in the first place to the selection of Mr. Storrs for the post of managing director and have now led to the offer made to him at Baltimore.

At various times he has been president of the Connecticut Company, operating practically all the electric railways in the state of Connecticut, and many of the bus lines there; president of the New England Investment & Security Company, operating among other properties the railways in Springfield and in Worcester, Mass.; vice-president of the Berkshire Street Railway; a director of the Union Trust Company, Springfield; a director of the New Haven Morris Plan Company, and a director of Grace Hospital in New Haven. In 1916 he was president of the American Electric Railway Association. With the entrance of the United States into the war he devoted himself to directing the association's war activities, and personally served as chairman of the association's committee on national defense in charge of transportation and the co-operation of the electric railways through the national council of defense.

Mr. Storrs was born in Buffalo, N. Y., on Jan. 4, 1869. He was educated at the University of Nebraska, graduating in 1890 and taking a master's degree in 1904. After he left college Mr. Storrs held various technical positions with the Union Pacific Railway, the New York, New Haven & Hartford Railroad and the Colorado Fuel & Iron Company. In 1907 he became president of the New England Investment & Security Company, serving until 1911. From 1912 to 1914 he was vice-president of the New York, New Haven & Hartford Railroad in charge of the electric railway properties operated under the name of the Connecticut Company. When these lines were segregated from the New York, New Haven & Hartford Railroad in 1914 Mr. Storrs was made president of the new system, The Connecticut Company, the post he held at the time of his appointment as managing director of the association.

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Construction and Equipment Orders Under Way

New line planned in Baltimore. Long Island improvements include 40 new cars. Chicago car order authorized. Twenty-five-mile railway for Texas. Virginia Electric & Power announces program

PLANS for the extension of its lines in East Baltimore are being made by the United Railways & Electric Company of Baltimore, Md. This new extension will be constructed to serve the new plant to be erected by the Western Electric Company. Officials of the United Railways discussed the subject on Jan. 3 with the Western Electric Company and the municipal authorities, at which time the extension of streets to the plant was also planned. Rights-of-way for tracks were exchanged between the United Railways & Electric Company and the Western Electric Company. The new plant will cost between $25,000,000 and $30,000,000 and will eventually employ about 25,000 persons.

100 Cars for Chicago

The Chicago Surface Lines, Chicago, Ill., is contemplating the purchase of 100 cars. Authorization for 60 of these cars already has been given by the Chicago Railways, and it is anticipated that the Chicago City Railway within a short time will authorize the purchase of the remaining 40. Specifications are now being prepared and should be ready for release in the near future. The Springfield Street Railway, Springfield, Mass., has allotted in its 1929 budget $305,000 for new plant and equipment and $515,000 for maintenance, material and labor. Similarly, the Worcester Consolidated Railway, Worcester, Mass., has allowed $230,000 for new plant and equipment and $620,000 for maintenance, materials and labor, to be expended during this year.

40 Cars for Long Island

The Long Island Railroad, New York, N. Y., will purchase forty new steel cars at a cost of $1,320,000 to bring up the maximum length to eleven cars on all of its trains. It will lengthen the westbound platform of the Kew Gardens station to accomodate eleven-car trains and will stop two additional trains at that station, one in the morning and one in the evening.

These changes in service were voluntarily promised recently by J. F. Keany, counsel for the road, at the first hearing held since the State Transit Commission had ordered certain improvements on the line.

Concerning the fourth and principal feature of the commission's order, equipment of trains in the electric service, with interlocking devices to prevent train movement until all doors are closed, the railway requested more time for consideration.

In the meantime, at the request of the railroad's attorney, engineers of the line and of the commission will confer as to the best method of installing the required devices.

It is said that eight months would be required to equip the trains with the safety devices.

New Texas Railway

The Port Isabel Company, which recently purchased the Rio Grande Railroad that runs from Point Isabel to Brownsville, a distance of 22 miles, also plans to construct an electric railway between Point Isabel and San Benito, a distance of 25 miles. Agricultural developments in the territory along the route of the proposed electric line are making rapid progress, and plans are on foot to make Point Isabel a tourist and pleasure resort.

The Kansas City Public Service Company, Kansas City, Mo., has received one of the new Twin Coach automotive type street cars for experimental purposes. As soon as the car is ready for service it will be tested and placed in regular operation.

The first two units of an order for ten steel passenger cars have been delivered to the Chicago, South Shore & South Bend Railroad, Michigan City, Ind., and will be placed in service immediately. The other units, all motor cars, will be delivered during the next two or three weeks.

All of these cars are the latest design Pullman type, with bucket seats similar to those now in use in a large number of the South Shore Line cars. These cars were built by the Standard Steel Car Company, of Hammond, Ind. This company now has an order for ten more steel cars, five motor and five trailer which are to be delivered in the spring.

Expansion in Virginia

The Virginia Electric Power Company, Richmond, Va., will spend approximately $4,000,000 in expansions to its system and in additions and replacements to its properties in 1929. This is in addition to the plans which are also being perfected for construction in the early part of 1930 on the Roanoke River hydro-electric development which will cost between $7,000,000 and $8,000,000. The 1929 program does not include any outstanding single projects, but will provide for the purchase of new street cars, buses, power apparatus and other equipment to care for the constantly increasing requirements for service. This $4,000,000 expansion and addition program is entirely aside from any maintenance expenses.

The Memphis Street Railway plans approximately $130,000 of track improvements in 1929. At the present time work of relaying the Poplar Avenue track has been started, the old track being replaced with 9-in., 134-lb. rails. This work will be under way for months as far as Dulop Street. Later new trackage on the Hernando line from the Beale to Calhoun Street approach to the depot is in prospect.

During 1928 much work on the railway's tracks was completed. The Jackson Avenue line was extended and new trackage and improvements made on McLemore Avenue, one line in the north

News for Manufacturers

A.E.R.A. Exhibit Committee

Will Hold Its First Meeting on

February 5

to prepare for the Great Exhibition

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48th Annual A.E.R.A. Convention

New Atlantic City Auditorium
September 28—October 4, Inclusive

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and the other in the south of the city. The Thomas Street line to Chelsea and the city limits north was also rebuilt. The cars were also greatly modernized, a number being equipped with upholstered seats.

The Pacific Electric Railway, Los Angeles, Cal., has ordered one six-cylinder parlor car and one special parlor car, both of nineteen-passenger capacity, from the Fageol Motor Company, Oakland, Cal. The Washington Railway & Electric Company, Washington, D. C., has ordered six, type W. 21-passenger coaches from the General Motors Truck Company. The Virginia Electric & Power Company, Richmond, Va., has purchased five Twin Coaches complete for its Richmond division.

Track Plans for Buffalo

A tentative track reconstruction and track area repaving program to be carried out by the International Railway, Buffalo N. Y., during the year 1929 was discussed recently at a conference between the city and street railway company officials. The proposed program involving fourteen streets was laid before the International Railway for change and ratification. The approved program, which is expected to be modified because of the cost, will be returned to the Common Council within the next 30 days. No estimate was made of the cost of the reconstruction and repaving program. In addition to the program mapped out by the city for the International Railway for the coming year, it was agreed that immediate steps be taken to guarantee the widening of Delaware Avenue to the same width as the avenue from Upper Terrace to Allen Street. The International Railway, following the conference, agreed to remove rails from the streets on which car lines have been abandoned whenever the city requests.

The British Columbia Electric Railway, Vancouver, B. C., will call for tenders immediately for the projected new hydro-electric plant on Stave River at Ruskin, B. C., it was announced recently by W. G. Murrin, president of the company.

The project will call for an ultimate outlay of $7,250,000, and completion of the first unit, which will develop 43,000 horsepower in one generator, is planned for the fall of 1930, in time for the peak load of 1930-31. At the same time, foundations will be laid for another generator of the same size which can be put in at any time. The Ruskin plant may eventually develop 175,000 horsepower.

Track materials purchased recently include 2,000 hemlock ties ordered by the Ottawa Electric Railway, Ottawa, Ont. The Chicago Surface Lines, Chicago, Ill., placed orders for 400 No. 32 14-in. bass African fibre metal case switch brooms. One hundred tons of conductor bar and a tongue switch for 14th and E Streets, N.W., have been ordered by the Washington Railway & Electric Company. Three track switches, 1,000 lb. of welding wire, and 25 kegs of track bolts were ordered recently by the Virginia Electric & Power Company.

Line Materials Ordered

Line material ordered by the Chicago Surface Lines includes 50,000 ft. of $\frac{5}{16}$-in., seven-strand span wire, 20,000 ft. of $\frac{5}{16}$-in., seven-strand bridge wire, 10,000 pieces of No. 000 copper armor, 3,000 trolley armors, 12,000 No. 000 trolley ears and 5,000 ft. of 3½-in. x 18-in. square, bore split, wulfing tile, 35 right hand and 10 left hand 1,000-amp. quick brake, single blade sectionalizing switches, 50 No. 000 right hand and 50 No. 000 left hand switches with 6-in. approaches, 500 galvanized cross-overs with 6-in. bronze removable tips, and 1,300 switches with 6-in. approaches. The Virginia Electric and Power Company ordered 100 clamps and trolley insulators, and 500 trolley ears.

Car equipment and supplies ordered by the Washington Railway & Electric Company include 150 22-in. cast iron car wheels and 50 30-in. cast iron car wheels, 40 30-in. steel wheels, 40 31-in. steel wheels, and 40 33-in. steel wheels. This company also ordered one Bean car washer and four sets of Westinghouse vacuum brakes for type Z coaches. The Chicago Surface Lines ordered one Wardwell model G double-acting band saw filer and setter. St. Louis Public Service Company, St. Louis, Mo., has filed plans for a two-story addition to its equipment and mechanical shop, to cost about $40,000.

Westinghouse Sales High

Operations of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., in the year just ended were at record levels, the quarter ended Sept. 30, last, establishing a new peak on earnings of $6,373,120, after all charges, or equal to $2.68 a share on 2,370,063 shares of combined preferred and common stocks issued. Previously Westinghouse's fiscal year ended March 31, but several months ago it was decided to alter this to the calendar year. The 1928 statement, therefore, will cover only nine months' operations.

The company estimates net income for the nine months last year to Dec. 31, before deduction of bond interest, but after federal taxes, at $18,000,000, which would be the equivalent of $6.75 a share on the enlarged capital basis of 2,666,315 combined shares. Computing on the same basis—that is, eliminating bond interest—this is an increase of about 5 per cent over the full year ended March 31, last, when net income, after taxes, totaled $17,141,163, or $6.43 a share on the larger capital.

Compared with the nine months to Dec. 31, 1927, on the new basis, when net income totaled $12,806,000, after taxes, or $4.80 a share, the results for the nine months ended Dec. 31 represent an increase of 40 per cent. The brevity of Westinghouse's quarterly reports precludes a proper interpretation of the great increase in net income this year.

Paving Brick Association to Meet

The 23d annual meeting of the National Paving Brick Manufacturers Association will be held at the Mayflower Hotel, Washington, D. C., Feb. 13-14-15, 1929. The program for the first two days will include papers and discussions of the latest practices in the design and construction of streets and highways, particularly the vitrified brick type. These sessions will be open to the general public and anyone interested in street and highway development is urged to attend. Many prominent engineers and other highway authorities will take part in the meeting. There will be a banquet Thursday night, Feb. 14, and the regular annual business session will be held on the last day of the meeting. Fred L. Manning of the Peebles Brick Company, Portsmouth, Ohio, is president of the association and George F. Schlesinger, chief engineer and managing director.

Weekly Business Conditions

The volume of business during the week ended Jan. 12, 1929, as reflected by check payments, was greater than in the corresponding period of 1928, according to the weekly statement of the Department of Commerce. Activity in steel plants was likewise greater than in the same week of last year. Detroit factory employment, indicating operations in the automobile industry, showed substantial expansion as compared with both the preceding week and the same week of 1928. The output of crude petroleum, covering the latest reported week, showed gains over both the preceding week and the same period of last year. Bituminous-coal output was also larger than in either prior period. Copper prices averaged higher than in either period, while iron and steel

Weekly Business Indicators

(Weeks ended Saturday. Average 1923-25 = 100)

	1929		1928			1927		
	Jan. 12	Jan. 5	Dec. 29	Dec. 22	Jan. 14	Jan. 7	Dec. 31	Dec. 24
Steel operations	110.5	110.5	107.9	105.3	93.0	88.0	75.0	*88.0
Bituminous-coal production	.....	101.3	70.7	113.4	111.5	101.1	81.5	100.7
Lumber production	.....	74.5	45.0	85.0	97.3	72.7	57.3	88.2
Petroleum production (daily average)	.....	124.4	123.9	122.5	113.9	114.2	116.2	116.8
Building contracts 37 states (daily av.)	.....	64.4	116.7	105.5	109.2	56.2	104.4	121.1
Price iron and steel, composite	87.5	87.6	87.5	87.5	85.1	84.7	84.7	84.8
Copper, electrolytic, price	.....	119.6	117.4	114.5	100.0	100.7	100.0	100.0
Check payments	154.8	164.2	119.3	150.6	138.0	154.9	103.4	132.8
Interest rates, call money	154.5	200.0	251.5	178.8	100.0	115.1	133.3	103.0
Business failures	156.0	116.2	88.2	120.6	154.3	125.1	103.9	122.4
Interest rates, time money	174.3	182.9	191.4	188.6	97.1	97.1	97.1	97.1
Federal reserve ratio	85.5	79.9	79.5	83.2	91.2	86.7	86.2	86.7

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prices, showing a fractional decline from the preceding week, were higher than a year ago.

Loans and discounts of Federal Reserve member banks showed a material contraction from the preceding week but were larger than a year ago. Interest rates on both time and call funds averaged lower than in the previous week but were substantially higher than a year ago. Prices for stocks showed only slight change from the preceding week but were higher than last year. Bond prices were also unchanged from the preceding week, but were below the level of a year ago.

Largest Electric Railway Export to Canada

Of the total railway motors, electric railway locomotives, electric mining and industrial locomotives, starting and controlling equipment for electric railways and vehicle motors, and railway signals, switches and accessories, valued at $118,755, which were exported from this country during the month of October, Canada received by far the greatest amount. The total export to the Dominion of these products was $80,317 which is divided in the following classes: Railway motors, $1,470. railway electric locomotives, $9,699, mining and industrial electric locomotives, $7,105, starting and controlling equipment, $2,-037, and railway signals, switches and attachments, $60,006.

Peru was second on the list, receiving $7,807, a large part of which was industrial and mining electric locomotives. British India was a close third receiving $7,065 worth of equipment, nearly all of which was railway motors. The total exports to Colombia were $7,010, most of which were railway motors. The total exports from this country were divided in the following classes: Railway motors, $17,455, railway electric locomotives, $11,622, mining and industrial electric locomotives, $17,149, starting and controlling equipment, $7,-482, and railway signals, switches and attachments, $65,047.

Cincinnati Car Corporation Elects Officers

New officers of the Cincinnati Car Corporation, which now includes the Cincinnati Car Company and the Versare Corporation, Albany, N. Y., are H. L. Sanders, president; A. L. Kasemeier, J. H. Elliott and A. F. Warhaus, vice-presidents; E. C. Bernhold, secretary-treasurer and S. E. Reiph, assistant secretary-treasurer.

The board, elected Jan. 8, by the stockholders, includes: Louis J. Hauck, Frederick Hertenstein, Harry M. Levy, Stanley M. Rowe, T. H. Schoepf, Joseph B. Verkamp, H. Belin Voorhees, Gustav A. Weil, William F. Wiley, Harry A. Worcester, Frederick Pruyn, G. S. Rockefeller, F. S. Moseley, and Messrs. Sanders and Warhaus.

ELECTRIC RAILWAY MATERIAL PRICES—JAN. 15, 1929

Metals—New York

Copper, electrolytic, cents per lb	16.525
Lead, cents per lb	6.65
Nickel, cents per lb., ingot	35.
Zinc, cents per lb	6.7
Tin, Straits, cents per lb	49.
Aluminum, 98 to 99 per cent, cents per lb	23.90
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	53.00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.45
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago	1.50
Central, Ill., screenings, Chicago	1.075
Kansas screenings, Kansas City	1.70

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅞ in. and larger, cents per lb	2.80
Tie plates (flat type), cents per lb	2.15
Angle bars, cents per lb	2.75
Rail bolts and nuts, cents per lb	3.90
Steel bars, cents per lb	1.95
Ties, white oak, Chicago, 6 in.x8 in.x8 ft	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.70
Sheet iron (24 gage), cents per lb	2.85
Sheet iron, galvanized (24 gage), cents per lb.	3.6
Galvanized barbed wire, cents per lb	3.35
Galvanized wire, ordinary, cents per lb	3.15

Waste—New York

Waste, wool, cents per lb	18.
Waste, cotton (100 lb. bale), cents per lb.:	
White	17.25
Colored	13.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb	10.4
White lead in oil (100 lb. keg), cents per lb.	13 2
Turpentine (bbl. lots), per gal	$0.665
Putty, 100 lb. tins, cents per lb	5.725

Wire—New York

Copper wire, cents per lb	18.62
Rubber-covered wire, No. 14, per 1,000 ft.	5.75
Weatherproof wire base, cents per lb	19.255

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	$2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.375
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, ¾-in., cu.yd., delivered	3.375
Sand, cu.yd., delivered	2.125

Old Metals—New York and Chicago

Heavy copper, cents per lb	13.375
Light copper, cents per lb	11.625
Heavy yellow brass, cents per lb	7.875
Zinc, old scrap, cents per lb	3.375
Lead, cents per lb. (heavy)	5.125
Steel car axles, Chicago, net ton	$16.25
Cast iron car wheels, Chicago, gross ton	14.25
Rails (short), Chicago, gross ton	17.50
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	8.25

Japanese Electrification Plans

Electrification of nine sections of five trunk railway lines has been decided upon by the Japanese Ministry of Railways. The projects will be spread over a period of six years, and will cost approximately 40,000,000 yen. All sections of the railway throughout the country which have numerous tunnels or heavy grades will be electrified. This plan is the result of a considerable number of studies which have been made and is based upon the original purpose to electrify all trunk lines situated near large cities.

Included in the plans is the construction of a new electric line connecting the present Ochanomizu station of the Yamanote line, which is the inner loop of the line encircling Tokyo with the Ryogoku railway station, and of laying parallel tracks between Ryogoku and Kameido, together with their electrification. This construction will cost more than 4,000,000 yen. This is to be an elevated railway and will cover a distance of 2,400 m. Three new bridges will be constructed, one of which will be 169 m. in length.

TRADE NOTES

Sullivan Machinery Company, Chicago, Ill., has elected Arthur E. Blackwood president of the company, succeeding the late Frederick K. Copeland. Mr. Blackwood has been with the Sullivan Machinery Company for the past 32 years. He came to the company shortly after graduating at Toronto University as a mechanical and electrical engineer, and later became manager of its eastern sales department with headquarters in New York, which office he held for 23 years. He was then elected a director and first vice-president in charge of finances, and moved to the company's head office at Chicago, where he continued in close relation with Mr. Copeland until the latter's death in November of this year.

King Company, manufacturer of cast iron street lighting products with manufacturing plant and general offices located at Sheffield, Ala., and sales office at Chicago, Ill., has reorganized whereby general and sales offices will be located at Canton, Ohio, with manufacturing plant at Sheffield, Ala., as at present. The Union Metal Manufacturing Company, of Canton, Ohio, has entered into an agreement with the King Company to sell all of its products, and the General Electric Merchandise Distributors' Association and Graybar Electric Company will act as agencies for the Union Metal Manufacturing Company in selling both steel and iron lighting standards.

Shepard Electric Crane & Hoist Company, including its Sprague Division, and the Niles Crane Corporation have combined under the corporate title of Shepard-Niles Crane & Hoist Corporation. The new corporation is in a position to provide a line of standard and special traveling cranes and electric hoists. The Shepard plant at Montour Falls, N. Y., and the Niles plant at Philadelphia, Pa., will be continued in operation for the production of the types of equipment for which their facilities have been designed. The main office will be at Montour Falls, N. Y.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
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H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL,
Publishing Director

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A Constructive Move in Seattle

AFTER ten years of municipal ownership during which the people and city officials of Seattle have witnessed the gradual disintegration of their street railway property with little more than casual interest, the attention of the community is again focused on this issue by the report recently rendered by the Traffic Research Commission. Voluntarily organized some two years ago, the commission proceeded to employ able engineering counsel which has labored continuously and consistently to solve not only the pressing problems of the moment but to suggest as well a plan of rapid transit and urban transportation development that would serve the city for many years to come.

Briefly, the report submitted to Mayor Edwards and the City Council provides for a system of rapid transit subway and elevated lines, supplemented by a rehabilitated system of surface lines and feeder bus routes, the aggregate cost of which is estimated at approximately $20,000,000. In the course of its study the commission reviewed the financial condition of the present municipal railway system. Concluding that with steadily decreasing patronage the property could not possibly meet its obligations, the commission recommended that the purchase contract be rewritten so as to provide for a reduced annual payment. Believing that the lost patronage can be regained by providing improved facilities, the commission suggests that a modern rapid transit service be co-ordinated with the existing street railway. The commission decides that the trolley car is still supreme as a city transportation unit and must continue to carry the burden of the load. Surface cars are to be retained except on the one main thoroughfare through the business district under which the subway is to operate. The motor bus is recognized as a valuable auxiliary vehicle but is discarded as a substitute for rail service.

Perhaps the most interesting and encouraging phase of the general plan is the proposal that the enterprise be financed by special assessment against benefited property. The city is to be divided into districts, each of which is to be assessed for the cost of all permanent way and stations according to the estimated benefit to be received. Twenty-year assessment bonds are suggested to meet this obligation. The fare is to be so fixed that the rider will pay only for rolling stock and actual expenses of operation, maintenance and depreciation. Another bond issue, to be paid, together with interest thereon, out of receipts, is proposed as a means to finance necessary rolling stock.

Setting aside all question as to the advisability of Seattle burdening itself with so stupendous a financial load at this stage of its civic development, it is refreshing to note that, unlike certain proposals which have been made in the past, the report bears the sponsorship of a substantial element in the business community and shows evidence, furthermore, of sane, straightforward and constructive engineering thought. While the situation is as yet too complex to admit of any sweeping generalization, the return to constructive direction after having floundered around for a decade under the questionable guidance of political expediency, gives rise to the hope that Seattle's experiment may yet be worked out constructively.

New York's New Traffic Plan Starts Well

WITH an appropriately theatrical flourish, Police Commissioner Whalen's new traffic regulations were inaugurated in the theater district of New York City last Monday evening. Flashlights blazed and cameras clicked as the new plan went into effect. Despite its overly spectacular introduction, however, the experiment proved to be a marked success and those who came to scoff remained to praise.

More drastic than anything which has been tried before, the new scheme includes the elimination of all parking in the theatrical district, pedestrian control, prohibition of vehicular turning movements, a ban on commercial vehicles and cruising taxicabs, and last but not least, a shorter traffic signal cycle. As a result of these regulations street capacity was increased fully 100 per cent. Automobiles and taxicabs moved quickly four abreast instead of crawling slowly through a narrow lane. Delays at intersections were cut in half. The street cars moved at a speed reminiscent of the old days before congestion.

Despite the ban on cruising, no serious difficulty was experienced by hotel guests or restaurant patrons in securing taxicabs, as the number discharging passengers was ample to accommodate all the people who wished to leave the area. From the big railroad stations came reports that fewer travelers than usual missed trains. Practically everyone seemed pleased by the result of the experiment.

The first success of the new plan was due in no small measure to the energetic work of the large police force on hand. How well it will work when the 400 extra policemen have been returned to their normal duties is a question. Probably, it will be necessary to retain permanently a considerable number of these extra men. This, however, will be a small price to pay for an important improvement.

It is a question, too, whether the same regulations can be extended advantageously to other congested districts. Some modification is likely to be needed before this can be done. One point, however, stands out in bold relief. Traffic moved much faster with the short signal cycle. This change could be made immediately to advantage elsewhere throughout the city. While it can hardly be said that New York's traffic problem has been solved by

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this single experiment, certainly Commissioner Whalen deserves hearty praise for his initial step in that direction.

There Is No Magic to Modernization

EVIDENCE continues to accumulate as to the value of modernization of the electric railway, and particularly as to the possibilities obtainable with new equipment. Even where the territory is so small that critics can see no possibilities, good management has been able to find a way out. Perhaps one of the most striking examples of this is seen in the record of the Lafayette Street Railway. For years it had been moribund. The physical property was in bad shape, the schedules were slow and uncertain, and the riding was limited. The company did not even own its cars, renting the most of them from another railway system. As a result of its difficulties the company went through a receivership with a drastic reorganization at the end, a new company being organized in March, 1922.

Fortunately the new management saw possibilities for service, even in a community of only 32,500 people. Immediately fifteen new cars were purchased, and within the past four years, three more have been added. The track has been rebuilt and the lines rerouted so as to eliminate tiresome waits on turnouts, and the schedule speed materially increased. The interurban cars that enter the city have been rerouted so as to eliminate interference with the city cars, and other things have been done to improve the regularity of service.

The effects of the new policy were almost immediate. The number of passengers increased more than 50 per cent the first year, and the growth in traffic has continued. Even though the fare was reduced from 7 cents to 5 cents there has been a material increase in revenue. Costs of operation have gone down greatly, due in large measure to the substitution of the lightweight cars for the heavy ones formerly used, and to the substitution of one man for two men. Despite the higher speed the accidents are fewer, the expenditures in this account for the past six years averaging less than one-quarter what they were under the old management.

Results such as these, while they may appear spectacular, can be obtained when the management has a realization of what the public wants and what it is willing to pay for, and then has a determination to furnish that service in the best manner possible. There is no magic to it.

Wanted: Young Blood

EVERY now and then a forward looking management, realizing the need for a thorough revision and modernization of its facilities and methods, starts out to find a young engineer capable of studying its system and bringing to bear upon current problems a fresh point of view and an analytical mind.

There is, however, a marked scarcity of young engineers of this type in the ranks of community transportation. The job requires an engineering background, supplemented with five or six years of electric railway experience—preferably divided among several departments. The man must have vision, imagination, and a knowledge of successful practices in the industry. He must have the ability to make a study of the practices of a given property with a view to eliminating inefficient methods and obsolete facilities. At the same time he must be able to keep in mind the major problems without losing himself in minor considerations of no great consequence. Finally, he must sell himself and his plans not only to the executives, but to the entire organization.

Such a man must have the courage of his convictions. He will encounter discouragements and even ridicule. He must be competent to pit his ideas against the prejudices of men with many years of practical experience. He should not discard a good plan just because he is told that it is impracticable. The "old timer" is inclined to brush aside suggested changes without giving them sufficient consideration. The industry has failed woefully to raise young men of this type. Those who start out to get experience are discouraged by lack of opportunity and inadequate pay. Does it not demonstrate that there are many electric railways that are not properly conducting one of the most important phases of modern industry—research? When, therefore, a progressive management seeks the type of man just described, the search is a long and difficult one. Frequently the qualifications demanded far exceed the limits of the remuneration offered. Does not this situation, therefore, indicate cause for considerable concern regarding an important phase of transportation management?

Stability of Costs Continues

STABILITY of financial elements in the industry has been most marked during the past few years. Following the violent upsets caused by the war, costs and fares have settled to a consistent level. This is very clearly shown in the charts prepared by Prof. Albert S. Richey and published in his article in the Jan. 12 issue of this paper. The maximum range of the various index figures over a five-year period has been far less than in any similar time in recent history. The greatest fluctuation in costs has been in operating materials, which have not in any year during this period varied more than 5.5 per cent from the average.

While construction costs have been almost stationary since the middle of 1923, it must be remembered that they are now established at approximately double prewar values. This in itself is sufficient explanation for the reluctance of managements to authorize projects unless there is every prospect of a fair return on the investment. It also explains why it frequently is found desirable to make extensions to service with the bus, where the initial investment is relatively small, rather than with the street railway, where the initial investment is relatively great. When the use of buses has demonstrated that the business is sufficient in volume to justify the construction of tracks, then the change can be made.

Stabilization of costs of construction and operation has, however, made it possible for the industry to plan with more confidence for the future than could be done when prices were fluctuating wildly. Few investors are willing to put their money into an enterprise with the knowledge that the physical plant may decrease rapidly in value due to a sudden recession in costs. Today, with small prospect of violent fluctuation in prices, it is possible to forecast the future with greater confidence and to put money into permanent construction where it can be justified. Expenditures made during the past year for track construction and rehabilitation, and similar expenditures planned for the present year, indicate that alert managements see the wisdom of this point of view. When the present uncertainty in the minds of

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some operators as to the trend of car development has been cleared up, there seems to be no reason why there should be any risk, from the standpoint of money values, in the purchase of whatever equipment is necessary to round out the service needed to fill the requirements of the traveling public.

In two of the index figures definite trends are noticeable. These are fares and wages, both of which have shown steady advances for the past six years or longer. Relatively, the increase in wages is materially greater than the increase in fares, so that, while other elements of cost have not fluctuated greatly, the higher labor bill has absorbed most of the increment of revenue. As Professor Richey points out, the increase in wages is out of all proportion to the increase in the cost of living, the "real wages" of electric railway trainmen being 41 per cent greater than they were in 1913. In other words, the employee is able to increase his standard of living 41 per cent over what it was in the earlier year. This change should make possible the employment of men of a higher type than operated the cars fifteen years ago. Undoubtedly this has happened on many properties.

Not Afraid to Proclaim Its Ideals

OUT of a situation at one time discouraging to contemplate, the Eastern Massachusetts Street Railway has gradually worked its way to a place that has made the reclamation of the road a source of gratification to the management. The process has been a slow one, but it has been sure. For ten years the road has been under public trustees, and it started on Jan. 15 on another period of this kind to run for five years. The road's record has not been established without the promptings of a set of ideals, best reflected, perhaps in the New Year statement of the company republished elsewhere in this issue. They are ideals not foreign to most electric railways, but it is unusual to see them proclaimed publicly and put forward so militantly. The first had for its object the avowed intention of the company to continue to deserve the confidence and co-operation of 140,000,000 car and bus riders annually in nineteen cities and 54 towns in Massachusetts, and the second has for its object to convince the public completely that it is cheaper, speedier, safer and more comfortable to ride in the company's cars and buses than for the public to use its own automobiles.

So the list continues. There is no need to repeat it in full, or even to summarize it. But it is of interest in that it reflects the attitude of the company toward its patrons and puts its own men publicly on record as obligated courageously, truthfully and intelligently to meet all unjust criticisms of the road and to act promptly and decisively upon all well-founded complaints and advice for improvement of service. Also to follow up the campaign among trainmen for courtesy founded upon the most effective business maxim, "The customer is never wrong."

Particularly is the management to be commended for the attitude it has taken in regard to the parking evil. The statement may well be pondered by other railway men as an example in the public relations field which sets forth the obligations of the railway, and does not hesitate resolutely to call to public attention conditions the continuance of which the management feels work in some cases to prevent the approach of the service ideals by the railway to which it is publicly pledged.

Fuel Oil Tests Apparently Successful

EXPERIMENTS have been in progress for several years with a view to using low-grade fuel oil as a substitute for gasoline in automotive engines. For that reason particular interest attaches to the recent announcement by the Philadelphia Rapid Transit Company that it has developed with the co-operation of the manufacturer, a satisfactory device for accomplishing this purpose. The company proposes to equip all of its 570 city and interurban buses for using fuel oil within the present year. The practicability of the device will thus receive a thorough test on a large scale.

The chief advantage of using oil is its low cost as compared with gasoline. With fuel oil selling at 8 cents or less per gallon this difference is a substantial amount. According to P.R.T. engineers, the saving is 29 per cent in cost and 5½ per cent in quantity.

On the other hand, if fuel oil is widely used in automobile engines, it is probable that the price will rise—perhaps almost to the level of gasoline prices. Although the cracking of oil can be done cheaply in the large refineries, there will always be a cracking cost between fuel oil and gasoline which cannot be entirely offset by the value of the by-products obtained. Another consideration is the fact that crude oil has a larger B.t.u. value per gallon than gasoline and can be burned in an internal combustion engine with little waste.

There is little to choose between fuel oil and gasoline regarding convenience of supply. The device being used by the Philadelphia company uses a 38-42 Baumé oil, which is available as a furnace oil in practically all cities and which dealers deliver to large consumers just as they do gasoline. Furthermore, the buses can operate on either gasoline or fuel oil without any change of carburetor or exhaust settings. Thus if a bus should need to replenish its supply of fuel before returning to the garage, gasoline could be used.

Some doubt has been felt by automotive engineers that fuel oil might have a detrimental effect on the engine and consequently increase the maintenance cost. Of course the fuel oil does not actually enter the engine, but is vaporized in an outside retort. After operating a bus on this fuel for 250,000 miles, the P.R.T. has not noticed any difference in the engine and has maintained it on the exact same schedule as the buses which are using gasoline.

Whether the oil-burning engine will be as flexible as the gasoline engine in traffic remains to be seen. Thus far the experiments seem to indicate an entirely satisfactory rate of acceleration.

It is not likely that the development of this apparatus for using fuel oil in place of gasoline will revolutionize automotive engine design. Manufacturers of private automobiles have investigated this question thoroughly and have come to the conclusion that gasoline is a more satisfactory fuel. To the individual automobile owner the price of fuel is a comparatively unimportant factor. With the bus operator however, the situation is quite different. A saving of only a few cents per gallon in his fuel bill amounts to a tremendous sum in the course of a year. If such a saving can be made by means of this device for burning fuel oil its popularity is assured. Certainly this is an experiment that was worth trying, and in making it the Philadelphia Rapid Transit Company has made a substantial contribution to the progress of the industry.

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Modernization Increases Riding in Lafayette

Adequate, fast and comfortable service, operating economies, and an intensive cultivation of good will are factors which have contributed to the success of the local street railway

Looking east toward Lafayette, Ind., across the levee and bridge spanning the Wabash

LAFAYETTE and West Lafayette, Ind., on the banks of the Wabash, with a combined population of only 32,500 have a thoroughly modern street car system which is making money—sufficient to maintain equipment and property in first-class shape and to provide a fair return on the investment. Back in 1913 the system, originally independent, was being operated as part of the interurban line of the Fort Wayne & Northern Indiana Traction Company. It was equipped with rented cars and burdened with a bonded indebtedness of $225,000. The years immediately following were accompanied by a succession of difficulties. The war brought rising costs. Influenza laid a paralyzing hand on traffic. A bad flood carried out the principal bridge between Lafayette and West Lafayette, thereby breaking the traffic connection with Purdue University and the residences of its 3,000 students. Then a few enterprising automobile owners began to carry passengers over the remaining bridge for a 5-cent fare. The number of these jitneys doubled and trebled as the business proved lucrative, and the restoration of the main bridge—to which the street car company contributed approximately $35,000—only enhanced their revenues.

Net earnings of the company declined steadily and after the default of bond interest, taxes, and stipulated payments on the new bridge in 1919, 1920, and 1921, the creditors petitioned for a receiver. Cars and track were in bad shape, schedules were slow, transfer connections uncertain and through routing of passengers between the two municipalities unheard of. If people used the street cars at all it was only because they had to.

In March, 1922, the property was offered at public auction. An old amusement park brought $6,000; the local public utility paid $95,000 for the railway power plant, and the street car property and such equipment as had not been rented finally were purchased for $75,000 by a group of local citizens. The capitalization of the new company, the Lafayette Street Railway, Inc., was fixed at $300,000, of which $200,000 was in twenty-year, 7 per cent bonds sold at par, and $100,000 common stock.

A program of new cars, rerouting of lines, and service improvements was commenced coincident with the passage of ordinances by Lafayette and West Lafayette officials which barred the jitneys from the streets used by the company's cars. Tracks were relaid with heavier rail where needed, double track extended on the levee

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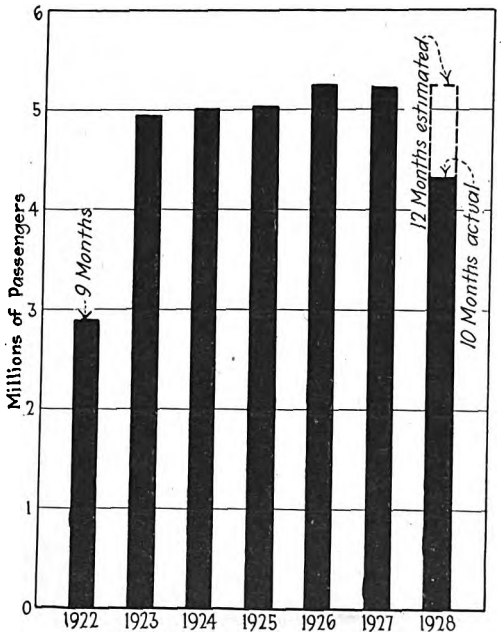


Total passengers carried in 1928 are expected to equal or better all previous records

is at present obligated only to maintain the pavement between its tracks. Except for such expense as is incurred by the extra heavy foundation for paving in those streets through which its tracks run, the company does not have to pay for the initial paving installation or its renewal. The paving of North Salisbury Street in West Lafayette which has just been completed is illustrative of the working of this arrangement. The railway availed itself of the opportunity presented by the tearing up of the street to renew with 80-lb. T rail approximately 3,000 ft. of its track on this street at a total cost of $16,872 for new oak ties, rails, concrete, special work and a bonus for speedy completion of the job. The actual paving cost to the railway was only that involved in the extra excavating and the heavier foundation work required under the tracks.

Interurban Terminal Changed to Eliminate Congestion

Formerly the interurban cars of the Indiana Service Company from Fort Wayne and the interurbans from Indianapolis of the Terre Haute, Indianapolis & Eastern Traction Company were accustomed to discharge and load passengers at the Public Square. This procedure delayed the local cars. One of the first moves of the new management was to locate an interurban station at Ninth and Ferry Streets adjacent to its carhouse and only one block removed from the main business thoroughfare, where separate tracks could be employed to take care of this business. Interurban cars entering Lafayette at the present time proceed directly to this terminal before discharging their passengers or baggage.

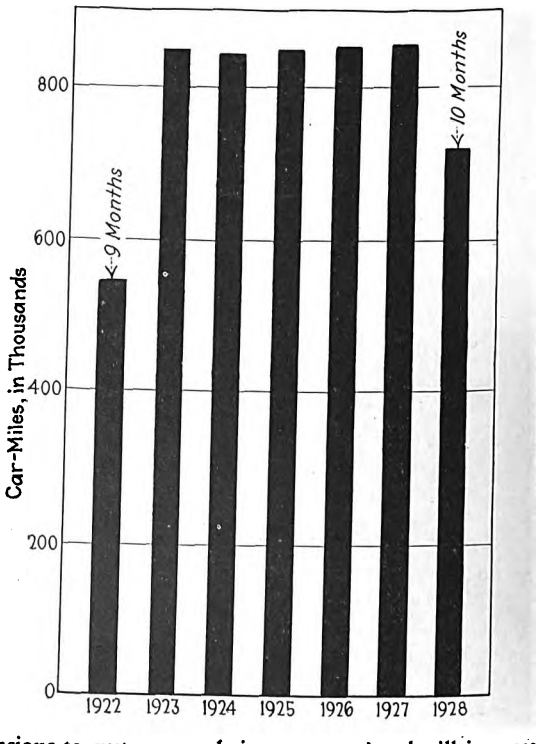
During the early part of the present year all the cars on the system have been thoroughly overhauled, motors and control equipment restored to good condition and the cars themselves cleaned and painted inside and out. Special attention has been directed to keeping the overhead lines in good shape with a view to minimizing service interruptions. New trolley wire replaces old before the latter becomes dangerously worn; switch frogs are frequently inspected and replaced if necessary; turnouts are carefully checked up, and new span wires are substituted for those in poor condition. Slack is taken up regularly every spring and restored with the coming of cold weather. Section insulators are replaced regularly every four months. In this way much of the usual grief and delay caused by trolley breaks is anticipated before it occurs.

Accidents Greatly Reduced

Electric gongs are used on all cars and, it is believed, have served materially to reduce the number of vehicular accidents and to clear the right-of-way for the movement of the cars. Lafayette, like any other city of equivalent size, has its downtown traffic and parking congestion. According to figures compiled by the Lafayette Motor Club, motor car registrations have increased approximately 102 per cent in the city and adjacent territory during the past seven years. The increase in population has been about 19 per cent.

In spite of increased speed of operation and a much stricter interpretation of what constitutes chargeable accidents, the sum expended annually in the settlement of property damage and personal injury claims has been reduced greatly. Using the sum spent in settlements in 1922 as a yardstick with an index figure of 100, the expenditures for damages during the succeeding years have been 44.6, 36.3, 6.7, 11.8, 28.3, and for ten months of 1928, 3.0 per cent. Since the 1922 figure is for only nine months, the percentages for the following years are in reality even better than the comparison would indicate.

Whereas in the first nine months of 1921 the old company carried 2,045,172 revenue passengers, the new company carried 3,094,018 in a similar period in 1923 and 3,098,516 in 1924, an increase of over 50 per cent. This advantage was improved materially in 1926 and 1927 with a still further increase anticipated for the present year. The gain has more than offset the reduction in fares from 7 cents to 5 and the introduction of the free transfer. The street car company has received the hearty



Extensions to system now being contemplated will increase the total car-miles operated in the coming year

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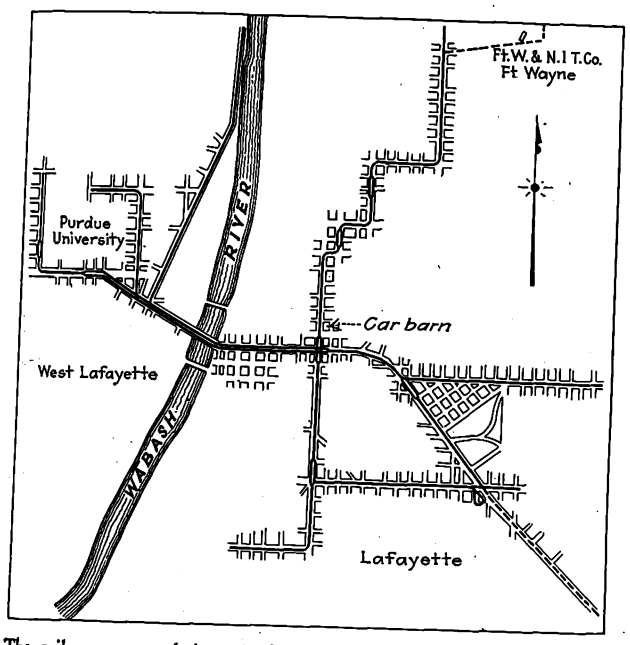


The railway system brings Lafayette and West Lafayette close together in social as well as business affairs. Total of main and second tracks and sidings is 16.4 miles

co-operation and patronage of the public simply because, as at present rendered, the service meets the specifications of what the populace considers attractive and convenient transportation. The street cars have been made easy to use and the railway management by a variety of public contacts and pronouncements has let it be known frequently that the communities' support has been appreciated. Promises made by the new management have been scrupulously fulfilled and the confidence of the people obtained and strengthened during the nearly six and one half years of local ownership and management of the railway utility.

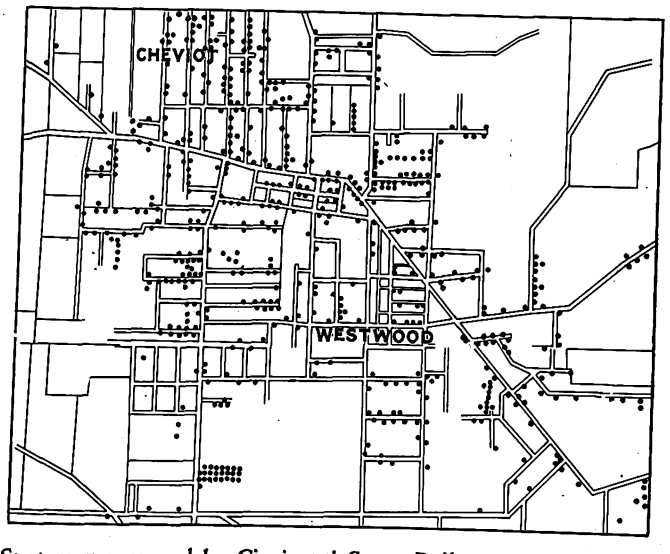
Briefly recapitulated, the factors which have apparently made for success in the operation of this small street railway have been the elimination of the jitney, the substitution of purchased power for that formerly generated in the railway plant, the immediate introduction of new one-man cars, the through routing of Lafayette and West Lafayette car lines with some rerouting of the latter, the general rehabilitation of track and overhead with purchase of electric switches and automatic block signals, the determination to give adequate, speedy, comfortable and courteous service under all circumstances, and, finally, the mutual good will arising from local ownership and management.

Buses Solve Unusual Traffic Problem in Cincinnati

RECENTLY the Cincinnati Street Railway was confronted with the problem of providing transportation for a new high school which was located in a sparsely settled section. This location was chosen by the Board of Education in anticipation of future development, but at the present time is located between two other residential sections, Price Hill on the one side and Westwood-Cheviot on the other. Operation of eight Twin Coaches on special routes has successfully solved this problem.

Cincinnati is a city of many hills with the residential sections on the highlands away from the basin or business section of the city. This residential development has been along the arteries and ridges and hills expanding in a fan-shaped area from the central district. The transportation system naturally was developed to connect these different residential sections with the business center of the city as these arteries formed the natural course of travel.

The location of the new high school on the outer edge of the fringe of the fan-shaped residential development bore no relation to the then existing systems of transportation. Naturally a great deal of pressure was brought upon the Cincinnati Street Railway to connect



Spot map prepared by Cincinnati Street Railway to show homes of high school pupils in Western Hills section

Fleet of Twin Coaches which handles Cincinnati school traffic

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the outlying residential sections with a car line passing in the vicinity of the new high school, but as there was very little natural interchange of traffic between these two communities, each of which had its direct connection with the business center of the city, it did not appear to be advisable to go to the expense of constructing a car line of 2.5 miles merely for serving the high school for two very brief periods each school day. Wishing to co-operate in every way possible in what it regarded as a local transportation problem, the Cincinnati Street Railway set about to devise ways and means of handling this passenger movement, but decided to employ buses for the purpose.

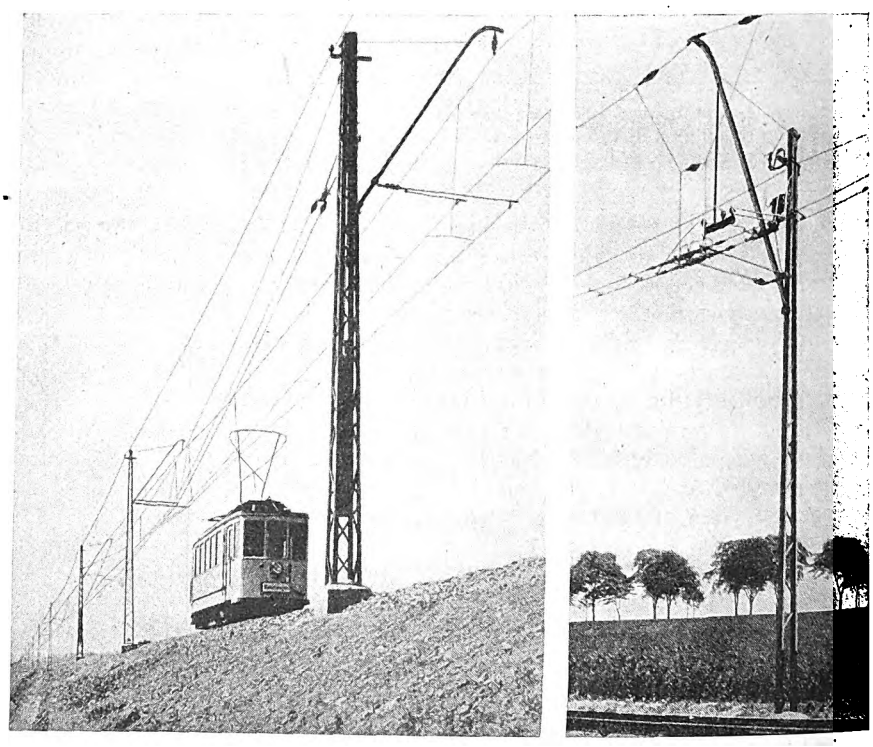
As the district which it was proposed to serve included a considerable area, Joe R. Ong, transportation engineer of the Cincinnati Street Railway, procured from the high school principal the names and addresses of every pupil living within the Westwood-Cheviot section. With this information available, maps of the district were prepared, showing with a dot the location of each child's home. The map was then studied carefully and routes laid out which would serve the greatest number to the best possible advantage. No attempt was made to have door-to-door pick-up, but regular stopping places at the corner along the route were used for boarding and alighting passengers. Eight distinct routes were selected, each served by one of the large capacity Twin Coaches which were purchased by the company for this purpose.

The schedules provide for each bus to arrive at the Western Hills High School at approximately 8:10 to 8:15 a.m., from which point they proceed to the Elder High School and the Seton Academy, arriving there about ten minutes later. In the afternoon the process is reversed, with the buses starting from the Elder High School and proceeding by way of the Seton Academy to the Western Hills High School, where they arrive in time to leave at about 3:15 p.m. Due to the length of the route it is only possible to use each bus for one trip morning and evening, except that one bus returns for a 4:15 trip from the school for those who have stayed late for orchestra or band practice, dramatic work or to make up deficiencies.

The school fare in Cincinnati is 5 cents, and the service, which has the approval of Edgar Dow Gilman, Director of Public Utilities, is arranged for in the city-control service-at-cost franchise under which the Cincinnati Street Railway is operated. The original plan for service to the school, as proposed by the school authorities, contemplated a double-track car line before mentioned, construction of which would have cost approximately $300,000, but the employment of buses was finally decided upon as a more favorable solution for the students in the Westwood-Cheviot areas. The Cincinnati Street Railway did make an extension of its Warsaw Line from Price Hill to the vicinity of the new school, so that an extension of approximately $\frac{3}{8}$ mile adequately cared for the students coming from the Price Hill section. The service to the others by the use of buses has proved entirely satisfactory. During the summer months the buses are used in handling traffic to a near-by amusement resort.

Double Trolley Catenary Construction

THE accompanying illustrations show a novel form of catenary construction with two trolley wires supported from a single messenger. They are on a section of track belonging to a high-speed German electric railway between Mettmann and Wülfrath in the Ruhr district, not far from Düsseldorf and Essen. The road is a 750-volt line, operating over city track at the termini, and using bow collectors. Most of it is single track. Two overhead wires are used, as in this country, partly for additional conductivity and partly to save the necessity of installing overhead frogs at the beginning and end of turnouts.



Novel overhead catenary construction on German interurban railway

Two trolley wires are used, and the overhead construction is divided mechanically into sections, as shown at the left, and electrically in sections, as shown at the right.

The first illustration is also interesting because it shows the method of dividing the overhead line mechanically into sections, the tension on each section being regulated by a pulley and counterweight. One end of each section is dead-ended to an anchor pole. Two poles of this kind are shown in the illustration. The second view shows a section insulator and the method of protecting the sections against lightning discharges by a horn arrester which is carried on the pole. The two pictures show that the mechanical sections are not co-terminous with the electrical sections.

The catenary construction is not used on all parts of the line. On other sections flexible brackets are employed. The line is part of quite an extended city and interurban railway company known as Mettmanner Strassenbahnen, G.m.b.H.

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New Group of

Standardized Cars Designed

J. G. Brill Company develops eight distinct electric car models, six for city service and two for interurban. General features of these designs outlined at New York Electric Railway Association meeting

By George Frey

General Sales Manager J. G. Brill Company, Philadelphia, Pa.

FOR the past few years the subject of modernization has been foremost in our minds. Every-day luxuries, if we may call them such, and the advent of individual transportation have taught us that we must develop street cars in keeping with the times. Our combined industry has left the worst behind it. The time has arrived now to modernize the street railway, and it is going to be done.

In keeping with the general trend and believing that the electric railways need rolling stock which will attract revenue-producing passengers and at the same time afford necessary efficiency and economy in manufacture, operation and maintenance, the J. G. Brill Company has developed a new line of standardized cars. Uniformity in design of general, sectional and end construction under this principle has the economic advantages that naturally attend mass production manufacture, such as lower first cost and the stocking of maintenance parts, either by the railway store department or the manufacturer.

The new line of cars was developed after a complete analysis and study of the railway transportation needs in various classes of service. Any character of electric railway transportation up to multiple-unit train service comes within its range. The complete system includes six types of city cars and two types of interurbans. The city cars are classified as single-end, four-wheel; double-end, four-wheel; single-end, eight-wheel; double-end, eight-wheel; single-end, eight-wheel, center-exit; and single-end, twelve-wheel, duplex articulated. The interurban cars are classed as single-end, eight-wheel, high-speed passenger; and single-end, eight-wheel, high-speed passenger and merchandise dispatch. The single-end cars appear to be the most desirable from the standpoint of weight, carrying capacity, general arrangement, convenience and maintenance costs.

Details of the Car Body

The car body frame is constructed of metal, designed to withstand severe operating and climatic conditions and speeds up to 60 m.p.h. This construction is somewhat stronger and heavier than is theoretically necessary to withstand collisions and side-swipes, and is sufficiently strong to carry three times the seated load. The metal frame is filled or furred with wood, treated with preservatives, to receive the interior finish and appliances. The wood framing, incidentally, aids in reducing noises to a minimum. The general cross-section dimensions of the car body are given in Table I.

The bodies have curved lower side girders, with a single sweep from the belt to the side sill, and a skirt below the side sill. Double longitudinal battens at the belt and skirt give a streamline effect for painting. The letter panels are deep, and all window sills are on the same horizontal plane. The windows are wide and single, and are designed to raise. The crown of the arch roof is 14½ in. These body proportions and details of design, with 26-in. or 28-in. wheels, create a pleasing general exterior appearance.

Both vestibule ends are alike to reduce the variety of replacement parts and to simplify manufacture. They are of the automotive type, with two large center panes of glass slightly inclined and two small wing panes, with an overhead metal sun visor and a ventilator behind the visor. The end vestibule glass is stationary. The operator is seated at all times, which permits the horizontal lines of the body superstructure to continue around the ends similar to the side of the car, carrying out the streamline or balanced exterior effect. A rigid bumper is projected at each end for the protection of the headlight and to serve as an anti-climber. The vestibules are tapered from body to vestibule corner posts, adding to the balanced appearance. The tapering also reduces the projection of the doors when opened.

TABLE I—DIMENSIONS COMMON TO ALL THE UNITS

Height, floor to top of roof	7 ft. 6 in.
Height, floor to underside of ceiling	7 ft. 1⅞ in.
Height, floor to window sill	2 ft. 8 in.
Height, side window opening	2 ft. 5½ in.
Height of raised side window above window sill	1 ft. 1⅞ in.
Width over sides at belt rail	8 ft. 4 in.
Length of cross seats	2 ft. 11 in.
Width of aisle at cross seats	1 ft. 11 in.
Center to center of side posts	3 ft. 5 in.
Center to center of cross seats	2 ft. 7 in.

The floor is on the same horizontal plane from end to end of car, with no offsets or steps inside the car. The double-truck car has a 3-in. compound ramp from the edge of the step to the main car floor at the bolster. The floor proper can be of wood, covered with linoleum or rubber, or of wood, chanarch or truss plate, covered with Flexolith or Masticote. On account of wheel wash the wood covered with Flexolith or Masticote seems the most desirable.

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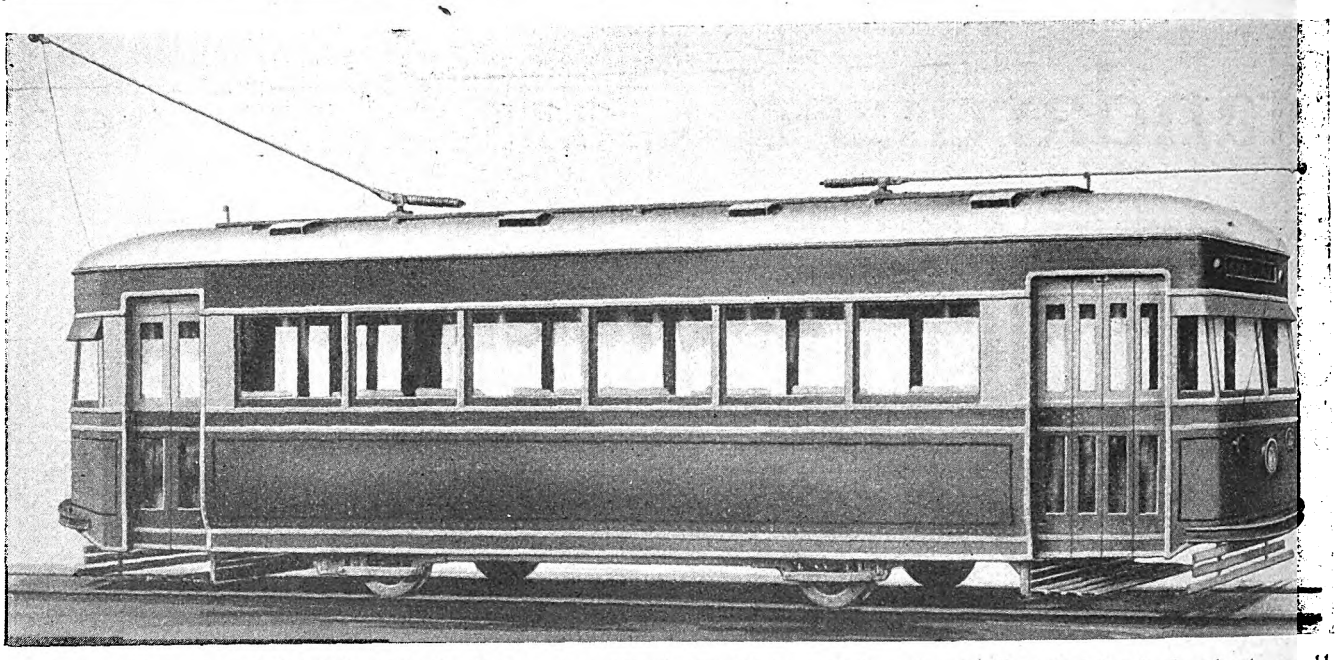


The four-wheel city car of the Brill standardized group uses a single truck but a radial motion is allowed each wheel and axle assembly by the long links at the journal boxes

Steps are of the stationary well type, with outward folding doors. On the four-wheel cars, the first step is $14\frac{11}{16}$ in. from the rail and the second step $13\frac{5}{16}$ in. high, making the top of the main car body floor 2 ft. 4 in. from the rail. On the eight-wheel or pivotal truck cars, the first step is 15 in. from the rail, and the second step 14 in. high. Inside the car there is a 3-in. compound ramp. This design of step eliminates the folding step and operating mechanism, thus reducing maintenance cost, first cost and noise.

Trolley bases are attached to running boards by cleats, insulated with rubber-covered bushings from the roof. The cleats are attached on the sides offset from the center, thus dissipating part of the trolley noise.

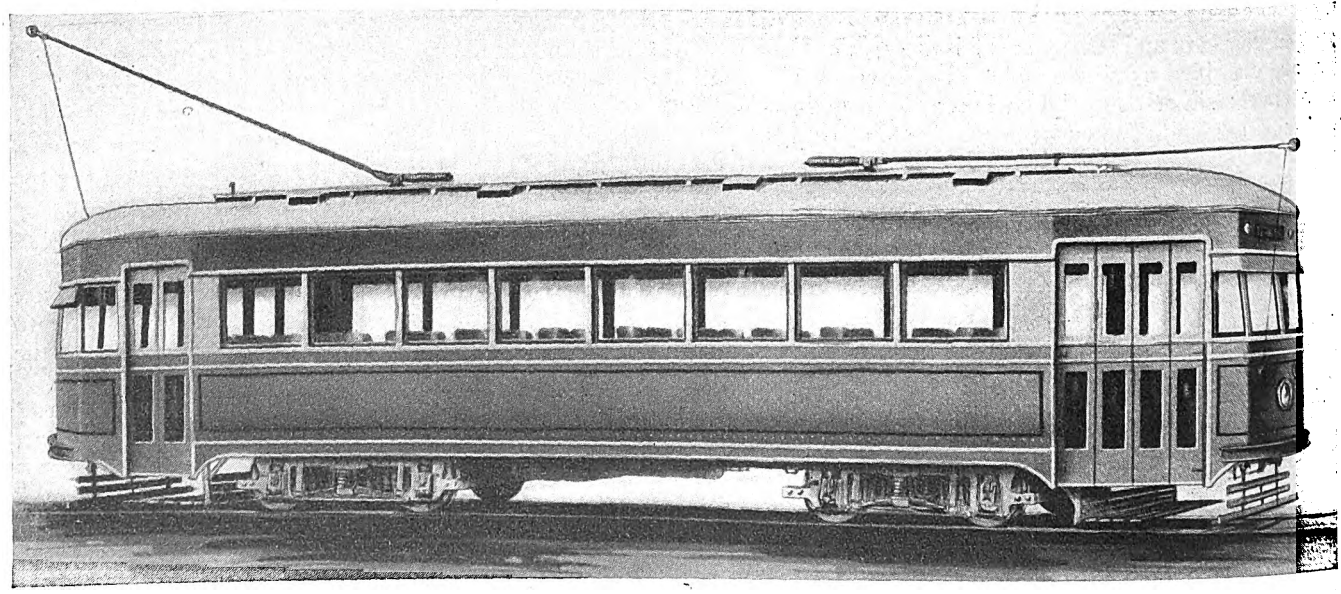
Light Material for Interior Trim

Side lining or wainscoting, and headlinings are of plywood composition or compressed rubber. All moldings are of metal. The interiors are painted instead of having a natural wood finish. The windows have metal frames and may be either stationary or designed to raise. The seats can be upholstered in rattan, leather or imitation leather or plush. Folding seats are provided for use in all idle doorways, thus increasing the available seating capacity. They also protect the step wells. The operator's seat is a reversible bucket seat, adjustable for height.

Illuminated roller signs are located directly over the middle vestibule windows, in the letter panel, with large letters and numerals. Bullseyes or tail lights are provided each side thereof to indicate whether a car is going or coming.

The door-operating mechanism can be of the pneumatic or electro-pneumatic type. Engines are placed overhead in cabinets over the doorways. Selective operation of the doors from the motorman's position is possible. Treadles at the remote exit doors are considered desirable, for they make possible a circulating load.

The tray type of lifeguard is used. Sand hoppers of liberal capacity, and operated by air, are placed



The appearance of this double-end, eight-wheel city type car is typical of all the units of the standardized line

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inside the car to keep the sand dry. The old foot gong has been eliminated and the hand-operated pneumatic horn substituted for it.

The fare collection device is installed in a position convenient to the operator and entering passengers to speed up loading and to reduce car standing time. Some thought is being given to the use of registering turnstiles on cars to relieve the operator of a portion of his fare collection duties. Enameled horizontal hand poles or the fixed type of steel car hand grips are provided over the longitudinal seats, while grab handles are attached to the backs of the cross seats. Pipe stanchions are considered necessary in doorways to serve as grab handles. They can be of aluminum or of porcelain enameled pipe with aluminum alloy sockets.

Electric cross-seat heaters are of the double-unit type, with thermostat control, as prescribed by heater manufacturers. Some consideration is being given to rheostat heating. The arch roof requires a number of low-level side roof exhaust ventilators with grills in the headlining. In addition, a direct flow of fresh air is obtained from ventilators behind the sun visors at each end of the car.

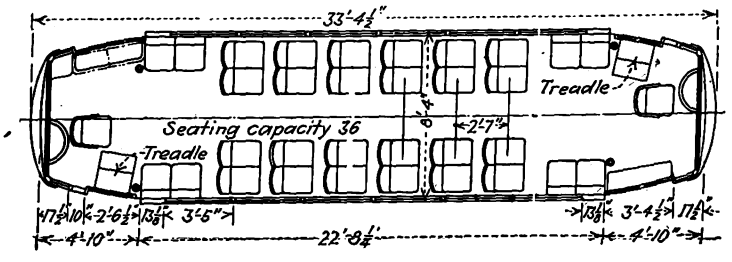
The "bath tub" type of draw curtain is provided behind the operator. The deep letter panel and low headroom features, however, do not warrant the use of side curtains.

The lights in the body are of the side, small dome fixture type, located near the center line of the cross-seats, so that seated passengers will get the full benefit of interior illumination. All the body lamps can be placed in one circuit by using a short-circuiting type of lamp. However, separate circuits are more desirable for the headlight and the sign, door and platform lights. Stop lights are considered necessary now on street cars and can be installed. An incandescent dash headlight is available with fresnel lens, which also illuminates the dasher, thus eliminating the expensive bank of lamps under the hood at the vestibule belt.

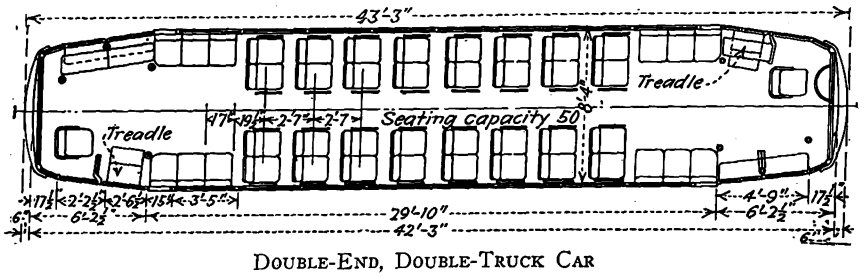
Aluminum alloys can be used in the cars to any extent desired. The company plans to build either all-steel cars, or cars with aluminum bodies and steel trucks, or cars with bodies and trucks of aluminum. The use of aluminum involves a greater first cost, but the decrease in weight effects lower operating costs.

Trucks for the Four-Wheel Cars

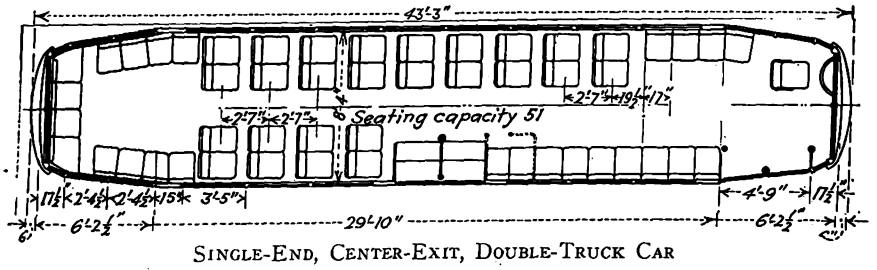
For car bodies up to about 34 ft. in length the four-wheel truck is practicable. The seating capacity and maximum load, however, are limited, as are the platform space and overhang. Also, the load per wheel is increased, the safety at high rates of speed is risked on irregular track and the riding comfort of the pivotal



Double-End, Four-Wheel Motor Car

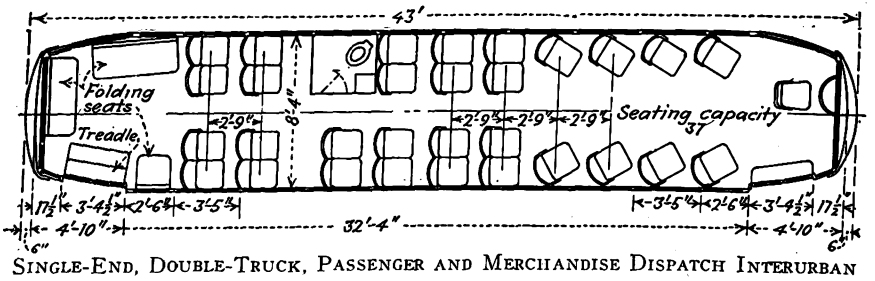


Double-End, Double-Truck Car

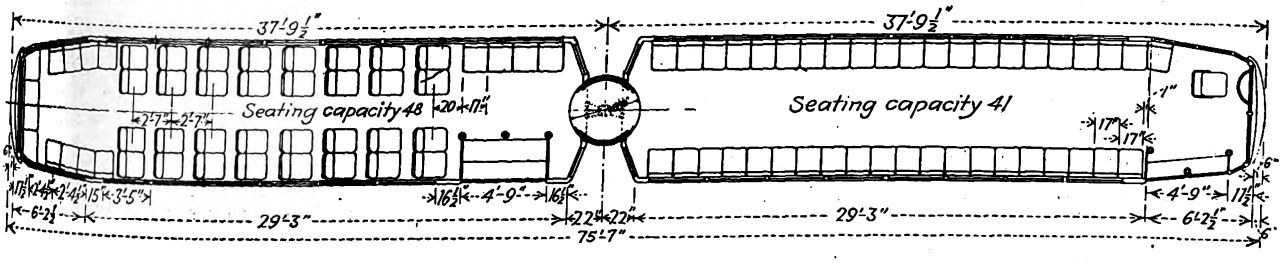


Single-End, Center-Exit, Double-Truck Car

The uniformity of design of the Brill models is shown by this group of illustrations, showing the floor plans of a four-wheel car; a double-truck, double-end car; a double-truck, single-end, center exit car; an interurban, and an articulated unit. Although a few general dimensions vary, many of them are common to all units



Single-End, Double-Truck, Passenger and Merchandise Dispatch Interurban



Single-End, Center-Exit, Articulated Car

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TABLE II—PRINCIPAL CHARACTERISTICS OF THE BRILL STANDARDIZED LINE OF CARS

Type of Car	Length Overall in Ft. and In.	Seating Capacity	Maximum Capacity	Number and Horsepower of Motors
Four-wheel, single-end	33—4½	42	100	2–50
Four-wheel, double-end	33—4½	36	100	2–50
Eight-wheel, single-end	43—3	53	160	4–25
Eight-wheel, single-end	43—3	53	160	4–35
Eight-wheel, double end	43—3	50	160	4–25
Eight-wheel, double-end	43—3	50	160	4–35
Eight-wheel, single-end, center-exit	43—3	51	160	4–25
Eight-wheel, single-end, center-exit	43—3	51	160	4–35
Twelve-wheel, duplex articulated	75—7	89	300	6–35
Eight-wheel, interurban, passenger car	43—0	39	100	4–50
Eight-wheel, interurban, passenger and merchandise dispatch car	43—0	37	100	4–50

eight-wheel car cannot be obtained. On the four-wheel car of the standardized line regular 28-in. solid wheels are used, pressed on and fixed to solid non-parallel axles. The wheelbase is 12 ft.

The radial motion allowed each wheel and axle assembly comes from long links at the journal boxes, which permit, under stress of centrifugal force, a movement in rounding curves. At the same time, the double bolt arrangement of these links does not allow this radial motion to be continuous. These double bolts exert a powerful influence, tending to return the wheel and axle assemblies to their normal position. Thus the wheel and axle assemblies are held to their normal position, in line with the car body, until there is exerted upon them some strong force, such as might be set up by the car body passing over bad irregularities or a curve in the track. The links then allow sufficient radial movement to guarantee smooth and comfortable riding. The bolts, however, oppose any continuous oscillation which might have a tendency to be set up. This arrangement allows the car to coast freely and eliminates the galloping motion.

Unit Assembly of Running Gear

The frame is of the composite type with rigid crossings to receive the motors, transmission and brakes. The entire running gear constitutes a unit assembly, designed for accessibility, convenient removal and minimum maintenance. The car body is suspended on four cantilever springs with a 19-ft. spring base. The far ends of these springs are shackled to the car underframe. The journals may be of the anti-friction bearing type, or of the plain wedge key type.

Two 50-hp. high-speed automotive-type motors, with four-point suspension, are mounted amidship of the truck, supported by crossings to the truck side frames. The first gear reduction, 3.25 to 1, is of the single spur type, directly connected to each motor and running in oil. A low-speed propeller shaft from the gear reduction unit turns a secondary bevel gear transmission at the center of each axle. The secondary transmission has a gear ratio of 2.5 to 1, giving a total reduction of 8.125 to 1. The bevel transmission also runs in oil. Its housing serves as a pivotal yoke giving radial action to the wheel and axle assemblies.

For braking, two external contracting air-actuated clasp drum brakes are employed on each axle, supported by the bevel gear housing. The total brake pressure of the drum brakes is equal to 100 per cent of the loaded car. In addition, there is one magnetic track brake on each side of the truck, supported by the truck side frame.

Conventional Trucks for Eight-Wheel Cars

Trucks for the eight or twelve-wheel cars are of the conventional four-wheel pivotal type. They employ 26-in. diameter solid wheels, pressed on cylindrical seats on heat-treated solid parallel axles of dimensions as recommended by the American Electric Railway Engineering Association.

Journals can be either of the anti-friction type or plain type. The swinging bolsters have guides which control the movement of the bolster. They also insure easy riding and dissipate side lash which is destructive to car bodies. Combination coil and plate springs are suspended from parallel swing links. The supports for the motors with single reduction drive are designed to make the electric equipment readily accessible and removable, and to insure perfect alignment. The shoe tread brakes have improved half ball hangers and automatic mechanical slack adjusters. All wearing parts are of hardened steel.

The conventional axle-borne type motors with single reduction are recommended for the pivotal eight-wheel or double-truck street cars. For the four-wheel cars, however, the high-speed motor is considered best. This type of motor with its necessary high reduction transmission adapts itself more readily to the running gear, which accounts for its selection. On certain of the models, either 25-hp. or 35-hp. motors can be mounted. These are the eight-wheel, single or double-end and center exit cars.

Foot operated electric control and air brakes are recommended for the new cars. The doors, signals and sanders can be operated with the hands, but the control and brakes should be foot operated. A space is provided in the lower left-hand corner of the vestibule for the pedals, and a cabinet is installed for the reverser and other operating switches. The hand brake should be of the high ratio gear or staffless type, with mechanical connections for braking of all wheels.

TABLE III—WEIGHTS OF ALL MODELS INCLUDED IN THE UNIFORMLY DESIGNED LINE OF BRILL CARS

Type of Car	Cars With Steel Bodies and Steel Trucks: Weight Complete	Cars With Steel Bodies and Steel Trucks: Weight per Seated Passenger	Cars with Aluminum Bodies and Steel Trucks: Weight Complete	Cars with Aluminum Bodies and Steel Trucks: Weight per Seated Passenger	Cars with Aluminum Bodies and Steel Trucks: Per Cent Saving by Using Aluminum	Cars with Aluminum Bodies and Aluminum Trucks: Weight Complete	Cars with Aluminum Bodies and Aluminum Trucks: Weight per Seated Passenger	Cars with Aluminum Bodies and Aluminum Trucks: Per Cent Saving by Using Aluminum
Four-wheel, single-end	26,195	622	21,870	518	16.5	19,645	469	25.0
Four-wheel, double-end	27,435	762	22,985	637	16.2	20,760	575	24.3
Eight-wheel, single-end, four 25-hp motors	29,865	563	24,695	466	17.3	22,565	425	24.4
Eight-wheel, single-end, four 35-hp motors	32,955	621	27,785	524	15.7	25,685	485	22.1
Eight-wheel, double-end, four 25-hp. motors	31,550	631	25,780	516	18.3	23,780	476	24.6
Eight-wheel, double-end, four 35-hp. motors	34,645	693	28,875	577	16.7	26,875	537	22.4
Eight-wheel, single-end, center-exit, four 25-hp. motors	30,765	603	25,455	499	17.3	23,325	457	24.2
Eight-wheel, single-end, center-exit, four 35-hp. motors	33,855	663	28,545	559	15.7	26,445	518	21.9
Twelve-wheel, duplex articulated	60,905	685	50,800	571	16.6	46,800	526	23.2
Eight-wheel, interurban, passenger	37,570	962	32,055	821	14.7	30,055	770	20.0
Eight-wheel, interurban, passenger and merchandise dispatch	37,470	1,011	31,955	863	14.7	29,955	809	20.0

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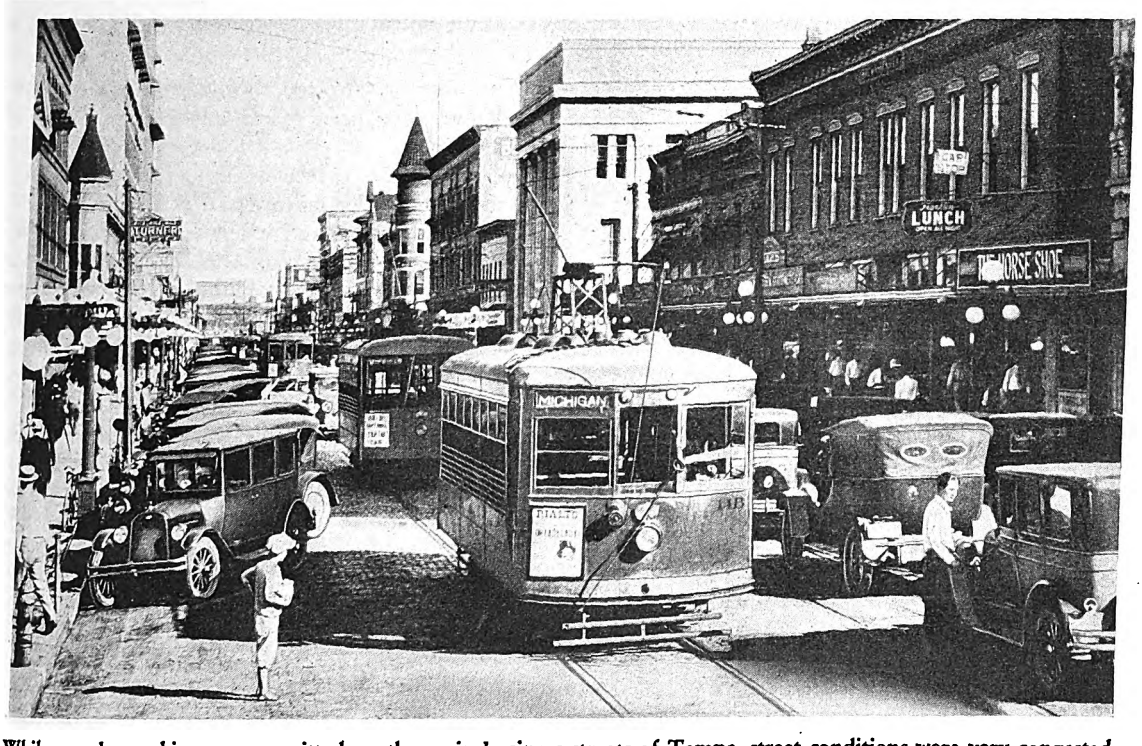
Tampa Reduces Accidents

58 Per Cent

Persistent and successful effort toward greater safety brings recognition in Anthony N. Brady contest



While angular parking was permitted on the main business streets of Tampa, street conditions were very congested. This situation has now passed with the adoption of parallel parking

WITH the notable record of accidents reduced this year by 58.6 per cent, or more than one-half, the Tampa Electric Company won the Brady Award for the best 1927 safety record, given to companies operating during the year between 1,000,000 and 5,000,000 car and bus-miles. This was accomplished in spite of the fact that the 1926 figures showed a material reduction from those of 1925. The miles operated per accident in 1927 were 3,480, as compared with 1,662 in 1926. The nearest approach in the history of the company to the 1927 figure was in 1922, when 2,775 miles per accident were operated, but in 1922 the city was much smaller and there were less than a third as many automobiles in the territory.

The Tampa Electric Company furnishes co-ordinated railway and bus service in Tampa and contiguous territories. It owns 55.87 miles of equivalent single track and operates 12.02 miles of bus routes. The rolling stock consists of 139 passenger cars, 14 service cars and 30 city buses. It provides transportation to a population of 146,200. The gross earnings for 1927 were $982,899.

While the major part of the company's safety work has been within its own organization, it has received hearty co-operation from various city organizations, such as city officials, Police Department, motor clubs, parent-teachers' association, and school officials, in bringing about the reduction of accidents as indicated by the figures already given.

The Police Department was one of the earliest organizations to co-operate with the company in safety measures, but during 1925 the traffic situation became so serious the City Commission decided a traffic advisory committee, composed of various business organizations throughout the city, was necessary to help solve the numerous traffic problems with which the city was confronted. The manager of the Tampa Electric Company was appointed chairman of this committee, and another member of the organization was appointed secretary. Through the co-ordinated efforts of the interests represented on this committee with the company's transportation problem, the Police Department and city officials, a number of changes have been effected in traffic regulations for the improvement of safety.

One of the most important of these was the change

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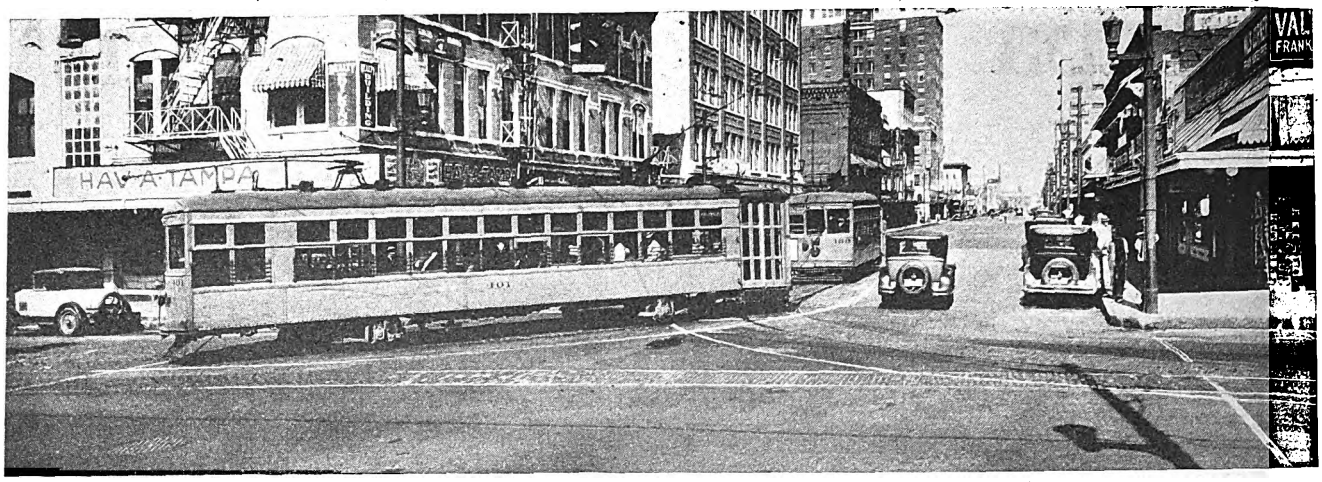


All track curves are marked with a white line at a sufficient distance from the rail to allow clearance for the overhang of any car

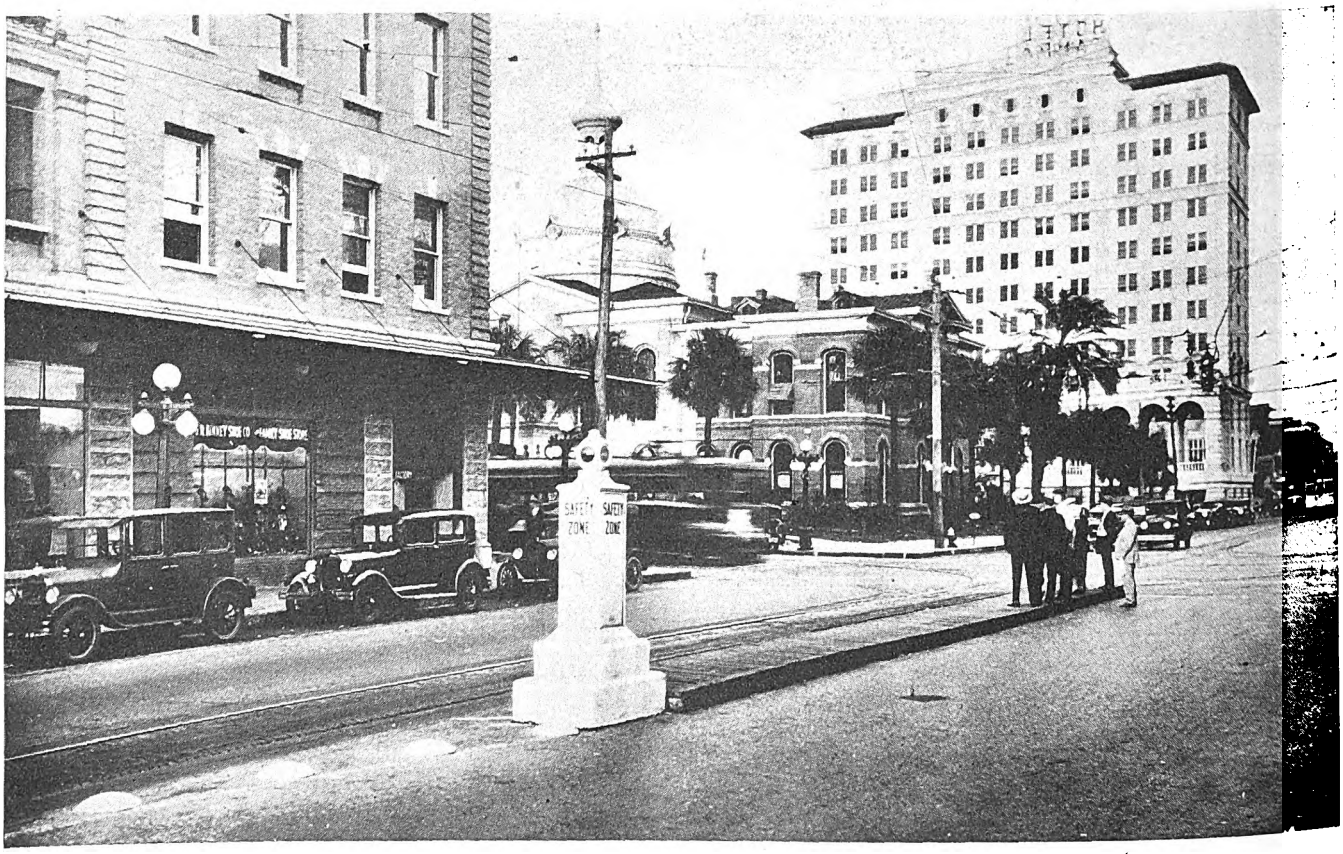
from angular to parallel parking on Tampa's main business streets. Two illustrations show the effect. One illustrates traffic conditions on one of the business streets on which car lines operate, taken shortly before the change from angular to parallel parking. The crowded and dangerous conditions prevailing at that time can readily be understood. The other view, while showing incidentally parallel parking, also illustrates one of the safety landings, of which a number have been built, all at the company's expense. As will be seen, the front end of this landing is protected by a blinker light. At present, parking has been prohibited on one side of narrow streets on which single track car lines operate, to allow passage of street cars and automobiles going the other direction.

A great many other safety precautions have been introduced. Reference will be made briefly to several of them.

A number of through thoroughfares have been established and have been marked with "stop" signs at each intersection.

To insure the safety of school children using street cars and buses, the majority of them are carried on special cars and buses, and when one-man cars are used, an extra man is stationed on the rear platform to insure safety. Whenever school children become unruly and by their carelessness endanger themselves and others, their names are secured, and a representative of the company calls on either the school official or the parent and warns him of the danger.

A car has been painted white with various safety slogans in black and red on the sides and ends, and during 1927 was operated as a regular car over each division for a day at a time until the entire system had been covered. Then it covered the system again for one day on each



These raised safety zones, with a blinker light at one end, have helped to reduce accidents and make boarding and alighting much more comfortable

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line on a different schedule. Passengers riding on this car did so as the company's guests, as no fares were charged. They were only asked to read the pamphlets given out by the operator.

The company co-operated with the daily papers in supplying information with reference to the progress made in safety work. For a short time the daily papers also ran pictures of trainmen with outstanding safety records.

The superintendent of roadway of the company devised a new type of switch, now manufactured by a prominent special work manufacturer, which permits safer car movement, both in and out of switches, and at a higher speed.

Bonus System Installed

One of the most important developments, however, in the opinion of the company, was the establishment of an accident prevention bonus system, beginning Oct. 1, 1926. A feature of it is that it not only creates interest in safety work in the individual but also provides for collective interest in team work.

Briefly, the company set up a fund of $400 as a base amount for each contest, which continued for a period of four months. For every accident less than the total number during the same period of the previous year, $10 was added to the fund. For each day on which there was no accident, $25 was added to the fund. If there were more accidents during any contest period than there were during the corresponding period of the previous year, $10 was deducted from the fund for each accident over the record of the previous year. To prevent unreported accidents a penalty was imposed on the guilty man by charging him with three accidents and requiring him to serve a period at the bottom of the extra list. For each unreported accident, also, $30 was deducted from the fund. The rules require a report of every accident, or unusual incident, however slight, either on or near the car or bus.

Trainmen and bus operators were grouped into two divisions. One consists of car operators, bus operators and motormen; the second division consists of conductors only. To participate in the contest it is necessary for a man to work as many as 800 hours during the four months' contest period.

How the Bonus Fund Is Divided

The division of the bonus fund is as follows:

Car operators, bus operators and motormen who were involved in no accidents of any nature during the contest period, twelve shares; those who have no chargeable accidents during the period, ten shares; those having one chargeable accident during the contest period, five shares; those having two chargeable accidents, three shares.

Conductors having no accidents of any nature during the contest period, seven shares; those having no chargeable accidents during the contest period, five shares; those having only one chargeable accident during the contest period, three shares.

A committee composed of two trainmen, one bus operator, the claim agent and the master mechanic, decides any questions that may arise as to the accident classification.

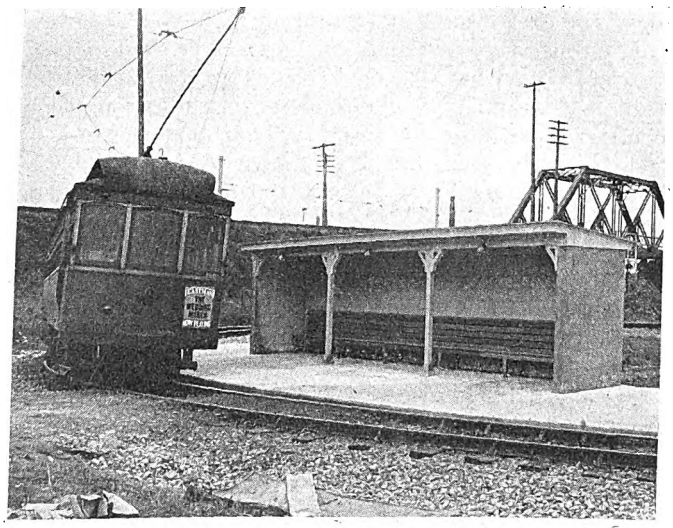
During 1927, 83 per cent of the trainmen and bus operators shared in the bonus plan; 7 per cent were disqualified for not having worked enough hours, and only 10 per cent did not participate in the fund because of having three or more chargeable accidents during the period. The total cost of this bonus fund for 1927 was $5,250. Over the year's period the men have received bonuses from $14.10 for men having two chargeable accidents to $50.35 for men having a perfect record.

Beginning with December, 1927, a contest was also arranged among the various lines of the system. This plan has as its reward a monthly prize of $5 for each man on the car or bus line which operates the most miles per accident. The extra men of the company are divided into groups and the members of the winning group are likewise given a prize of $5 each. This also has proved very effective.

During 1926 and 1927, the company's labor turnover, due to the so-called boom condition in Florida, was very great, and during 1927 only about 25 per cent of the trainmen and bus operators had been in service for more than two years. In view of this fact, the results obtained in accident prevention work were all the more remarkable.

Extensive Improvements Made on Rochester Subway

Ten shelters have been erected, one of the stations enlarged, all of the stations repainted and part of the right-of-way fenced in to prevent trespassing



The new waiting shelter and platform constructed at Driving Park Avenue Loop

TO ADD to the safety and comfort of passengers, and to insure parts of the system against too rapid depreciation, the city of Rochester has made a number of improvements to its subway system, operated by the New York State Railways. The work consisted of waterproofing the joints in the superstructure between Exchange and Oak Streets to prevent leakage of surface water, the building of ten shelters in subway stations, the construction of platforms and waiting rooms at two loop stations, the repainting of all subway stations, the erection of 3,500 ft. of fencing to prevent trespassing and the enlarging of the Times Square station.

The ten shelters were added in the subway stations between Driving Park Avenue and Rowland Loop. They were built at the foot of the stairway leading from the street wherever possible. Last winter it was found

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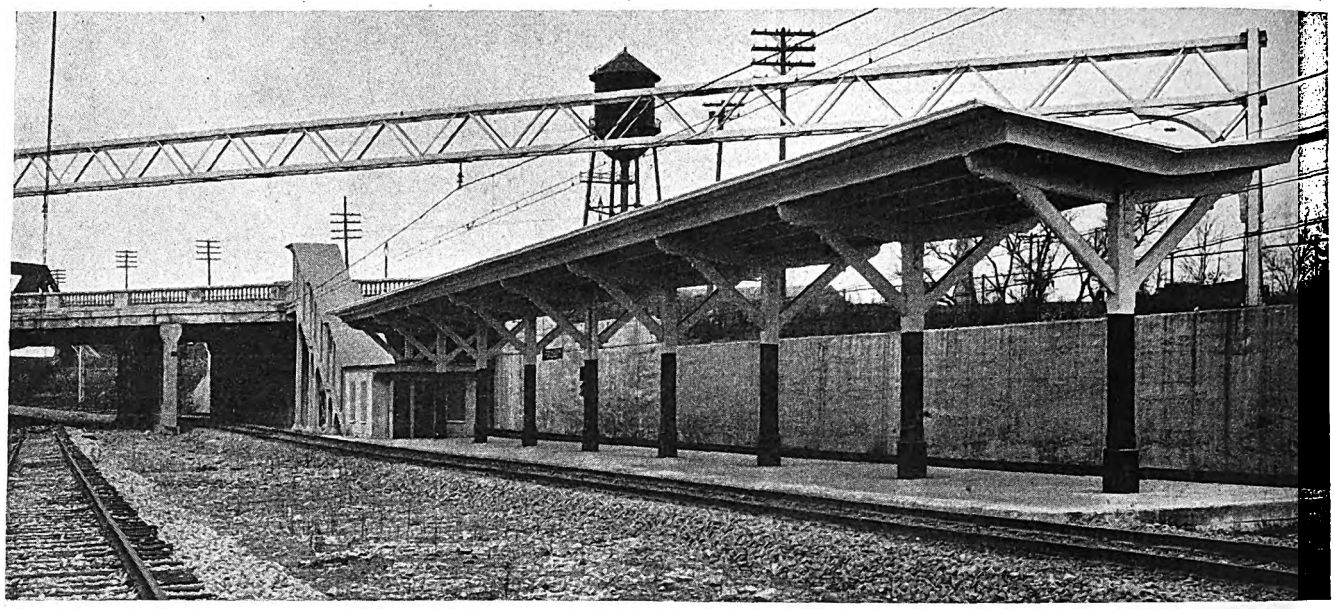

Shelters have been erected at ten stations along the Rochester subway lines. Wherever possible they were built at the foot of the stairway, as was this one at Lexington Avenue

that water drained from the roof of the stairway covers to the station platform at the foot of the stairs and caused a sheet of ice to form, so that passengers hurrying down the steps often lost their footing and suffered painful falls.

The shelters are built of cinder block and are stuccoed. They are of a design to agree with the stairway covers and, on an average, are about 12 to 17 ft. long. They are roofed and have benches inside, but are not heated, with the exception of the Times Square station. The contract for this work involved an expenditure of $11,000. There are fourteen stations along the subway, including the station at Driving Park Avenue Loop and at Rowland's Loop.

Two Stations Completed

A new waiting room and platform also has been completed at the Driving Park Avenue Loop, as well as a shelter and platform at Rowland's. At Rowland's a sidewalk and steps were built to connect with the street railway terminus. Under the same contract additional retaining walls were built where the dirt banks had shown a tendency to wash out, chiefly in the Rowland's section. The figure for this work was $9,500.

Under another contract the Times Square station was enlarged to give double the former waiting space. A small concession for the sale of papers and the checking of parcels is housed in it. The extension covers the exit from the stairway leading from Exchange Street. Under the same contract a small oil house was built at the Howell Street Loop for the servicing of Rochester, Lockport & Buffalo cars. A curb was erected on top of the wall between Court and Griffiths Streets to protect the subway below from material falling from the wall. The cost of all this work was approximately $10,000.

Another important part of the improvement program was the repainting of all subway stations. This work was done at a cost of $1,395.

A contract was let for the erection of 3,500 ft. of wire mesh fencing along the right-of-way. This is a protective measure designed for the safety of persons walking along the subway, as well as a means of preventing trespassing. Most of this is being erected in the eastern section. The work will cost $3,400. It is not intended that the fence shall delineate the subway right-of-way.

The city itself, through its department of public works, is waterproofing the joints in the superstructure between Exchange and Oak Streets to prevent the leakage of surface water. The first step in this work is to cut through the asphalt around the kiosks to expose the joints in the concrete underneath. Waterproof material is then laid over the joints and small drainage pipes are sunk through the concrete, so that moisture will drain through into the subway without damaging its concrete and steel deck.

When the work around the kiosks is completed, each concrete joint between Exchange Street and Oak Street is to be waterproofed. This will necessitate removing a strip of asphalt surfacing, about 4 ft. wide at each joint, and cutting through the layer of low-grade concrete under the asphalt. Otherwise, water would seep through the joint of the concrete, slowly disintegrating the material and rusting the steel framework underneath.

As the deck over the Aqueduct is already waterproofed, no additional work will be required there; but the city has completed improvements to the sidewalks on the cantilever construction over the Aqueduct and also along South Avenue, so that not only are the sidewalks now in good condition, but the arched steel underneath is guarded against moisture and rust. The waterproofing work was continued during the fall, as long as weather permitted, and is to be continued in the spring.

Credit Union Formed in Gary

THE Gary Railways Employees Credit Union was incorporated on Jan. 2. Stock in the union is being sold at $5 per share. The project aims to aid employees in saving, to make loans to members at reasonable rates with or without security, and to invest any surplus in a manner required by law. The capital stock consists of 2,000 shares. Any employee of the Gary Railways, Gary, Ind., is eligible for membership and may purchase one or more shares of stock in the union, either for cash or on a time-payment plan.

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P. R. T. To Use
Fuel Oil For Buses

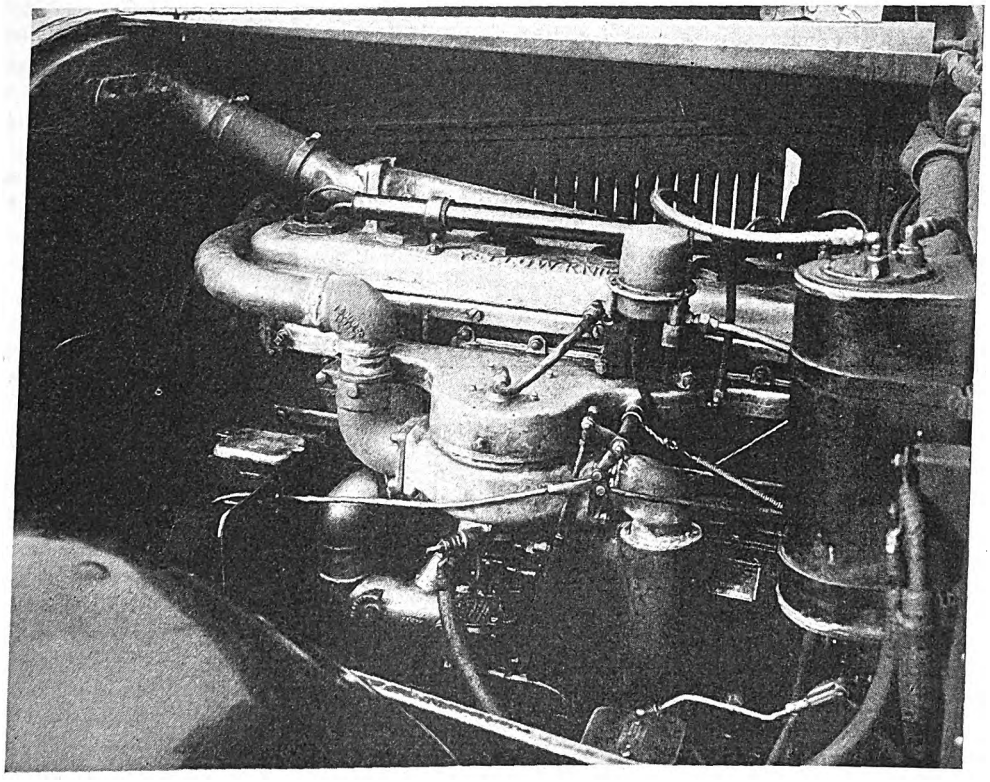
Apparatus has been developed making it possible to use 38-42 oil, Baumé, with a difference in fuel cost of 29 per cent. Equipment described before the Philadelphia Engineers' Club

By J. A. Queeney

Vice-President Mitten Management, Inc., Philadelphia, Pa.

DURING the present year the Philadelphia Rapid Transit Company will equip all of its buses with a device to permit the use of low-grade fuel oil in the engines. Experiments have been made on the device over a period of two years, and at the present time twenty buses are operating successfully with the fuel oil. The practicability has been so demonstrated that the company will go ahead with the equipping of all its 570 city and intercity buses.

The fuel now being used is a 38-42 oil, Baumé scale. The performance of the engine with this fuel compares very favorably with the performance secured with gasoline. Idling speed, acceleration and power, all essentials to good operation, are obtained with this device with a fixed carburetor setting.



As the Godward gas generator appears when adapted for fuel oil consumption and fully installed on an engine

The amount of fuel necessary to generate 1 kw.-hr. is 5½ per cent less than the amount of gasoline needed, using the same carburetor setting. The saving in the cost of fuel by burning oil instead of gasoline amounts to approximately 29 per cent. Since there are practically 85,000 motor buses in operation in the United States at the present time, the possible saving in the cost of fuel represents more than $50,000,000 per year.

Although the engine requires added equipment to burn the fuel oil, either oil or gasoline can be used when it is installed. If a bus using fuel oil travels away from the point of supply and runs out, the tank may be filled with gasoline and without any adjustment the bus will proceed, with no perceptible change in the performance of the vehicle.

The buses using fuel oil are on the same maintenance schedule as those using gasoline. One of the buses has been operated more than 250,000 miles and has been closely observed to see if the new fuel would have any effect on the engine to require additional maintenance. Nothing could be found to indicate any additional wear or any change whatsoever in the condition of the engine.

When fuel oil was first used a little trouble was experienced in the exhaust smoke, particularly when the engine was idling. This trouble was remedied by the

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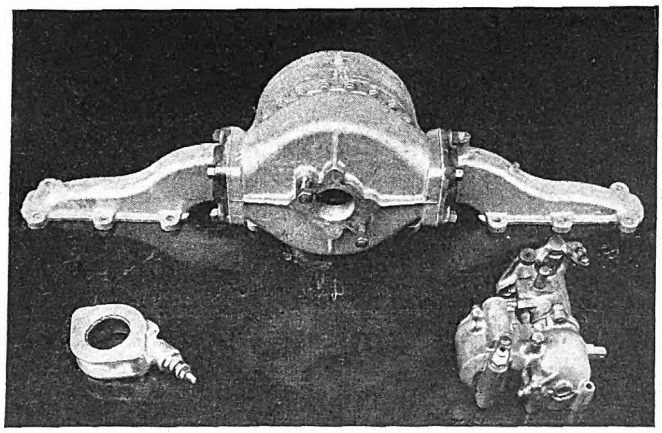


Bottom view of the main aluminum chamber. The wet mixture from the carburetor enters through the hole and is vaporized within the chamber by the heat from the exhaust

simple expedient of removing the throttle valve from the conventional location in the carburetor below the gas generator to a point where the mixture enters the intake manifold.

The device, manufactured by the Godward Gas Generator, Inc., consists of an aluminum pot in which are set a number of stationary thin curved plates, radiating from a central core. The lower edges of the plates are in contact with the aluminum pot, which is heated by the exhaust of the engine. The fuel is drawn from a standard carburetor through the inside of the pot over the surface of the warm plates, and is converted into a dry gas. It then passes through the intake manifold into the cylinder for burning. The deflector plates that are heated have a total surface of 2,000 sq.in., so that complete conversion to a hot gas is assured.

The device as designed for the use of fuel oil has incorporated in it an electrical heating unit which is used during the starting period only. By means of this unit the temperature of the fuel is raised sufficiently to start the engine. The unit receives its energy from the storage battery and consumes 80 amp. at 12 volts for about one minute, the time required for starting the engine under present conditions, which is no greater than that required to start with gasoline.

In addition to the Godward device a special intake manifold is used. The new manifold has no sharp bends, pockets or hot spots, and it has a much greater cross-sectional area and consequently less restriction than the conventional manifold. A reduction in the intake manifold velocity is permissible because of the dry gas produced in the gas generator. This construction also allows an increase in the quantity of mixture entering the cylinder, thus increasing the volumetric efficiency of the engine. No other special equipment is required. The same carburetor as supplied by the manufacturer with the engine is used.

Experiments Conducted for Two Years

The problem of operating gas engines successfully with fuel oil without the use of gasoline for starting or without complicated mechanism has been considered by many engineers as impossible of solution and by others as extremely doubtful. The apparent advantages, however, seemed to be too great not to warrant a trial. Accordingly, the company accepted an inventor's device about two years ago and installed it on one of the taxicabs for trial. After numerous tests it was found that, while it was possible to operate on fuel oil by starting the engine on gasoline, the general performance was so unsatisfactory that it could not be given serious consideration. For example, when good idling performance was obtained, it would be impossible to secure sufficient power output for satisfactory operation at the usual speed, and when it was possible to obtain sufficient power output, the engine would not operate satisfactorily at the lower speeds. After many months of effort it was decided that the experimentation was not being conducted along the proper lines.

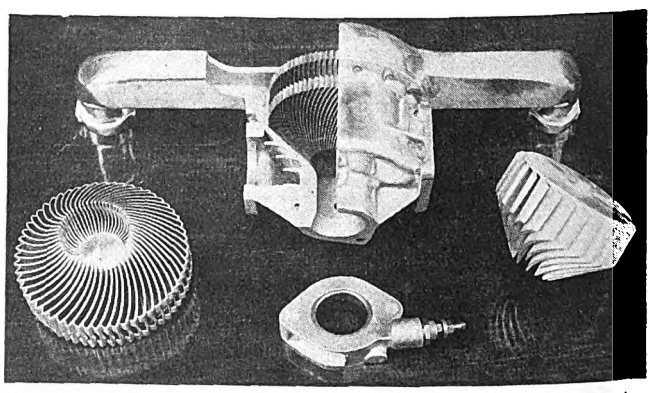
In January, 1927, the Godward gas generator was brought to our attention as a device for saving gasoline and increasing the output of the engine. The device was given a trial and found to be satisfactory for saving gasoline. Observations made through a glass window, inserted in the intake manifold, showed that with gasoline and a standard carburetor and manifold wet gasoline was carried into the engine's cylinder under all running conditions. With the Godward gas generator installed, however, no evidence of a wet mixture could be found in the manifold.

At the present time twenty gas-electric buses are equipped with the device and are operating in intercity service where heavy grades are encountered. Since the installation of the device these vehicles have made more than 300,000 miles. The generator has enabled us to increase the horsepower output of the engines of these particular buses 15 per cent, resulting in a decided improvement in the performance of the vehicles, especially on hills. The additional output has enabled us to increase the scheduled speed of intercity lines without any increase in gasoline consumption in pounds per brake-horsepower per hour.

In addition to the twenty gas-electric buses that are operated with gasoline, we also have five taxicabs of the standard mechanical-driven type that are equipped with the Godward gas generator. These taxicabs have four-cylinder Yellow Knight engines. The installation of the generator not only has improved the performance of the vehicles decidedly, but also has resulted in a reduction of gasoline consumption of 9 per cent.

During this development we concluded that the gas generator could be modified and used as a basis of the equipment necessary to operate on fuel oil successfully. After numerous experiments and tests the present equipment was developed and we now have twenty buses that have operated more than 250,000 miles on fuel oil. Six of these are equipped with an improved device, including all modifications and changes made to date.

In addition to the apparatus used for the burning of



Cutaway view of the Godward device showing how the stationary deflector, consisting of several thin curved plates, is mounted inside. The electric heating unit for starting and two types of deflectors also are shown

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fuel oil, we also have developed apparatus for analyzing the exhaust. This equipment serves two purposes—first, of checking the engine's efficiency, as any unburned gas that is present in the exhaust represents a definite power loss, and second, of analyzing the exhaust to reduce to a minimum the poisonous carbon monoxide gas.

It is not unusual to hear occasionally of the death of some unfortunate person due to carbon monoxide gas. No doubt many people believe that because of the size of the motor bus it is a great offender by filling the air with this poisonous gas. Recognizing the importance of reducing to a minimum the carbon monoxide gas we conducted many experiments and finally developed the exhaust analyzing equipment, now installed in the automotive research laboratory of the Hunting Park bus shops.

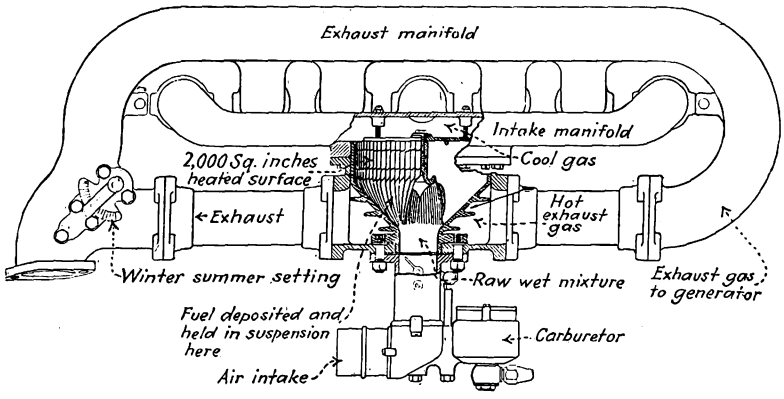
Our studies made with this equipment prove conclusively that by maintaining the engine in good mechanical condition and by proper adjustment of the carburetor the exhaust gas can be controlled. A survey by engineers of the United States Bureau of Mines disclosed that "the percentage of carbon monoxide gas with the majority of cars is between 5 and 9 per cent." With this apparatus we have no difficulty in decreasing the carbon monoxide content from the exhaust of our buses to 3 per cent or less. We have obtained as low as 1 per cent under both idling and operating conditions.

Gasoline as sold at any filling station contains approximately 85 per cent carbon and 15 per cent hydrogen. During the burning process inside the engine the gasoline is broken up into various gases, the most common of which are carbon monoxide, carbon dioxide, hydrogen, methane and gasoline vapor. Of this group the two most important are carbon monoxide and carbon dioxide. If compression were perfect all the carbon monoxide would be burned to carbon dioxide, a harmless gas, but since this condition is never attained in the modern automobile, we have to deal with carbon monoxide, which is poisonous.

From the foregoing it is evident that an instrument which accurately measures the carbon dioxide in the exhaust gas is valuable as giving an indication of the performance of the engine. Numerous tests have shown that a motor in good condition produces between 10 and 12 per cent carbon dioxide, and if, therefore, the engine under consideration shows a much lower figure, it is evident that either the carburetor is poorly adjusted, the ignition is faulty, or the compression is low due to leaky valves or some other cause.

Apparatus Measures Unburned Combustibles

It is not practical to measure the carbon dioxide directly with an electrical indicator, so an instrument has been developed which measures the carbon monoxide, hydrogen and other combustibles present in the exhaust. This instrument records the incompleteness of combustion. The apparatus consists of two small cylinders, each containing a wire of special composition. These wires are connected to a battery and to a meter through suitable resistances. The meter is simply a moving coil galvanometer. When the switch connecting the batteries with the wires in the two cylinders is closed the meter will register zero, until both cylinders are filled with air and the entire electrical system is balanced. In operating a connection is made between the exhaust manifold of the engine and the inlet pipe of the testing apparatus. As the exhaust gas enters one of the cylinders it draws a small quantity of air through a nozzle. The resulting mixture, being combustible, is ignited when it comes in contact with the heated wire. The burning of the gas increases the temperature of the wire, the rise being effected by the percentage of the combustibles contained in the gas. The change of resistance of the wire caused by the increases in temperature disturbs the electrical balance of the two circuits, arranged as a Wheatstone bridge, and causes a deflection of the galvanometer. The deflection varies in accordance with the percentage of combustibles present in the exhaust, and by referring the galvanometer reading to a chart the percentage of carbon monoxide, hydrogen and other combustibles can be determined. Definite standards are established, and if the meter reading is above or below these standards the operator adjusts the carburetor or ignition, or makes other changes until the meter reading becomes normal.



A total heated surface of 2,000 sq.in. within the chamber vaporizes the mixture of fuel oil and air before it enters the intake manifold. The exhaust manifold is designed so that full exhaust or none can be passed through the generator

To confirm their own tests the Philadelphia Rapid Transit Company engaged the services of Professors Autenreith and Baum of the College of the City of New York to test the device developed for burning fuel oil and the apparatus for the analysis and control of the exhaust. They tested buses using standard equipment and others using the vaporizing device for comparing results, and then conducted a series of tests with different fuels and types of equipment on a single unit. The following is their report:

On Dec. 15, 1928, the writers visited your Hunting Park Avenue garage and noted the operation of bus No. 57, which was equipped with a Godward gas generator and manifold and which burned fuel oil. The engine was started on this fuel and ran very well with ample power and acceleration for all conditions of traffic and grades encountered. The operation of the engine could not be distinguished from that of similar buses on the street using gasoline.

We tested this engine on a water barrel and the generator delivered 44.3 kw., substantially the same output as obtained from the engine and generator of bus No. 36, the latter using standard equipment and gasoline and delivering 43.8 kw. The carburetor air valve of bus No. 36 was in the normal position for winter running, and the power output of both units was measured at wide open throttles, at 1,600 r.p.m., this being the average operating speed.

We felt that a comparison of the performance of two different power units running on different equipment would not furnish data from which it would be possible to draw dependable conclusions, so we suggested that the performance of a single unit be determined with different fuels and types of equipment. Accordingly, another series of tests were conducted. The bus

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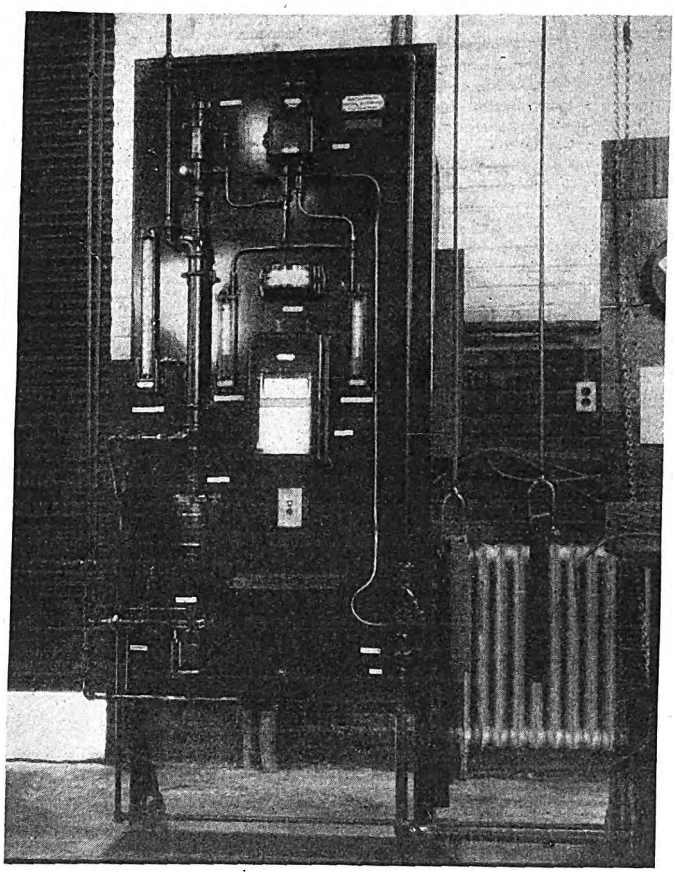

This laboratory equipment for analyzing the exhaust permits the checking of engine efficiency, as any unburned combustibles represent a definite power loss

used for these tests was equipped as it came from the factory with a Zenith carburetor, which had a No. 29 Venturi, No. 24 main jet, No. 22 compensating jet and No. 55 idling jet. The power unit of this bus delivered as much as 49.4 kw. at 1,600 r.p.m. on gasoline. The exhaust gas analyses showed a carbon monoxide content as low as 3.1 per cent at 1,600 r.p.m. and a carbon monoxide content as low as 7.3 per cent on idling at 380 r.p.m. The carbon dioxide contents were 12.2 per cent and 6.4 per cent, and the oxygen 0.5 per cent and 4.4 per cent, at the higher and lower speeds, respectively. We consider this an unusually good performance as far as the carbon monoxide content is concerned, particularly under full power.

The standard manifolds were then removed and replaced by the Godward equipment. The same carburetor was used and the unit operated under the same conditions. The power output was found to be 3.85 per cent less with the same carburetor setting and standard manifold because of the damping effect of the new equipment on the carburetor jets. The exhaust gas analyses, however, showed carbon monoxide contents of 1.4 per cent and 7.6 per cent, and carbon dioxide contents of 13.6 per cent and 7 per cent, at the 1,600 r.p.m. and idling speeds, respectively.

It was then decided to readjust the carburetor for equal power and best results as to carbon monoxide content with the gas generator equipment. Outputs of 49.4 kw. and 50 kw. were obtained on two successive runs with the idling jet set at No. 40. Reducing this jet to No. 40, the smallest obtainable, resulted in a carbon monoxide content of 6.4 per cent when idling. This size jet is considered entirely too small for this size engine, and yet it was found necessary to enlarge the holes in the idling needle valve seat to a $\frac{1}{8}$-in. diameter to obtain the idling mixture producing the minimum carbon monoxide content.

After these changes were completed the same power was obtained and the gas analyses of the exhaust showed for two successive runs the averages of 13.8 per cent carbon dioxide, 0.4 per cent oxygen and 1.05 per cent carbon monoxide. At 380 r.p.m., the exhaust analyzed 10.2 per cent carbon dioxide, 6 per cent oxygen and 0.25 per cent carbon monoxide.

The engine was then operated on fuel oil with a specific gravity of 8.014, or 42 Baumé. With this fuel the power unit delivered as much as 47.5 kw. at 1,600 r.p.m. with the carburetor settings of Venturi No. 33, main jet No. 29, compensating jet No. 28, idling jet No. 40, and the idling needle valve seat enlarged to the diameter of $\frac{1}{8}$ in. With these settings the exhaust gas showed at wide open throttle a content of 12.6 per cent carbon dioxide, 0.25 per cent oxygen and 2.45 per cent carbon monoxide. At idling speed the analyses showed 9.7 per cent carbon dioxide, 7 per cent oxygen and 0.0 per cent carbon monoxide. With another needle valve setting the exhaust analyzed 10.4 per cent carbon dioxide, 5.6 per cent oxygen and 0.0 per cent carbon monoxide. It must not be assumed from these results that any needle valve setting will give low carbon monoxide content on idling. For instance, with one particular needle valve setting a percentage of 2.9 carbon monoxide was obtained. This, however, was the highest value obtained with fuel oil on idling.

On previous experiments with this type of engine and carburetor we have not been able to get satisfactory idling with so lean an idling mixture with the standard manifolding. From the various runs made under the different conditions described we are convinced that it is practicable to operate your buses on either gasoline or fuel oil with the gas generator equipment and standard carburetor, and secure a carbon monoxide content of the exhaust gases of less than 3 per cent under your conditions of operation.

Our tests showed that the gas generator equipment had the effect of reducing the carbon monoxide content of the exhaust gases without reducing the power. Of course, for best results with any kind of fuel the proper carburetor settings must be determined, but as far as operation on the road is concerned a change from fuel oil to gasoline without changing the carburetor setting will not be apparent to the driver.

Two Hours from South Bend to Chicago

ANOTHER milestone in the progress of the Chicago, South Shore & South Bend Railroad, since the change of management in 1925, came with the inauguration of a flat two-hour schedule for extra fast trains between the line's terminal cities of South Bend and Chicago on Jan. 1.

For three years this railroad has been carrying on an extensive reconstruction program designed for better and faster service to the people of its territory. Scheduled time between the Chicago and South Bend terminals, set with the beginning of the new regime at two hours and a half, was cut last spring to two hours and fifteen minutes in the case of four trains. Last fall this was shortened to two hours and five minutes in the case of two trains, westbound in the morning and eastbound at night. This service was specially designed for commuters, and both trains carried dining cars for the convenience of the passengers.

With the new two-hour schedule, the same arrangement will obtain, except that the Fort Dearborn Limited, Chicago-bound morning train, leaves South Bend station at 7:05 a.m. instead of 7 a.m. At the same time the Chicago Express which formerly left Gary at 8:30 a.m. now leaves at 8:22, changing leaving times also at East Chicago, Hammond and Hegewisch.

Beginning in 1925, with the change of management, improvements and reconstruction affecting virtually every department of the railroad have been made. Nearly $8,000,000 has been invested in the property, toward giving improved service to both passengers and freight patrons.

Faith in the future of the great industrial areas, the homesites and growing cities of northern Indiana has been the principal reason for the development of the South Shore Line. Public response has so far justified this faith. Within the three years of the present management, passenger revenue has increased from $599,236 to $1,772,918. Freight revenue has increased in the same period from $189,263 to $1,129,856. Total operating revenue has grown from $858,265 to $2,971,488 for the year ended Sept. 30, 1928.

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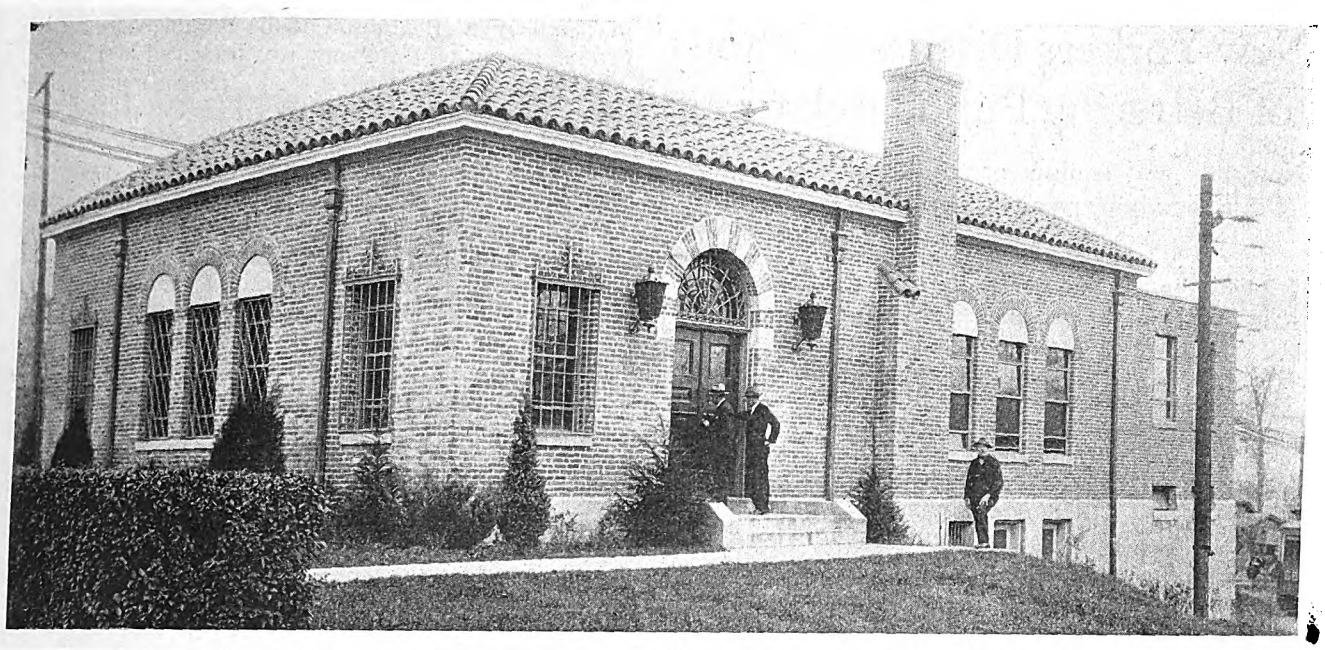


Buff brick walls, ornamental window grilles and a red tile roof give a Spanish appearance to this attractive club house at Cincinnati

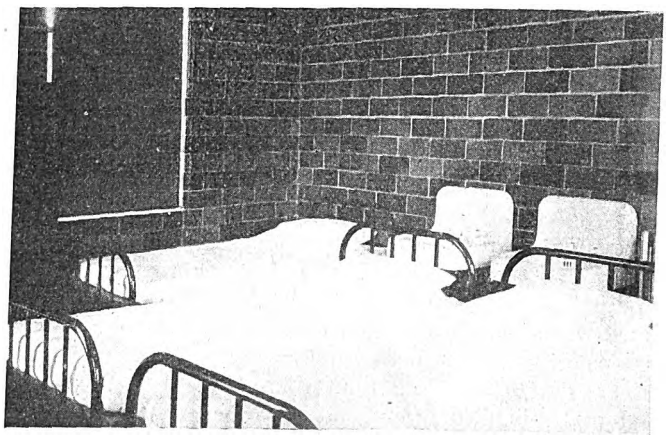
Cincinnati Railway Builds Attractive Office

ENLARGEMENT of an existing substation of the Cincinnati Street Railway to house new automatic electrical equipment made it necessary to move the Hyde Park division office from its location immediately adjacent to the carhouse. A new one-story structure, rectangular in shape with a garage projecting in the rear, was built on the front corner of the division yards at Tarpis and Erie Avenues. Buff brick walls and a red tile roof give the building a Spanish appearance.

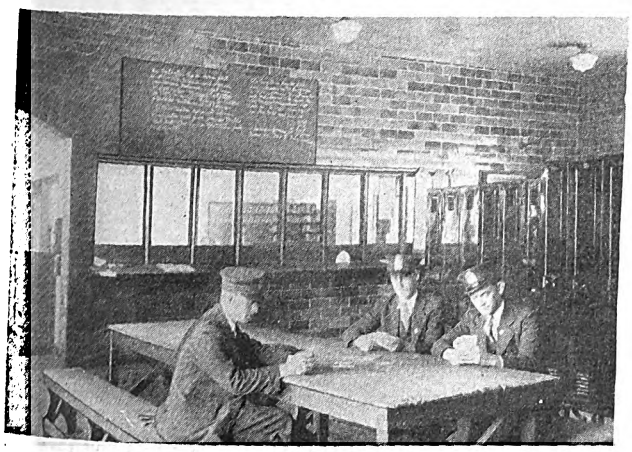
Inside, the walls are of glazed tile with a sanitary curve where walls meet the painted and varnished cement floor, and rounded corners where wall meets wall. There are no dust-collecting corners in the whole building. In addition to a boiler room, janitor's quarters, curve-cleaners' grease room, and a garage for the emergency truck, the basement contains a white-tiled wash room equipped with two shower baths and a dressing alcove.

The club room, an office for the receiving clerks, sleeping quarters, and the private office of the division superintendent occupy most of the first floor. Smaller rooms for storing supplies, for filing lost articles, for lockers, and a shower bath, toilet and lockers for the clerks take up the remaining space.

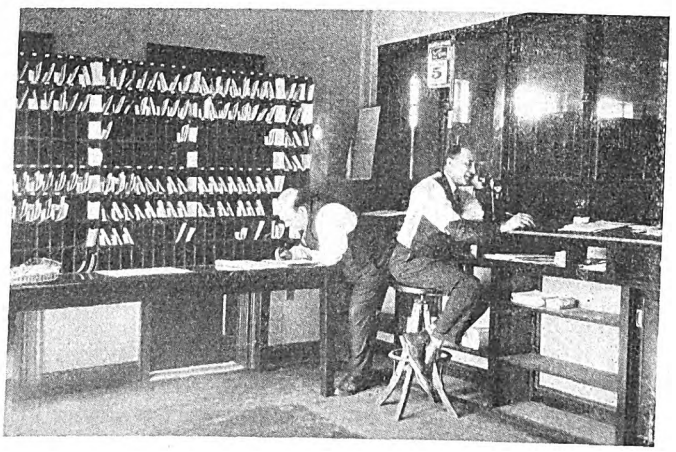
A reinforced glass partition with windows protected with ornamental grille work separates the clerks' office from the club room. The sleeping room is outfitted with six walnut-finished Simmonds iron beds, six lockers and two wash stands.



Comfortable sleeping quarters are included in the equipment of the building at Hyde Park division headquarters



Equipment installed in this club room includes two long linoleum-topped tables, benches and glass-inclosed schedule frames and bulletin boards



The receiving clerks' office is 18 ft. square with a counter running the full length of one side of the room. Shower, toilet, and locker facilities are provided in an adjoining room

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New Yorkers Discuss Methods of Bettering Public Relations

New cars and equipment, employee training, and service improvement were topics at state association's mid-winter meeting

HOW the local transportation companies can improve their relations with their patrons, the public, was the principal topic of discussion at the midwinter meeting of the New York Electric Railway Association, held at the Hotel Commodore, New York City, on Jan. 22. The sessions were attended by about 200 members and guests, with W. E. Thompson, vice-president Third Avenue Railway System, presiding. Operating practices of various properties visited during a recent trip sponsored by a Rochester, N. Y., newspaper were discussed by R. R. Hadsell, general manager Schenectady Railway. Wherever the party went they were impressed with the fact that those electric railway properties which were in the best repute with their patrons were invariably the ones that were giving particular attention to the training of their platform men in the elements of courtesy, safety and ride salesmanship. "The platform man is today the key man of the industry," said Mr. Hadsell, "and the public is quick to appreciate the little courtesies and attentions that it receives from a well-trained, neat-appearing train force."

William E. Wood, president, Virginia Electric & Power Company, told of the steps taken by his company in establishing itself in the good graces of its patrons, which had led not only to better earnings and a more hopeful outlook but, indirectly, to the winning of the Coffin Award in 1928. When he and his associates took over the management of the property in Richmond they found their principal handicap to be a heritage of ill-feeling left by an able but contentious former management. As soon as the new management made clear that it desired to play fair, that it sought nothing to which it was not justly entitled, and that it intended to meet the public more than half way in any question of service or policy, there was a change of feeling and the responsible elements in the community hastened to proffer their support. Since then there has been a gradual strengthening of the bond of interest until, at the present time. the company is receiving splendid co-operation from the residents of the communities which it serves.

The case in favor of the purchase of new rolling stock, as opposed to the rehabilitation of the old equipment was presented by George Frey, general sales manager J. G. Brill Company, Philadelphia, Pa., whose paper is presented in abstract elsewhere in this issue. He was followed by J. B. Hayes, general superintendent of transportation, Virginia Electric & Power Company, Norfolk, Va., who outlined the program carried out on his property of redesigning and rehabilitating old rolling stock to meet present-day requirements. This step, it was explained, was not taken from choice but from necessity. Although the company would have preferred buying new cars, the result had been gratifying, resulting in an actual return of 46 per cent on the cost of rebuilding. As a direct result of the program of modernization the company is able to point to slightly increased speed, a material improvement in passenger comfort, better appearance, and safer operation.

A paper on modernization of electric car equipment, prepared by A. J. Manson of the Westinghouse Electric & Manufacturing Company, was presented by Harry R. Meyer at the afternoon session. Recent improvements made in motor and control design for electric cars were discussed. Whereas once manufacturers had a standard type of motor, now in order to meet the demands for higher schedule speeds, higher rates of acceleration, quieter operation, and reduced unsprung weight, many modifications are necessary. Provision for better lubrication of motors has been given considerable study, and an attempt made to provide gearing which will run in oil. Foot control of the motors is a new development by the company. This has appeared desirable in order to relieve the operators of one-man cars from some of the duties which were previously performed by hand. Dynamic braking and car heating are other developments that promise to be of particular advantage in modern cars, and in reducing costs of power. In an endeavor to reduce noise in operation of car equipment. sound-deadening gears have been developed, and improved brake rigging also reduces much noise. The employment of the high speed motor and its drive through double reduction gears is giving gratifying results.

Speed and comfort were stressed as the two most important things to be incorporated in modern cars, by J. C. Thirlwall, General Electric Company. This company has been trying to develop equipment to satisfy the demands for higher rates of acceleration and retardation. The present tendency is to install greater motor capacity in cars, and this has enabled the rates of acceleration to be doubled. Rates of retardation also have been doubled through the use of track brakes in addition to air brakes. Each of these developments should result in a 10 per cent increase in scheduled speed.

Some improvements in air-brake equipment were outlined by John F. Craig, of the Westinghouse Traction Brake Company. He said that the demand for increased car speed has made braking operations more important. Faster operation of brakes enables the car operator to keep his place in traffic since he can stop as quickly as other vehicles. Faster action of brakes also enables the operator to stop his car so as to decrease the length of standing time by making it more convenient for passengers to board and alight quickly.

The importance of efficient employees and a satisfied public in connection with electric railway operation, were stressed by R. S. Tompkins, assistant to the president United Railways & Electric Company of Baltimore. It is now an accepted fact that railway customers must be satisfied. The idea of educating the public to agree with the things done by electric railways does not work out satisfactorily, and should be shoved into the background. Individual handling of complaints has been undertaken in Baltimore and has produced pleasing results. The number of letters of complaints published in newspapers has been reduced considerably, and also the number of complaints made by the public to the Public Service Commission.

Service and co-operation between the railway and public officials spell sucess, according to Norman A. Boyd, Mayor of Binghamton, N. Y. He spoke of the good feeling existing at Binghamton between the company and the city, and said that employee education and effective publicity were influential factors in promoting good will.

The banquet in the evening was addressed by James E. Begg, United States congressman from Ohio, who stressed the necessity for modernization in all industries in order to keep pace with the demands of the times.

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Time and Labor-Saving Ideas

from Staten Island

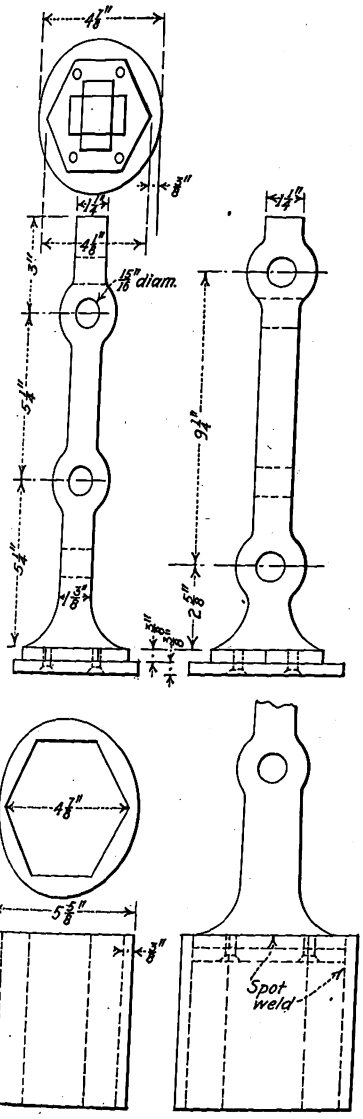


Fig. 1—At top, stem for wrench. Fig. 2—Bottom, left, socket. Fig. 3—Bottom, right, assembly of parts

Wrench Designed With Replaceable Socket

IN A WRENCH, devised in the shops of the Staten Island Rapid Transit Railway, Staten Island, N. Y., the socket can be replaced without renewing the stem.

The stem, shown in Fig. 1, is made of 1⅜-in. square steel and has four 15/16-in. leverage holes. The bottom is forged to a hexagonal shape, of such dimensions as will fit exactly the hexagonal hole in the top of the socket. A ⅜x4⅞-in. flat steel plate is screwed to the bottom of the hexagonal forging.

The socket, shown in Fig. 2, is made of steel and has an outside diameter of 5⅝ in. The top surface is formed with a hexagonal hole to fit the hexagonal portion of the stem, and the inside is shaped to fit the pinion nut. The assembly of these two pieces is shown in Fig. 3. The stem is entered through the socket and the two peripheral surfaces of the hexagonal portion of the top of the socket and the stem are placed in contact. The ⅜-in. circular plate on the stem is placed against the under surface of the top of the socket. The hexagonal and circular portion of the stem are spot-welded to the socket. This arrangement permits of renewing the socket by breaking the spot-welded joints.

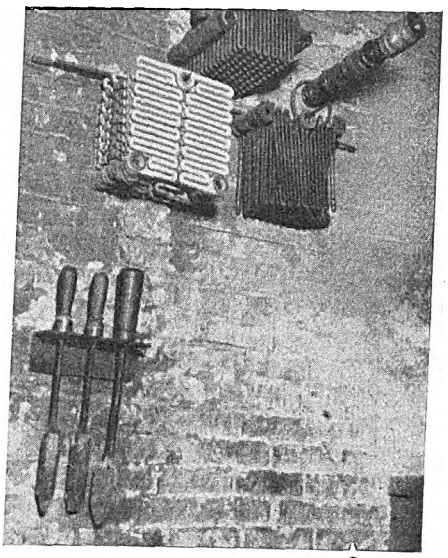
Metallic Sling Lifts and Carries Armatures

LIFTING or carrying armatures by means of hooks, chains or rope slings offers the danger of mechanical injury at the bearing fit, end bells, commutator or end connections. To eliminate this possibility entirely, a flat metallic sling is used in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y. The sling is shown in the accompanying illustration.

The sling is made of 0.058-in. gage sheet metal, ¼-in. and ⅛-in. flat plates. The sheet metal is 62 in. long, 12 in. wide at the center, and 8 in. wide at the ends. For a length of 4 in., each end is clamped between two plates, one 8x12x¼ in., and the other, 8x4x⅛ in. These two plates and sheet metal are held together by six ⅜-in. rivets. The over-all length of the sling is 78 in. Each 8x12-in. plate is drilled with a lifting hole 4 1/16 in. from the end, with a diameter of 3⅞ in.

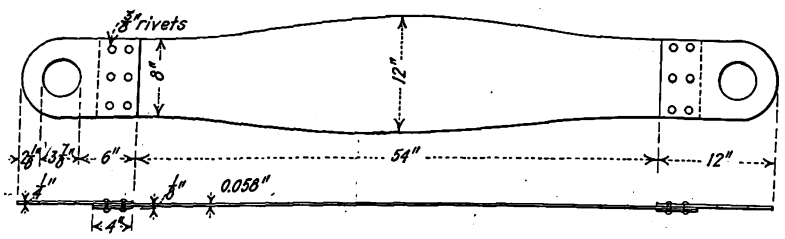
In lifting an armature the sling is placed around the core at the center of gravity, and both end plates are hooked on the lifting device. This design of sling has been in constant use for several years lifting armatures weighing 1,650 lb. each, and not a single failure has developed.

Safe Storage for Rheostat Parts



Convenient storage of repair parts assists the workmen

WHEN several mechanics use the same bench while overhauling different types of apparatus, each must see that his daily stock of material is cared for properly to prevent destruction and loss. Confronted with this problem, the Staten Island Rapid Transit Railway, Staten Island, N. Y., tried many suggested schemes for storing rheostat grids and mica washers, but none of the ideas proved satisfactory. Destruction occurred due to the carelessness of workmen. The problem



Armature sling used by Staten Island Rapid Transit Railway

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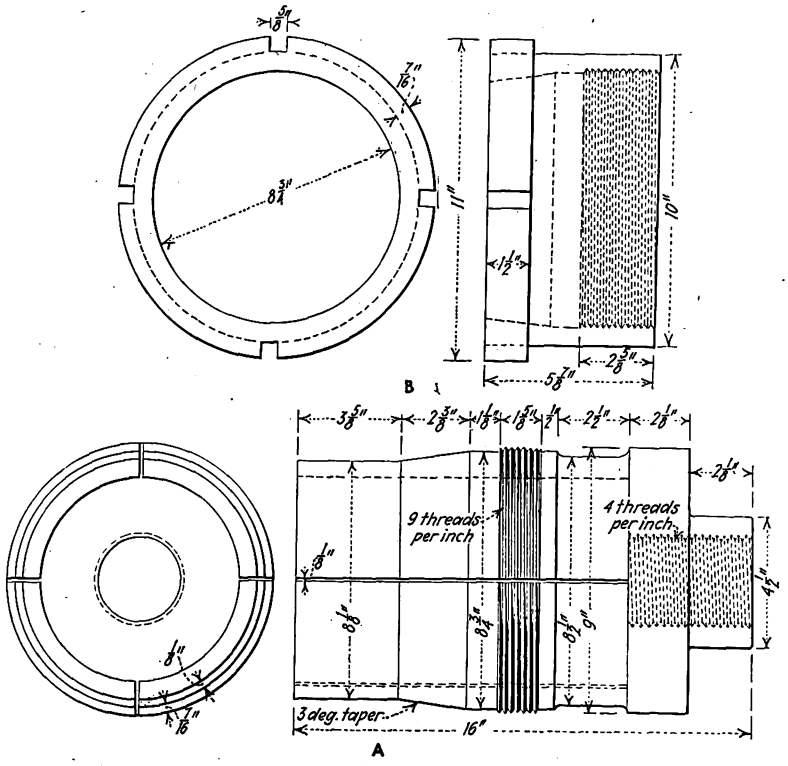


Use of this chuck has resulted in an increase of the boring output

was solved finally by storing the material within reach of the men at the bench on the wall adjacent to it, as shown in the accompanying illustration. Threaded ½-in. rods were screwed into expansion sleeves imbedded in the brick wall. The daily supply is suspended from these rods.

A neat soldering iron rack also appears in the illustration. The rack was made from a piece of ¼x3-in. angle and was fastened to the wall. Slots made in the angles provide a substantial support for the various sizes of iron.

Self-Centering Axle-Bearing Chuck

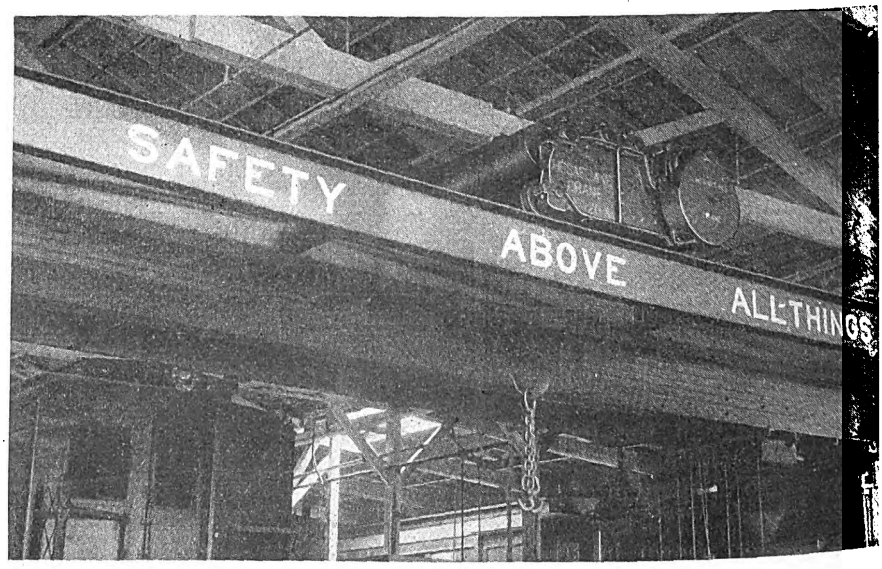
BEARINGS for axles are given constant attention on the Staten Island Rapid Transit Railway, Staten Island, N. Y. Abnormal wear is not permitted and as a result the bearings are being rebabbitted and rebored constantly. Difficulty was experienced in obtaining a chuck which would permit of heavy service and require a minimum of labor for centering. Consequently Machinist Joseph A. Collins designed and manufactured the chuck shown in the accompanying sketch. It is self-centering. The bearing is placed inside of *A* and when the collar *B* is screwed up the diameter of *A* is decreased as the 3-deg. surfaces come in contact. This centers the bearing accurately and grips it firmly at all points.

The cylinder shown in *A* is made from a solid piece of steel of 9 in. diameter and 16 in. long. It is turned to a diameter of 8⅛ in. for a length of 3⅝ in. and a 3-deg. taper for a length of 2⅜ in. The next 1⅛ in. is turned to 8¾ in. diameter, and the next 1⅝ in. has nine standard threads per inch. The diameter of the next ½ in. is 8¾ in., and for the following 2½ in. the diameter is decreased to 8½ in. Adjacent is a flange 2⅛ in. wide and 9 in. in diameter. This flange has a hub projection 2⅛ in. long and 4½ in. in diameter. The hub and flange are bored and threaded with four threads per inch to fit the lathe spindle. The opposite end of this cylinder is bored to fit the outer diameter of the axle bearing when the adjustable collar *B* is in the full release position. Four ⅛-in. slots are cut longitudinally in the cylinder 90 deg. apart and end at the flange.

The adjustable collar shown in sketch *B* is made from a piece of steel 11 in. in diameter and 5⅞ in. long. The flange is 1½ in. wide and the cylinder is 10 in. in diameter. The flange has four slots ⅝ in. wide and 7/16 in. deep to permit the use of a suitable wrench for screwing it on to the cylinder *A*. The inside is bored with a 3-deg. taper and has seven threads per inch for a distance of 2⅝ in. to correspond to the taper and threads on *A*.

Novel Safety Appeal

SAFETY is given careful attention in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y. All moving elements of the machinery are guarded carefully and the men are given regular instruction in the advantages of playing safe at all times. Conspicuous bulletin boards appearing throughout the shop give accident statistics and act as a constant reminder to guard against accidents. This safety work has had a remarkable effect in reducing the number of shop accidents. A novel safety appeal is printed on the span girder of the overhead traveling crane. As shown in the illustration, this reads "Safety Above All Things." This meets the eye upon entering the shop and immediately impresses the observer with the fact that safety predominates.



Safety warning on overhead crane

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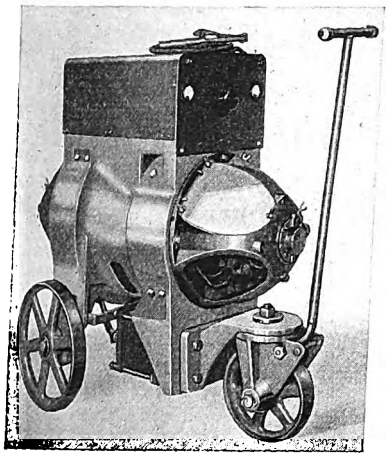
Improved Equipment Suggestions

200 Ampere D.C. Arc-Welding Set

A RECENT development of the Westinghouse Electric & Manufacturing Company is the 200-ampere d.c. welding set. This has particular application in a large number of shops, especially in street railway and railroad work, where only direct current is available for the driving motor of the welding set. It is designed so that either a 230 or 550-volt driving motor may be used. The construction is such that the set may be used either as a portable or stationary unit.

The accompanying illustration gives



Welding set for electric railway shops

an idea of the simplicity, compactness and ruggedness of the self-contained unit. The driving motor and generator have a common frame and common shaft, supported by ball bearings. The control is mounted on the top as a part of the frame and is protected by a sheet steel cabinet. Three roller bearing wheels attached to the frame make the set readily portable and give a welder with small over-all dimensions and a low center of gravity. For stationary use, the running gear can be omitted.

The rating of the unit is in accordance with the N.E.M.A. standards of practice, being 200 ampere, 1 hour, 50 deg. rise in a resistance load at 25 volts. The welding range is 60—300 amperes.

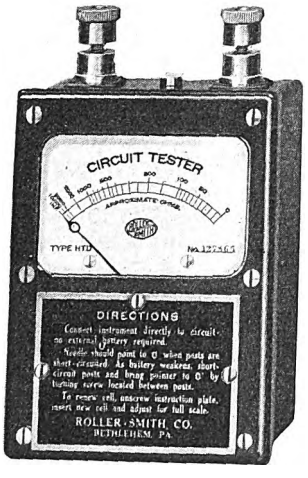
The driving motor of the set, a special type S.K., wound for either 230 or 550 volts, is compound wound and maintains constant speed with a voltage fluctuation of not more than 10 per cent. The motor starting rheostat with low voltage protection is enclosed and mounted in a sheet steel cabinet on top of the set.

The generator is a single operator, constant current, differentially compound wound and is separately excited from the motor supply line. The field rheostat of the generator gives a one-dial adjustment over the entire welding range.

Portable Direct-Reading Circuit Tester

FOR locating open circuits and reading the resistance of circuits, the Roller-Smith Company, New York, N. Y., announces a small portable direct-reading circuit tester. The instrument is 4½x3x1½ in., and weighs only 19 oz. It includes a small high-grade d'Arsonval d.c. voltmeter, connected in series with a small dry cell. The arrangement is such that when the two terminals of the instrument are connected the circuit is completed. The instrument pointer will indicate full scale when the terminals are short circuited. The scale is arranged to read ohms directly from zero to 10,000.

The instrument is inclosed in a

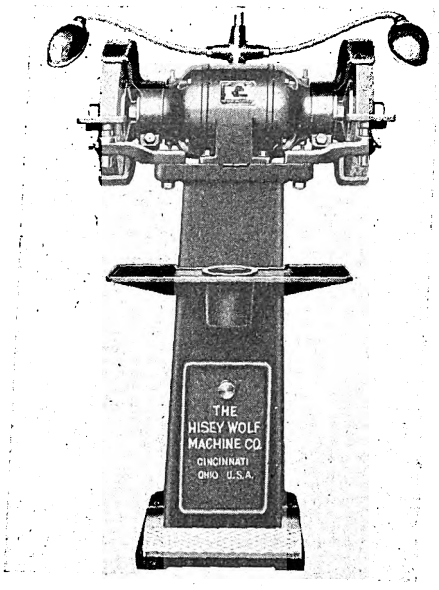


Improved direct-reading circuit tester

heavy sheet-metal case with black finish and is equipped with nickel-plated binding posts. An etched metal instruction plate is attached to the front of the instrument, which gives instructions regarding the checking of the calibration and replacement of the battery used in the instrument.

Automatic Grinder Lights

FORGETTING to turn off the light at the grinders is impossible when the new type automatic grinder light just brought out by the Hisey-Wolf Machine Company, Cincinnati, Ohio, is used. A conduit bracket supports the lighting fixture. Flexible metal holders permit adjustment to any desired position. Lights are



Grinder equipped with automatic lights and switch treadle

turned on or off automatically with the off and on switch of the control. Grinders are furnished with either push buttons or treadle switch. The treadle provides for turning off the current automatically as soon as the operator leaves the machine. The treadle extends the entire width of the column and permits simultaneous operation of two workmen.

Extension for Expansion Reamer

TO CONVERT the piston pin type of reamer into a steering-knuckle type a special extension, known as the King Bolt Pilot, has been designed by the Scully Steel & Iron Company, Chicago, Ill., for use with the Scully J.M.C. expansion reamers. One size of King Bolt Pilot will fit several sizes of J.M.C. reamers. The regular taper pilot bushings or guides as used with the piston pin type are used with the King Bolt Pilot to center the reamer.

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News *of the* Industry

A New Note in a New Year's Message

Eastern Massachusetts Street Railway sets forth its ideals. Urges men to meet criticism intelligently

R. B. STEARNS, vice-president and general manager, on behalf of the Eastern Massachusetts Street Railway, wished the public a happy and prosperous new year and outlined some of the ambitions of his company for 1929 as follows:

To continue to deserve the confidence and co-operation of the 140,000,000 of car and bus riders annually in 19 cities and 54 towns in Massachusetts.

To convince the public completely that it is cheaper, speedier, safer and more comfortable to ride in our cars and buses than to use their own automobiles.

To sell the idea to public authorities everywhere that unrestricted auto parking on highways in the business districts of cities and towns is not only unfair to the street railway but also to the traveling public.

To meet courageously, truthfully and intelligently all unjust criticisms of the road and to act promptly and decisively upon all well founded complaints and advice for improvement of service.

To follow up the campaign among blue uniform men (our salesmen) for courtesy founded upon the most effective business maxim, "The customer is never wrong."

To co-operate with highest efficiency and lowest possible fares consistent with the rights of property owners to obtain a fair and reasonable return on their investment.

In every carhouse, manager's office, repair shop and in the Boston office on Dec. 29 appeared the following notice addressed to employees:

Are you for your bread and butter? If so, don't be afraid to defend this street railway from unjust attack. To hold our jobs we must be one great big family, all for one and one for all. If we all pull together and do our best, nobody can do us any harm. We are for you. Are you for us?

Mr. Stearns put special stress upon the necessity of vigorous action by the municipal authorities involving what he described as "The Parking Crime" in the business streets of many cities. He said:

Almost every Saturday night in the majority of the cities where we operate the traffic tangles are indescribable and after a very careful study of actual conditions we are certain that this is due primarily either to the unregulated, half-hearted or unsystematic supervision of parked autos or the absence of any enforceable rules.

I say, all honor to the traffic policemen in every one of our cities and towns. During the past ten years I have never heard of a single instance in which a traffic officer did not do everything he reasonably could to give street car passengers a square deal.

Street cars and buses are moving highways. The people who ride in them are entitled to the right to be conveyed to their destination without being delayed and obstructed by parked automobiles.

Public highways were never built at great expense to taxpayers to become public garages. The merchant who believes that unrestricted parking helps him is making a monumental mistake. He might as well have the huge merchandise box in front of his store as a parked automobile.

Mr. Stearns contends that the streets belong to the busy man—not to the lazy and luxurious few. He asks why hundreds of people should be inconvenienced going to and from their work by someone who insists on leaving his automobile in the way of traffic. He asks why one citizen should be permitted to appropriate 150 sq.ft. of property for an hour or two, thus forcing all other citizens to scramble around at the risk of their lives. This, he says, is preposterous.

On Jan. 15, 1919, the Eastern Massachusetts Street Railway started out under public trustees on a career which has attracted country-wide attention.

It is the successor of the Bay State Street Railway and became a state operated railway under the provisions of Chapter 188 of the Special Acts of the Massachusetts Legislature of 1918.

Under this legislative act public control was to continue for ten years, and on Jan. 15, 1929, this period ended. The last session of the Legislature decided to continue public control for another five years. Messrs. Arthur G. Wadleigh and Fred J. Crowley, who have served for the ten years, were reappointed recently by Governor Fuller. The directors have chosen Lester Watson their representative among the trustees.

New Traffic Regulations Work Well

Effort of New York's Police Commissioner to bring order out of chaos in theatrical district successful. Minor modifications likely. Non-parking ban to be extended

DISTANCES which formerly took from eight to nine minutes to traverse under the old system of traffic control in the zone between Fifth and Ninth Avenues, and 39th and 52d Streets in New York can now be covered in an average of about four minutes under the new scheme of regulation during theater hours.

The initial test of the new system by which theater curtains are "staggered," parking forbidden, cruising taxicabs barred, buses forbidden to turn into their terminals to discharge their passengers and all turns prohibited went into effect on the evening of Jan. 21, with more that a tinge of carnival spirit and just a suggestion of the bizarre.

The most encouraging report and the one which led Police Commissioner Whalen to pronounce the new system "a huge success," was the one from his first deputy commissioner, Mr. Hoyt, who asserted traffic had been speeded up 50 per cent by the new system.

> THERE is no reason on earth why the streets should be turned into public garages. We expect to eliminate parking except for legitimate and actual commercial purposes.
>
> —COMMISSIONER WHALEN

Cruising over the whole area without taking advantage of the Police Department insignia on his automobile and without using the siren which takes the place of a horn on official cars, Mr. Hoyt tested out the new traffic regulations from the viewpoint of the average citizen. This is what he found:

At the peak of the early rush, the worst of the entire evening, it was possible to drive from Fifth to Ninth Avenue through 45th Street, with its eleven theaters, in the unheard-of time of four minutes after the no-turn rule became effective at 8 o'clock.

It took three minutes and four seconds to drive from Ninth to Fifth Avenue through 44th Street, while 42d Street, which has sixteen theaters and two car tracks, was traversed from Fifth to Ninth Avenue in four minutes, despite one delay for a trolley car discharging passengers.

Fifth and Ninth Avenues, where even the commissioner expected a jumble of traffic because it was from these thoroughfares principally that turns into the zone were to be made, were rivers of smoothly flowing traffic, on which it was possible to drive from 42d to 50th Street and back again in half the time it took under the old system of traffic control.

Deputy Chief Inspector Coleman, after surveying the outlying sections of the zone, pronounced the new system a success and declared that 42d Street was "just like the main street of a small town" while Commissioner Whalen's plan was in effect.

Pedestrians fitted perfectly into Commissioner Whalen's traffic demonstration. In fact, as the New York *Times* said, they had to do so. At each corner a sergeant and eight husky patrol-

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men saw to that. The man or woman afoot went ahead when the green light signaled that they might, and remained in groups on the corners when the red light gleamed against them. The sergeant and his sturdy men quickly overhauled any persons who sought to dash against the traffic and courteously but firmly shepherded the strays back to the curb.

If the traffic rules failed to give the walkers an "even break," the pedestrian had it all to himself in the side streets. All parking had been done away with and the streets never looked so wide or so empty. The man who was walking on the north side of the street and who decided that he would move down to the south side did not have to hurdle parked cars, or insinuate himself between the dirty bumpers of machines. He just walked over, and he had the whole street in which to do it.

Subway lines reported traffic increases during the theater rush period, while taxicab operators experienced a distinct falling-off in business. Railroad terminals reported that fewer passengers missed trains because of delayed passage through the theater zone. The suburban bus lines with terminals in the restricted area were only slightly affected by the parking restrictions.

On the Interborough's west side subway lines the traffic from the Bronx and upper Broadway from 8 to 8:45 p.m. was reported considerably heavier than usual. Operating officials of the company attributed the increase to the new regulations which, they believed, caused many to resort to the underground routes rather than enter the restricted area in motor cars. On the B.-M. T. lines the traffic from points north of Times Square was slightly heavier than normal. Both the I. R. T. and B.-M. T. reported that traffic from points south of Times Square was no heavier than usual. Operating officials of both companies expressed the belief early last night that the after-theater travel on their lines would be heavier than normal. However, no special preparations were made to handle any surplus traffic.

The group of suburban bus operators with terminals in the theater zone reported that they were but little affected by the new regulations because their schedules were already arranged to accommodate persons using the lines to return to homes in New Jersey and other suburban sections. Aside from slight inconvenience in foregoing left and right turns, causing them to change their normal routes a trifle, these transportation agencies suffered little from the new traffic rules. In most cases the buses remained in their terminals during the restricted hours, awaiting the closing of amusement places.

Mr. Whalen says the pedestrians are the greatest problem of the reformation experiment, hotel keepers, taxi-drivers' unions, garage-men's associations and others to the contrary notwithstanding.

The traffic control plan banished empty cabs from the zone bounded by Fifth and Ninth Avenues and 42d and 50th Streets between 7 and 9:30 o'clock, when the incoming traffic is at its peak, but under a subsequent modification, eight taxi stands have been designated at alternate corners of Fifth and Ninth Avenues. Officials of the hack bureau will be in charge of each station and upon receipt of a call from any hotel, will immediately give a driver authority to enter the zone "empty."

By this device five cabs will be allowed to park at each station, and the number will be replenished by drawing upon passing cabs as fast as the others leave.

As a result of his modifications establishing taxi stands and allowing baggage trucks in the zone, Mr. Whalen believes he has put to rest the fears of hotel owners, a committee of whom conferred with him on Wednesday and laid their grievances before him.

One hotel man among the delegation that conferred with the commissioner said abolition of parking added difficulties to guests unable to get accommodations at a hotel, for the driver isn't permitted to wait while they find out. Another claimed that the "no turn" rule, which lengthens taxying distances, increased the cost of the journey from certains hotels to terminals. Mr. Whalen said:

To restore parking and right turns would strike at the very heart of our plan, which has already demonstrated its worth. As for the first criticism, I see no reason why we should make any drastic change because of something that is the exception rather than the rule. Nor do I see any reason why the turns should be reinstated because of additional costs. It is already proved that the new plan has brought about a great saving in time, which is more than adequate compensation, I believe.

He told hotel men a perfect code of regulation cannot be made in a week and that no regulations could satisfy all the far-flung and diverse interests of any section. The disposition of merchants and others appears to be to give the commissioner a chance. One commentator said:

We are going to give Commissioner Whalen a good chance to regulate the situation. In my opinion, it is too soon to ask for changes. What if it does interfere with business a little at first? We firmly believe the bad features will be corrected as soon as he discovers any mistakes. The non-parking rule, the principal feature of the plan in my opinion, works splendidly.

Twin Cities Fares

The St. Paul City Council authorized an agreement with the Twin City Rapid Transit Company providing for the establishment of the same fare in St. Paul as may be ordered by the Minnesota Railroad & Warehouse Commission for Minneapolis. Since that time the state commission expert has recommended a fare of nine tokens for 65 cents compared with present rate of six for 40 cents and a cash fare increase to 10 cents from 8 cents for the Minneapolis system of the Twin City Rapid Transit Company.

$55,000,000 Extension of Boston "L" Suggested

Rapid transit extensions to cost $55,000,000 are proposed by the special transit commission which was authorized by the Massachusetts Legislature in 1927 to study the transportation problems of Boston.

Briefly, the proposition is to extend the Boston Elevated Railway by sending out rapid transit lines, subways and elevated structures, into the suburbs on all sides of Boston and to finance the project by a tax levy in all the cities and towns that will be benefited by it.

The plan has already been laid before the Mayors and the chairman of the selectmen in those cities and towns, and the complete plan with maps and charts will be presented to the Massachusetts Legislature within a few days. It is estimated that it would add from 28 to 30 cents per $1,000 to the tax levy in the various places.

Henry I. Harriman, who is chairman of the special transit commission, is now chairman also of the Boston Elevated Board of Public Trustees. He is strongly in favor of the plan, and may be influential in committing the Boston Elevated Railway to the proposal if the Legislature approves it.

Nine Suggestions for Chicago Solution

A statement of nine fundamentals for the settlement of the transportation problem in Chicago with the recommendation that agreement be reached on these fundamentals and that legislation be sought at the present session of the General Assembly has been submitted to the transportation committee of the City Council by railway interests of the city.

The Frankhouser sub-committee of the local transportation committee, however, has countered with objections to certain of the fundamentals, and considerable debate appears to be necessary before an agreement is reached. The Aldermen object particularly to providing for a straight out indeterminate franchise and propose instead an alternative of a fixed-term franchise for not to exceed 40 years, or an indeterminate franchise which will give the city a right to purchase the property, on reasonable notice, at the price fixed by the ordinance, with a further provision that all of the receipts in excess of operating costs, sinking fund and return to the company shall go to the city and be used for the amortization of the properties. Previously the aldermen had expressed themselves in favor of the terminable permit.

The nine fundamentals proposed by the companies are as follows:

1. A unified and comprehensive transportation system for Chicago, consisting of surface and elevated lines to be operated in connection with city-owned subways and supplemented by motor bus lines.
2. A service-at-cost, consisting of the items specified in the ordinance.
3. An indeterminate franchise on condi-

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tion that the city have the right to purchase the traction system at any time on reasonable notice at a price fixed by the ordinance and with the further provision that all or part of the receipts in excess of operating costs, sinking fund, and return to the company go to the city.

4. An agreed valuation on the existing railway properties to be known as the initial capital value, the cost of all expenditures for extensions and betterments to be added to the initial capital value.

5. A reasonable return to the company on its capital value, the initial rate of return to be specified in the ordinance and such rate of return to continue in effect until changed by order of the transit commission.

6. Agreement by the new railway company to spend the several amounts mentioned and during the respective periods set forth in the ordinance for extensions and betterments.

7. Agreement by the city to construct the subways specified and within the periods sanctioned in the ordinance and the equipment and operation of such subways by the new transit company; the cost of such equipment to be added to the company's capital account.

8. Establishment of home rule for Chicago by the creation of a local transit commission whose members shall be appointed by the city; the commission to have jurisdiction over the transportation company similar to that which the Illinois Commerce Commission now exercises.

9. A referendum and approval by a majority of voters voting thereon and the enabling legislation expressly so to provide before ordinance becomes effective.

Trolley Service in Methuen to Continue

About 200 residents of the Town Farm and Hampshire Roads districts of Methuen, Mass., who will be affected by the discontinuance of service by the Massachusetts Northeastern Street Railway, met recently and voted in favor of a proposal made by the Eastern Massachusetts Street Railway to supply service.

Attorney Edward McEnally, representing Earle Warwick of Malden, who filed a petition in Methuen to operate a bus line over the route of the Northeastern company, said that when the Massachusetts Northeastern Street Railway served a notice of discontinuance of service it thought only of the dollar.

Fred A. Cummings, vice-president, representing the Eastern Massachusetts Street Railway, said that if the Department of Public Utilities had not requested the Northeastern to run, and if the railway had not done so, he would have operated Eastern Massachusetts cars on that line and only force of arms would have stopped him. If the residents of Methuen wanted railway service the Eastern Massachusetts would purchase the line from the Northeastern. Mr. Cummings also stated that if this were done the Eastern Massachusetts would be unable to continue service permanently unless the Methuen Board of Selectmen and the Lawrence City Council revoked the franchise of the Northeastern and the transfer was approved by the Department of Public Utilities.

Relief Suggested at Grand Rapids

City consulting engineer advances proposal. Wants all common carrier transportation service under railway control

AN important move toward municipal subsidizing of the Grand Rapids Railroad, Grand Rapids, Mich., by taxation relief measures, at the same time grouping of all local common carrier transportation service under the control of the railway, has been made by Gerald J. Wagner, consulting engineer to the city, who has submitted a report to the City Commission dealing with the local transportation problem. Mr. Wagner backed his report with a recommendation for immediate consideration and action. Among other things Mr. Wagner recommended:

Elimination of the requirement that the railway pay for the construction of pavement between the tracks.

Reduction of taxes to a point where the railway can compete with bus operation.

Authorization of the railway to purchase a taxi system and sufficient additional buses so that special group service can be given, ranging from individual taxi service, group bus service up to 31-passenger bus capacity or more, and also regular mass transportation and rail cars and buses operating on regular schedules.

Insuring the railway reasonable protection on its investment providing it furnishes adequate rail, bus and taxicab service to meet the demands of the public as called for by good city transportation practice.

Elimination of one short avenue line and substitution of a bus line that will serve a larger patronage.

Special peak hour service from several points.

Group service from a number of points.

Taxicab service from any part of the city to any other part on call.

By placing the foregoing recommendations in effect, Mr. Wagner said, the common carrier transportation service furnished will not only conform to the standard city transportation practice, so far as routing and the territory served is concerned, but it will also permit individual and special group service to be rendered for the benefit of both the company and the city, namely:

By having the company handle all the common carrier service an earnest effort will have been made to increase the earnings of the company to a maximum before actually subsidizing it, through general funds, for the return, taxes and depreciation on the amount already included in its investment for pavements, which would be approximately sufficient to permit the company to earn enough to insure new capital for its business.

It will also reduce to a minimum the congestion in the downtown section.

It will produce the greatest general efficiency in the common carrier transportation service, thus reducing to a minimum the amount which the city must necessarily consider in the future as a subsidy to the common carrier transportation service to attract sufficient capital to insure to the city in the future continuous, reliable and efficient transportation service to meet the economic needs of the city.

In further detailing his report, Mr. Wagner says:

From our experience during the last ten years, it is evident there are two outstanding conditions which have been constantly before us as they relate to the handling of mass transportation in the city:

The growing use of the individually owned automobile.

The elimination from the existing mass transportation system owned by the company of many of the burdens carried by the system and which have prevented it from earning sufficient on the "fair value" of the property after paying operating expenses, taxes and depreciation to safeguard the existing capital in the property and to encourage the owners to place new money in the property for rehabilitation and new capital requirements.

Publication of this report and its recommendations in the local newspapers has brought favorable editorial comment and also supporting comment from the readers of those newspapers. The Grand Rapids *Herald* said editorially:

Boiled down to its ultimate, the report by Consulting Engineer Gerald J. Wagner means that, if Grand Rapids is to continue to have railway service, patronage must be increased or the burden upon the railroad must be decreased. That plain gist of the expert's opinion is borne out by even the most superficial study of the company's records and reports.

While the population of the city and its environs has been steadily growing, the railway's patronage has been as steadily falling off. It now has reached a point where, unless something is done, this metropolitan area of 190,000 people will be deprived of all transportation service except such as is provided by buses, taxicabs and private motor cars. To abandon rail service would be to handicap the city's retail trade immeasurably. In fact, directly all community relationships would feel the loss.

The best way out of the difficulty, of course, would be to increase the company's revenue. But it is the general opinion of experts, both those retained by the city and the company's agents, that no further increase in fares is feasible. Only one other alternative remains: Easing the burden of financial obligations which the company is required to carry.

The outstanding opportunity for action is in the matter of payment for pavement between the tracks. The railroad now is required to pay for this pavement as well as for one foot on either side of the rails. Taxicab companies and bus lines, which compete with the railway, make no such contribution, although they use the streets.

One attempt was made by referendum to eliminate this paving burden, but it failed. At that time, however, the city did not confront a definite crisis as regards rail transportation. It is not improbable that, if the issue were properly presented at the spring elections, the vote might be reversed.

We have seen, in the case of our interurban lines, what can happen when motor car competition traveling over publicly maintained roads takes away the business of a railroad. The same thing can happen in Grand Rapids to a railway service which is nationally recognized for its efficiency. And Grand Rapids does not want that to happen.

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Railway and Vehicular Tunnel Suggested for Baltimore

A tube under Franklin Street, from Howard to Calvert Streets, providing for both street car and vehicular traffic, is one of the outstanding recommendations made by the Baltimore Traffic Committee, appointed some months ago by Mayor William F. Broening. In considering the matter the committee resorted to the use of checks made by the United Railways & Electric Company and the report rendered three years ago by Kelker, De Loeuw & Company in making its survey of the existing conditions. Dean J. Locke, of the United, was one of the members of the committee.

The committee confined its first report to suggestions dealing with east and west traffic, but will report later on north and south traffic. Only the downtown section of the city was under consideration. As a preliminary measure to afford relief from a condition conceded to be bad, the committee suggested a no-parking plan to be followed by adoption of other measures from time to time. The United Railways & Electric Company has been a strong advocate of no-parking in the downtown section of the city but previous efforts to bring this about have met with failure.

The committee suggested the Franklin Street tunnel plan for future consideration. It was pointed out that the tunnel would eliminate many curves on the route of the No. 4 cars of the United. It also was explained that traffic using the tunnel could be diverted north or south on Calvert Street to a proposed viaduct on Bath Street, or to Pleasant Street.

The United is deeply interested in the proposals which have been made by the committee. It operates cars on all the streets dealt with in the report.

$5,600,000 Municipal Transportation Bond Issue at Detroit

A proposed bond issue of $5,600,000 has been approved by the City Council at Detroit, Mich. The proposition, which was recommended by the Street Railway Commission, was presented to the Council by City Controller Percy L. Monteith and John H. Morgan, city statistician and auditor for the Department of Street Railways.

Of the proceeds of the issue, $1,270,000 would be used for 200 new buses, including the 120 now in use in the de luxe service, and $1,360,000 would be used to pay for the 100 new Peter Witt type street cars, delivery of which is to start in March, it was announced. It is proposed to use the balance, amounting to $2,970,000, in the improvement and extension of the municipal lines.

It was pointed out by the controller that the bonds could be issued as budget bonds, and that it would not be necessary to have the bond issue approved at a general election. A possible annual saving of $125,000 in interest would result, as the budget bonds could be sold at 4½ per cent interest, whereas most of the bonds outstanding against the Department of Street Railways bear interest at 6 per cent.

If the proposed bond issue is sold, the total indebtedness of the D. S. R. will amount to $31,000,000. This includes the sum which the department still owes to the Detroit United Railway on the contract for the purchase of the lines.

What Governors Had to Say

Incoming Governors of 1929 gave little or no attention to the study of transportation although they stressed the importance of highway appropriation and development. This characterization applies to messages to the Legislatures of Maine, Connecticut, Vermont, South Carolina, Indiana, Wisconsin, Delaware, Tennessee, North Dakota, Iowa, Arizona and Montana. On the subject of New York's highways Governor Roosevelt told the Legislature that the whole problem was so involved in the broader subject of taxes and of budget that he would present it later.

With more specific application to the railway field were the messages of Governor Allen of Massachusetts, Governor Caulfield of Missouri and Governor Emmerson of Illinois.

As mentioned in these pages before, Governor Allen, referring to the problem of the Boston Elevated, said that it was his hope that the experience of past Legislatures joined to the fresh vigor of a new one would find an equitable solution and place the matter on a sure foundation. He believed a continuation of the present policy of private ownership and public control was the most economical and the most efficient method of solution. At the end of a stipulated period of public control, the situation should be susceptible to such revision as conditions and circumstances might indicate as desirable.

He also asked the Legislature to look with favor on a program for liberal extension of rapid transit lines, based on the thought that such extension and improvement of service benefit not simply those who ride upon the cars and trains but the entire community. He recommended that the Legislature approach all proposals for transportation improvement with the thought in mind that the cost of such rapid transit extension should be borne by others than the car riders, said a report would soon be made public on the study of the transportation needs of Boston, Chelsea, Revere and vicinity and recommended additional legislation if necessary for the construction of the East Boston tunnel.

Governor Henry S. Caulfield in his first message to the Missouri General Assembly recommended that the Missouri Public Service Commission be facilitated in the making of rate-base valuations for public utilities through the amending of the laws which now hamper this work. On this point the Governor's message reads:

At present the Public Service Commission is restricted in its important function of finding valuations for rate-making purposes, by the method of making appropriations, although this expense is not paid by the State Treasury. I recommend that the law be amended so that valuation work is not hampered or delayed by these artificial restrictions.

Governor Louis Emmerson of Illinois in his inaugural address at Springfield, Ill., delivered before a joint session of the General Assembly, dwells at length on public utilities and the state's functions in their regulation.

On these points the Governor's message reads:

The purpose of public utility regulation is to provide ample protection for the public from exorbitant rates or insufficient or unsatisfactory service. This purpose is not served by hampering development of utility companies or preventing their earning a fair return on investment. Regulatory supervision and laws which cripple utilities are no more in the interest of the public good than are those which give to corporations an undue advantage in service or charges. An honest, impartial and intelligent exercise of the regulatory powers of the State Commerce Commission will be the established policy of this administration.

Perhaps the most important utility legislation to come before this Assembly will be in relation to the Chicago traction problem. The franchise of the Chicago surface lines, which carry about three-fourths of the entire transportation load of the city, expired two years ago, and since that time the properties have been operated under temporary permits extended from time to time. The north and west side lines are in federal receivership and the owners of the properties have found it impossible to make needed extensions and improvements because of their inability to borrow money pending the securing of a grant from the city.

Involved in this franchise question is the proposal, discussed for many years, of a unification of surface, elevated and bus lines and the construction of subways.

Obviously, this is a Chicago problem and the people of that city and the traction companies should agree upon the necessary enabling legislation before asking for action by the General Assembly.

The Governor pledges the Assembly and the state administration to assist in any effort upon which there is a general agreement, for all appreciate the need of improved local transportation in the metropolitan area in order that Chicago may continue to expand and develop.

Paving Debt Paid in Poughkeepsie

A sum in excess of $109,000 was paid recently by the Poughkeepsie & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., to the city in settlement of paving debts. A stipulation filed in the office of the County Clerk states that the projected suit against the company to recover the full amount of $190,382 in paving assessments shall be discontinued. The claims arose out of a provision that the railway must pay for paving between its rails and for 2 ft., each side of the rails.

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Joint Association Meetings in Missouri

Following are programs which have just been completed for the joint meeting of the Midwest Electric Railway Association and the Midwest Claim Agents Association to be held in the Robidoux Hotel, St. Joseph, Mo., Feb. 7-8:

MIDWEST ELECTRIC RAILWAY ASSOCIATION
THURSDAY, FEB. 7, 1929

"A Fair Fare for Every Customer," by Walter Jackson, fare and motor-bus consultant, New York City.

"Interurban Fares," by Robert B. Campbell, president and general manager Arkansas Valley Interurban Railway, Wichita, Kan.

"Urban Fares," by William B. Bennett, director of research St. Louis Public Service Company, St. Louis, Mo.

Discussion of fares led by H. B. Cobban, general manager Northeast Oklahoma Railroad, Miami, Okla.

Round table luncheons to continue discussion of fares

Interurban, chairman, Robert P. Woods, president Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.

Street Railways, chairman, Charles A. Semrad, vice-president and general manager St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

"Development in City and Interurban Equipment," by Charles O. Birney, superintendent of car construction Stone & Webster, Inc., St. Louis, Mo.

"Good Will and Employee Cooperation," by C. D. Porter, vice-president and general manager Omaha & Council Bluffs Street Railway, Omaha, Neb.

Banquet and dance, Robidoux Hotel, for both associations

"Forty-six Years," by Earl W. Hodges, director of personal relations Henry L. Doherty & Company, New York City.

JOINT MEETING
FRIDAY, FEB. 8, 1929

"The Legal Aspects of Operation," by H. S. Robertson, president Denver Tramway Corporation, Denver, Col.

Discussion, led by D. L. Fennell, general superintendent of transportation Kansas City Public Service Company, Kansas City, Mo. and D. M. Finch, claim agent Des Moines City Railway, Des Moines.

"Interurban Claims," by H. C. White, division claims attorney Illinois Terminal Railroad, Decatur, Ill.

Business Session

MIDWEST CLAIM AGENTS ASSOCIATION
THURSDAY, FEB. 7, 1929

President's address, by G. R. Whitmore, general claims attorney Illinois Terminal Railroad, Peoria, Ill.

Report of Executive Committee.

Report of Secretary-Treasurer.

"Industrial Surgery," by Dr. J. F. Hassig, surgeon Kansas City Public Service Company and president of Kansas State Medical Association.

Discussion

"Motor Vehicle Accidents," by Von L. Baker, claim agent St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.

Discussion

Luncheon, followed by round-table discussions

"Blind Accidents," by W. B. Bracken, claim agent St. Louis Public Service Company, St. Louis, Mo.

"Safety," by H. M. Shaw, insurance and safety engineer Illinois Power & Light Corporation, Chicago, Ill.

"Law Suits," Trevor Neilson, general claims agent East St. Louis & Suburban Railroad, East St. Louis, Ill.

Employee Education Vital

Holding its first meeting at association headquarters, New York City, on Jan. 14, the committee of the Transportation & Traffic Association on the employee decided to continue the study of certain subjects brought out in the report of last year's committee on employee-customer contact, of which it is, to an extent, the successor. The education of the employee, with particular reference to motormen and conductors, in matters relative to their company's economic status was placed first in importance, and a sub-committee, consisting of S. E. Emmons, chairman; H. H. Fenton, E. C. Spring, Jeff. L. Alexander, F. W. Allen, B. W. Arnold and Tom P. Walker, was appointed to study this subject.

In recognition of the excellent results report from Boston and from Cleveland in the study of accident-proneness, it was decided to continue the study of this subject, to which a sub-committee consisting of Dr. Slocombe, C. H. Evenson, L. P. Baurhenn, A. LeRoy Hodges, D. C. O'Dowd, R. M. Reade and R. W. Emerson was assigned. A third sub-committee, to cover the subject of selection and follow-up, was composed of W. Frank Persons, E. K. Miles, D. A. Scanlon and A. W. Brohman. Leslie Vickers, economist on the association staff, was directed to act as ex-officio member of each sub-committee. The committee will hold its next meeting in Chicago at some date to be announced later.

Among those who attended the meeting were R. W. Emerson, chairman, H. H. Fenton, C. S. Slocombe, S. E. Emmons, E. K. Miles, E. C. Spring, Leslie Vickers, Guy C. Hecker and J. W. Welch, general secretary.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Jan. 28-Feb. 1*—American Institute of Electrical Engineers, annual convention, 33 W. 39th St., New York, N. Y.**

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***May 1-3*—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***June 21-22*—New York Electric Railway Association, Bluff Point, N. Y.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

More Subway and Vehicular Tunnel Talk in New York

A plan for the construction of a subway and vehicular tunnel from the northeastern district of The Bronx through the east side of Manhattan, thence to Brooklyn, to be undertaken by private capital at a cost exceeding $400,000,000 and turned over to the city "at the end of a reasonable period for the amortization" of the investment, is announced on behalf of a group of business men by Logan Billingsley, president of The Bronx Chamber of Commerce. Nominal toll charges for vehicles using the tunnel and subway operation at a 5-cent fare are planned, Mr. Billingsley declared.

Wage Increases on Illinois Lines

The 1,500 motormen, conductors and bus drivers employed by the Illinois Traction System (The Illinois Terminal Railroad) have received wage increase ranging from 3 cents to 6½ cents an hour. This brings the wage scale of all motormen and conductors, whether new or old employees, to 70 cents or more an hour. This new agreement has been signed by the company and the five local unions with which its employees are affiliated. It provides that motormen and conductors in passenger service who formerly received 67½ cents an hour will receive 70 cents; motormen and conductors in freight service who were paid 70 cents will receive 75 cents, and operators of one-man buses have been raised from 60 cents to 66½ cents an hour. Increases date back to Dec. 1.

Substitution Considered on Ohio Interurban

Whether the Cincinnati, Lawrenceburg & Aurora Traction Company is to substitute buses for electric cars on the portion of its line within the city limits of Cincinnati, Ohio, or even for its entire length from Aurora into Cincinnati, is under consideration. This was developed at a public hearing held on Jan. 17 by the traffic committee of City Council. Charles H. Deppe, president of the railway, said that owing to the death of Charles A. Hinsch, illness of other directors of the company and

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engineering considerations, he was not prepared to make a statement at present, but hoped to be able to do so within two weeks.

Mayor Seasongood suggested that a report that had been made on the subject by City Manager Sherrill should be read. This disclosed that under plans of the Cincinnati Street Railway it was proposed that the cars of the Aurora interurban road stop at the corporation limit and that buses be used into the city from that point. That would eliminate the necessity of changing cars at Anderson's Ferry inside the city. Colonel Sherrill added that the interurban was considering plans for substituting buses on its entire route from Aurora. Mr. Deppe replied that no plan as yet had been approved by the directors of the company. On motion of Mayor Seasongood, it was decided to meet again on Jan. 29 when a final decision would be made by the company or city.

Service Threatened in Muskegon

The first railway in Michigan and the third in the United States to be operated electrically, when "juice" took the place of mule and horsepower—the Muskegon Traction & Lighting Company, Muskegon, Mich.—probably will be abandoned unless a fare increase is granted. This action has been forecasted by an announcement by B. A. Powell, vice-president and general manager, that a continuance of decreased revenues will make continuation of the service impossible. His announcement will be laid before the City Commission immediately, and a hearing requested at an early date.

Mr. Powell declared that necessary repairs and capital outlay could not be made, that safe operation could not be continued with the present low revenues. He announced that for more than fifteen years the lines have been operated at a loss, failing even to pay interest charges. The increased use of private automobiles and buses, not only by business and professional men, but by factory workers as well is cited as the cause of the present crisis. Only at rush hours are the cars paying their way.

Seven years ago, Muskegon Heights voted 8 to 1 in favor of cars over buses and until recently the Muskegon City Commission co-operated with the company by rejecting applications for competing bus lines. Lately, however, this policy has been abandoned by the broadening of bus service to parallel or overlap car lines. This is said to have been another factor in the traction company's decision. At the same time, the possibility of abandoning the railway has been discussed and the Muskegon Heights City Council, in considering bus applications now pending, questioned operators as to their ability to supplant the cars in the near future.

Rates of fares in Muskegon are: Buses, 5 cents; street car, 10 cents cash or four tokens for 30 cents, with a 6-cent fare for school children.

Recent Bus Developments

Bus Growth Considered

Massachusetts board discusses expansion of these lines. Has new classification of accounts in preparation for such carriers

THE Massachusetts Department of Public Utilities, the state regulatory body, has decided that railroads should not operate short hauls in and out of terminal points, or make too frequent stops, but that such service should be left to the electric railways and the bus lines. This policy the department enunciates in its annual report just sent to the Massachusetts Legislature. It may mean that in the future the department will allow more stations and stops in the Boston suburbs to be discontinued. It has been argued that the short hauls should be left to the Boston Elevated and the Eastern Massachusetts.

Eighty Motor Bus Companies in Massachusetts

On the operations of electric railways during the year the department makes this general report:

We pointed out in our last annual report that there had been a marked increase in the abandonment of electric railway tracks. This tendency has continued during the year covered by this report and electric railways operating lines in country districts and thinly settled areas have continued to abandon street railway tracks and to substitute bus service therefor. The Milford & Uxbridge Street Railway went into the hands of a receiver, was reorganized and then abandoned all its railway tracks, substituting bus service therefor. The Middlesex & Boston Street Railway has continued to abandon electric railway service, substituting buses therefor. During the year this company abandoned all railway operation in Waltham. The Boston Elevated Railway has established more bus routes as feeders to its main lines. The municipally-owned Norton, Taunton & Attleboro Street Railway has been abandoned and three other companies have gone into the territory formerly served by it, each taking a part thereof to be served by buses.

Regarding the bus lines in the state the department report says:

There are now 89 motor bus companies operating in various sections of the state under certificates granted by the department, including those operated by electric railways and by subsidiaries of railroads.

The department has in preparation a new and more comprehensive classification of accounts and form of return for bus companies under its jurisdiction, which it hopes to make effective in the near future.

During the year the department granted certificates of public convenience and necessity to eleven operators of new bus lines, while 69 additional certificates have been granted to holders of certificates, mainly electric railways, for extensions of bus service. The certificates issued to new licensees, with one exception where transportation had previously been rendered by an electric railway, have been for lines wholly local in character and confined to a service within the limits of single municipalities.

Pennsylvania Buys Into Long-Distance P.R.T. Lines

The Pennsylvania Railroad announced on Jan. 21 that plans had been adopted for the complete co-ordination of rail and bus passenger service in the territory served by its system.

The service will be established progressively where need exists or arises either in the public interest or to encourage the continued development of the company's general passenger traffic.

When arrangements are completed under this broad plan, passengers over specified routes may be offered the option of making their journeys partly by rail and partly by bus, using sleeping cars at night and buses for all or part of the daylight hours of the trip.

This will extend to joint rail and bus travel, the same principle which is contemplated in the joint rail and air transcontinental service to be established by the Pennsylvania Railroad and other interests during the coming spring.

As a step preliminary to putting into effect this general plan for the co-ordination of rail and bus service, the Pennsylvania Railroad makes the further announcement that it has acquired a substantial interest in three bus companies operating lines radiating from the city of Philadelphia and its vicinity, and heretofore owned in entirety by the Philadelphia Rapid Transit Company. The companies in question are the following:

Peoples Rapid Transit Company, Inc.—Operating 76 buses and providing service between Philadelphia and New York; Philadelphia and Atlantic City; Philadelphia, Wilmington, Baltimore and Washington; with special excursions to Valley Forge, Buffalo, West Point and other places of interest.

Montgomery Bus Company — Operating seventeen buses and providing service between Philadelphia (at 63rd and Lancaster Avenue), Rosemont and Garrett Hill, via Lancaster Pike; Ardmore and Gladwyne; Rosemont, Wayne and Strafford.

Philadelphia Suburban Transit Company, Inc.—Operating thirteen buses and providing service between Philadelphia (at 63rd Street and Lancaster Avenue), Ardmore and Bryn Mawr, via Montgomery Pike.

Acquisition of shares in these lines, and establishment of working relations with them, follows the incorporation last September of the Pennsylvania Railroad's subsidiary, the Pennsylvania General Transit Company, which has applications for certificates of public convenience in various counties of Pennsylvania pending before the State Public Service Commission.

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De Luxe Express Route in Jacksonville

Jacksonville witnessed the inauguration of a de luxe express bus route with four Twin coaches between Murray Hill, Avondale and the downtown business district on Jan. 14, as a manifestation of the desire of the Jacksonville Traction Company generally to improve and increase service throughout the city. The service brings Murray Hill closer to Jacksonville. It gives a part of Avondale transportation service for the first time.

The fare is 10 cents or a token and 3 cents. The weekly pass and the school tickets are not accepted. Passengers riding in buses may transfer to any car line in the downtown section except the Murray Hill car line. Passengers commencing their trip on a street car and desiring to transfer to the bus line pay a 10-cent fare on the trolley and ask for a transfer to the bus line at the time the fair is paid. A specially designated transfer is issued to those transferring to the bus line to avoid confusion. This transfer must be issued when the fare is paid.

Transfers are accepted on the bus at Laura and Forsyth Streets, Broad and Adams Streets, and the Union Depot. Persons living in Murray Hill, who desire to use the weekly pass, tokens or school tickets, may board the bus in Murray Hill and transfer to the Murray Hill car line at the end of the car line. Persons leaving the city on a weekly pass, tokens or school tickets for Murray Hill may transfer to the bus at the end of the car line.

Buffalo Line Approved

A certificate was granted by the Public Service Commission on Jan. 17 to the International Bus Corporation for the operation of a bus line in Kensington Avenue, Buffalo, between Bailey Avenue and the east city line. The new line will be operated in connection with the Bailey Avenue bus line and the International Railway's cars. The recent action of the commission is in response to demands for service. The city consented to operation of the bus line on Nov. 12, 1928.

Rights Approved for Geneva Railway Bus Lines

The Public Service Commission of New York has granted a certificate to the Geneva Railway Bus Lines, Inc., for the operation of a bus line between Geneva and Seneca Falls, passing through Waterloo and the towns of Waterloo and Seneca Falls, with a branch line from Geneva along Seneca Lake to the Geneva-Seneca Falls highway.

The bus line will serve territory formerly transversed by the railway connecting Geneva, Seneca Falls and Auburn, now discontinued. Evidence submitted at the hearing showed that operation by the buses resulted in a 68 per cent increase in passengers over the number carried in the cars of the railway company.

Buses will operate on practically the same schedule as the railway with more frequent trips if necessary. The same fare will be charged.

Favors Substitution on Berkshire Line

No definite opposition to the Berkshire Street Railway's petition for authority to substitute buses for electric cars, where it may seem necessary to reduce operation costs on its 90-mile system, was voiced at the hearing on the proposal held by the Massachusetts State Public Utilities Commission in Boston on Jan. 17. Representatives Sisson of Pittsfield and Akeroyd of Lanesboro spoke in favor of the petition.

C. Q. Richmond, manager, said that the company formerly did a gross business up to $1,200,000 annually, but last year it was less than $700,000. He said the company had succeeded in paying taxes and meeting operating expenses, but had been obliged to suspend dividends. The plan would avoid the necessity of obtaining separate franchises for bus lines from the various cities and towns served.

New Service Planned in Bethlehem

The Bethlehem Transit Company, a 6-mile line, which carried people from Center Valley and intermediate points into the city of Bethlehem, Pa., to their work, has been dissolved. The climax came recently, when the Mayor and City Council ordered the company to repair its roadbed within the city of Bethlehem, because of danger to automobile transportation. In some places the tracks extended several inches above street level. Upon failure of the company to comply with the order, the city sent a squad of workmen to the tracks where, guarded by platoons of police, the offending rails were torn up. This in itself sealed the eventual fate of the organization.

Patronage on the line, which extends principally into the rural sections, has been steadily falling off. Yet there is a considerable amount of passenger traffic at certain hours.

Coincident with the announcement that the line was disbanded, the Lehigh Valley Transportation Company, the bus line subsidiary of the Lehigh Valley Transit Company, promised that the route formerly covered by the Bethlehem line would be served with the company's buses.

The bus proposition was advanced by H. F. Dicke, vice-president of the Lehigh Valley Transportation Company, which is dickering with the Bethlehem Chamber of Commerce to stand any loss under $10,000 which the organization might sustain in the first year of its operation.

Gasoline Tax Bill in New York

A second gasoline tax bill was introduced in the Assembly on Jan. 14 by Louis A. Cuvillier, Democrat of New York, imposing a tax of 2 cents a gallon of motor fuel. The bill contains the section providing for refunds of tax, and/or exemptions in the payment of tax for purchase of gasoline not intended for motor fuel use. Under the Cuvillier bill the state would retain 10 per cent of the total amount of tax collected.

The receiver of taxes of the city of New York would receive 50 per cent of the amount of tax collected in New York City, such moneys to be used to reduce taxes, while the residue would be distributed to the county treasurers of the various counties in the proportion that their total road mileage outside of cities and incorporated villages bears to the total road mileage of the state.

Agitation for All Buses on Broadway, Louisville

Whether or not street cars on Broadway shall be replaced by buses is a problem before city officials and officers of the Louisville Railway, Louisville, Ky. Elimination of cars was suggested in a report of the Jefferson County Grand Jury, following an inspection of safety zones, or concrete monument type standards, on Broadway. Railway officials contend that installing enough buses to care for Broadway traffic would entail further outlay that probably would result in a 15-cent fare.

At present street cars are used on Broadway only for express service through the street and buses make the local stops in a combination service, which has proved very satisfactory. One opinion is that neither the street cars nor the buses are at fault, but merely the motorists, or perhaps the city in not having the loading stations properly marked. In fact, the loading station had proved so practical that the board of safety recently went over plans for installing many more of them.

James P. Barnes, president of the railway, contends that a move to eliminate the cars, if carried into effect, would be merely a burden on the public, and cites the financial costs. He also held that to move all traffic by bus on Broadway would add to the unit cost more than that of trams. He said:

If there is a traffic problem on Broadway it is not caused by street cars or buses. More than one-third of the passengers hauled over Broadway each day are by street car. A traffic survey showed Broadway at peak hours to be only partially filled with street cars, buses, automobiles, etc., that is, from a capacity standpoint. This does not represent congestion.

Arthur A. Will, former Mayor of the city, and now chairman of the board of safety, favors the elimination of street cars. Sharing the view of others he has the idea that Louisville should have a Fifth Avenue, like New York, or a Michigan Boulevard, like Chicago.

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Financial and Corporate

No Extension of Piedmont & Northern Railway

The petition of the Piedmont & Northern Railway to have the adverse order of the Interstate Commerce Commission on a proposed extension of its lines set aside has been dismissed by a special court formed to hear the case, in an opinion filed at Greenville, S. C., by Clerk D. C. Durham, of the Federal Court of Western South Carolina.

The opinion of the court was written by Judge Morris A. Soper, United States district judge at Baltimore, and concurred in by Judge Elliott Northcott, member of the Circuit Court of Appeals at Richmond, and Judge Edmund Waddill, Jr., senior circuit court judge of the Circuit Court of Appeals at Richmond.

The Piedmont & Northern is seeking permission to extend its lines. This permission was denied by the Commerce Commission on the grounds that the proposed new line paralleled the Southern Railway and that the territory it is proposed to serve is adequately served.

The Piedmont & Northern is an electric railway owned by the Duke interests. The company's lines run from Greenwood, S. C., to Spartanburg, S. C., and from Gastonia, N. C., to Charlotte, N. C., with some minor branches. The proposal is to link up the existing track and to extend the line from Charlotte to Winston-Salem, N. C., giving a continuous line of approximately 250 miles.

The railway claims that the Commerce Commission is without jurisdiction because of the interurban character of the road and also because the project, it is alleged, was begun before the regulatory body was given jurisdiction in such cases.

The Southern Railway and most of the other steam railroads that operate in North Carolina opposed the proposed extension.

It has since been learned that the railway will appeal its case against the Interstate Commerce Commission to the United States Supreme Court.

City Offers $604,463 for California Cable Line

City Engineer M. M. O'Shaughnessy, of San Francisco, Cal., has estimated that all the city can afford to pay for the parts of the California Street Railroad Cable Company's property it can use is $604,463. This estimate the city engineer made public on Jan. 9 at a conference of city and cable company officials at the City Hall. The conference was called to discuss measures for taking over the cable company properties, franchises on parts of which expire next month. Herman Pfleger, representing the company, said:

If that is an offer we can tell you right now we won't accept it. It's not enough by a long way.

The parts of the system the city contemplates merging with its municipal lines are the California Street and Hyde Street trackage. It does not want the O'Farrell Street line.

Mr. O'Shaughnessy said it would cost $1,762,000 for the city to produce new the parts it wants and that the depreciated value of these parts is about $903,704.

The whole cable system new would cost $2,252,458, he said, and its depreciated value would be $1,097,404.

The figure of $604,463 quoted by the City Engineer as "all the city can afford for the parts it wants," means, he said, the figure at which the city could operate on a 5-cent fare, make a reasonable profit and retire bonds after 25 years.

Attorney Pfleger assured the conference that even though franchises expire there will be no interruption of service until some agreement is reached.

Bankers Discuss Baltimore Situation

SECURITIES of the United Railways & Electric Company, Baltimore, Md., exhibit little change in quotation and a minimum of public interest. Until the litigation affecting the future of this corporation approaches nearer to a conclusion or, more desirably, the earnings exhibit a definite rising tendency, there is likely to be little activity in these issues notwithstanding the low prices at which they are now quoted.

The Public Service Commission of Maryland, in its reply to the company's court proceedings, is reported to have said that it considered the fare permitted as adequate, on the ground that the authorized fare is all that the service is worth. Surely this is unusual logic with which to answer forcible argument.

A public service corporation must be compensated with adequate return upon invested capital and its credit maintained; otherwise, the service eventually ceases, to the discomfort and inconvenience of the public. It sounds like the ridiculous assertion that no hat is worth more than $3, therefore the sale of hats at a higher price should be prohibited. Our street car service is no luxury, it is a vital necessity. Destroy it and any other class of service which would essay to take its place will be considerably more costly to rider and taxpayer alike.—*Nelson, Cook & Company.*

$17,500,000 Value Placed on Nashville Property

Fixing the valuation of the property of the Nashville Railway & Light Company, Nashville, Tenn., at $17,500,000 with a total valuation of depreciable property of $13,950,000 as of June 30, 1926, as a basis for computing the rate of return, the State Railroad & Public Utilities Commission has ordered the company to operate the railway and electric divisions as joint property and compute the rates from the net results of this joint operation.

The valuation of the combined property of the company on the basis of reproduction cost less depreciation as of June 30, 1926, was placed at $23,083,706, according to a report submitted at the hearing in August, 1927, by William J. Hagenah, Chicago, engineer who represented the company. An audit of the company's books showed the railway division was not at the date of the report on June 30, 1926, earning a reasonable return on the investment in railway property and the deficit had to be made up by the return from the light and power department. It was pointed out at the hearing held in August, 1927, that in one other instance when the railway fare of another company had been increased by the order of the commission, there had been no corresponding increase in earnings.

Elements such as the historic cost, original cost, reproduction cost and the power of the commission to fix such rates as will give an adequate return, coupled with the ability of the utility to collect such rates and make an adequate return, were considered by the commission before giving its opinion and order.

The opinion of the commission regarding the valuation of the property was rendered as the result of a petititon filed by the Railway & Light Company on March 20, 1926, in which the company asked for a revaluation of its property. The commission, acting upon the request made in the petition, appointed Albert S. Richey, Worcester, Mass., to represent the commission in making an inventory, and the Railway & Light Company appointed William J. Hagenah, of Chicago, to represent the company.

Under the direction of these two engineers, a complete appraisal of the company's property was made and a report presented at a hearing held on Aug. 8, 1927. Because of the large amount of detailed work necessary in its preparation, more than a year was required to compile the report in a form to be presented to the commission.

Final Accounting for Two Massachusetts Roads

Judge Wait of the Supreme Court has ordered a distribution of the money remaining in the hands of Walter Adams, receiver of the Milford & Uxbridge Street Railway and the Millford, Holliston & Framingham Street

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Railway, Framingham, Mass. This ends the litigation over the affairs of these companies, before the courts since July 28, 1926, when the American Trust Company and the Old Colony Trust Company, Boston, Mass., as trustees for bondholders, filed bills in equity to foreclose mortgages on the properties to secure payment on the bonds.

Judge Wait's final decree provides for the payment of $47,846 to the Old Colony Trust Company for the bondholders of the Milford & Uxbridge line and $38,756 to the American Trust Company for bondholders of the Milford Holliston & Framingham Company. There are $335,000 of bonds of the Milford & Uxbridge and $165,000 of bonds of the Milford, Hollister & Framingham outstanding.

The two companies were formerly controlled by the Boston & Worcester Street Railway. They are now operated by a new company, namely: the Milford, Framingham, Hopedale & Uxbridge Street Railway, which acquired the lines at foreclosure.

Lower Net on Brooklyn City

For the six months' period ended Dec. 30, 1928, passenger revenue of the Brooklyn City Railroad, Brooklyn, N. Y., was $5,580,706 against $5,638,188. Operating expenses and taxes increased from $4,942,424 for the 1927 period to $4,966,154 for the six months ended December, 1928. There was a falling off in the net corporate income, which was $509,475 in the 1928 period and $558,381 in the 1927 period.

Passenger Record in Cincinnati

Revenues of the Cincinnati Street Railway, Cincinnati, Ohio, fell off during the latter part of December, but this was offset by a reduction in operating expense. This falling off was due to the fact that the number of revenue passengers carried in the month was 8,668,601 as against 8,831,609 in the corresponding month of last year. The number of revenue passengers carried in the year 1928 was 102,349,759, against 100,822,449 in the year 1927, or an increase of 1,527,310. The figures follow:

RESULTS IN CINCINNATI IN DECEMBER

Operating revenue	$743,897
Operating expenses	519,175
Net operating revenue	$224,721
Taxes	47,263
Operating income	$177,458
Non-operating income	2,108
Gross income	$179,567
Rental, interest, sinking fund and return on capital	171,584
Surplus	$7,982
Total in fare control fund—	
Nov. 30, 1928	$448,004
Dec. 31, 1928	455,986
Revenue passengers	8,668,601
Transfer passengers	2,637,314
Free passengers	117,991
Total passengers carried	11,423,906

John E. Zimmerman on New Jersey Board

John E. Zimmerman, chairman of the executive committee of the United Gas Improvement Company and acting president of that company, has been elected a director of the Public Service Corporation of New Jersey, to succeed Arthur W. Thompson, who has resigned from that board as well as from the office of president and director of the United Gas Improvement Company. Mr. Zimmerman has also been elected to succeed Mr. Thompson on the boards of the various underlying companies, and has been elected to the executive committee of the New Jersey corporation.

Expansion by Ohio Utility

Two new public utilities, one in Ohio and one in Hawaii, are soon to be added to the holdings of the Utilities Service Company at Alliance, Ohio, of which E. W. Sweezy, vice-president of the Stark Electric Railroad, is president. The estimated cost of the two new companies is $9,000,000. Mr. Sweezy, accompanied by Former Judge George H. Clark of Canton, Ohio, his legal advisor, sailed on Jan. 26 from San Francisco, Cal., for Hilo, Hawaii, to complete negotiations for the purchase of the hydro-electric plant located at Hilo, the second largest town in Hawaii with a population of about 15,000 persons. This plant is serving 6,000 customers.

Mr. Sweezy expects to return from the Hawaiian trip about Feb. 20, and upon his return will complete negotiations for taking over the Northern Ohio Telephone Company, which adds another link in the already long chain of Ohio utilities controlled by the Utilities Service Company.

Organized less than a year ago, shortly after the purchase of the Suburban Light & Power Company of Cleveland by Mr. Sweezy, the Utilities Service Company at the present time owns and controls more than half a hundred Ohio utility companies with estimated valuation in excess of $18,000,000, of which the Stark Electric Railroad, a branch 35 miles long between Canton and Salem, is a part. Utilities now controlled by the Utilities Service Company include ice plants in five large Ohio cities—Toledo, Springfield, Youngstown, Canton and Massillon—several power lines and a network of telephone systems.

Working Out a Plan for Springfield

The exact nature of plans now under consideration by officials and the receiver of the Springfield Railway, Springfield, Ohio, are not ready for public announcement, but according to Julius Theobald, manager, plans are under way which are presumed to include reorganization of the lines with the idea of augmenting the railway service with buses, as suggested by Willitts H. Sawyer, receiver, ,when he took over the lines last summer. These plans have been made more definite since the City Commission recently suggested competitive proposals for supplying transportation. A time limit for these proposals was set for Feb. 1.

Conspectus of Indexes for January, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	Jan. 1929 7.71	Dec. 1928 7.71	Jan. 1928 7.59	Jan. 1929 7.71	Jan. 1924 6.91
Electric Railway Materials* 1913 = 100	Jan. 1929 145.3	Dec. 1928 145.5	Jan. 1928 140.6	March 1924 163.9	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	Jan. 1929 229.9	Dec. 1928 229.8	Jan. 1928 225.6	Jan. 1929 229.9	Jan. 1924 217.4
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Jan. 1929 204.5	Dec. 1928 205.1	Jan. 1928 200.9	March 1924 206.8	Sept. 1927 199.4
Eng. News-Record Construction Cost (General) 1913 = 100	Jan. 1929 209.4	Dec. 1928 210.2	Jan. 1928 203.9	March 1924 224.7	Nov. 1927 202.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	Dec. 1928 96.7	Nov. 1928 96.7	Dec. 1927 96.8	Dec. 1925 104.5	April 1927 93.7
Bradstreet Wholesale Commodities 1913 = 9.21	Jan. 1929 12.96	Dec. 1928 13.15	Jan. 1928 13.57	Dec. 1925 14.41	July 1924 12.23
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	Dec. 1928 155.8	Nov. 1928 157.3	Dec. 1927 155.9	Nov. 1925 167.1	May 1924 141.0
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	Dec. 1928 162.1	Nov. 1928 162.6	Dec. 1927 163.6	Nov. 1925 171.8	April 1928 160.8
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	Dec. 1928 127.3	Nov. 1928 135.0	Dec. 1927 109.8	Nov. 1928 135.0	July 1924 73.4
Bank Clearings Outside N. Y. City 1926 = 100	Dec. 1928 106.6	Nov. 1928 104.0	Dec. 1927 96.8	May 1928 108.4	May 1924 84.4
Business Failures Number	Dec. 1928 1670	Nov. 1928 1568	Dec. 1927 1820	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	46.55	54.23	51.06	122.95	22.11

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

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Personal Items

B. R. Chestney in Charge at Macon

With the consolidation of the Macon utilities with the Georgia Power Company on Dec. 1, 1928, referred to in the ELECTRIC RAILWAY JOURNAL, issue of Dec. 29, 1928, B. R. Chestney was made division manager of the Macon division of the latter company.

Mr. Chestney has been identified with the property at Macon since 1917 when he was made engineer maintenance of way of the Macon Railway & Light Company. In 1924 he was put in charge of operation of the railway system, serving in these capacities until 1928. Upon the resignation in 1928 of

B. R. Chestney

L. A. Magraw, vice-president and general manager of the Macon utilities, to accept a similar position with the South Carolina Power Company in Charleston, Mr. Chestney succeeded him in the management of the Macon companies.

Since leaving Georgia Tech in 1906, Mr. Chestney has been adding to a storehouse of valuable experience. As a starter, practical pointers were obtained when he served as a topographer and transit man on a railroad survey from Leon in the State of Juanoguato to Vera Cruz, Mexico. In 1907, he returned to Georgia and accepted a position as a topographer and draftsman for the Atlanta, Griffin & Macon Electric Railway, making surveys of a proposed interurban railway. This project being abandoned, he went to work in June, 1908, on preliminary surveys and investigations of the Lloyd Shoals hydro-electric plant for the Bibb Power Company, a predecessor company to the Central Georgia Power Company. This was his first connection with the companies with which he has since been employed. In 1910 he took up the work of running surveys for transmission lines for the Central Georgia Power Company and supervised the construction of the line from the Lloyd Shoals dam to Macon. He also was in charge of the construction of the line from Bibb to Griffin, and in 1912 was in charge of the construction of the line from Griffin to Atlanta, securing all of the rights-of-way into Atlanta.

In 1913 he was transferred from field construction work into the Macon offices of the Central Georgia Power Company with the title of general engineer, and in 1916 he was made chief engineer of that company.

Mr. Chestney was born in Macon on June 13, 1885. He attended the Macon grammar and high schools and entered Georgia School of Technology in 1901. He is an associate member of the American Society of Civil Engineers. He is also a member and has held important committee appointments in the National Electric Light and the American Electric Railway Association.

L. Wingerter Succeeds Miss Hanlan at Gary

Margaret K. Hanlan, for the past five years assistant publicity director of the Gary Railways, Gary, Ind., has resigned to accept the post of advertising manager of the Public Service Company of Oklahoma at Tulsa, Okla. While associated with the Gary Railways, Miss Hanlan enjoyed the distinction of being one of the very few women in the United States engaged in publicity work for a street railway.

Lawrence Wingerter, formerly connected with the advertising department of the Westinghouse Electric & Manufacturing Company, is Miss Hanlan's successor.

W. E. Wood of Richmond Honored

William E. Wood, president of the Virginia Electric & Power Company, Richmond, Va., was elected vice-president of the Engineers Public Service Company at the board of directors meeting in New York on Jan. 24. Engineers Public Service controls the Richmond property.

Arthur P. Russell Executive Vice-President of New Haven

Directors of the New York, New Haven & Hartford Railroad on Jan. 22 announced the election of Arthur P. Russell of Hingham, Mass., as executive vice-president of the New Haven system. Mr. Russell has been vice-president since March 1, 1920. His headquarters will continue to be in Boston, but he will maintain an office at New Haven.

Mr. Russell will continue as president of the New England Transportation Company, the motor coach subsidiary of the New Haven. He also will represent the company in all matters in Massachusetts and Rhode Island.

R. R. Hadsell General Manager at Schenectady

Promotion of Roy R. Hadsell, general superintendent of transportation New York State Railways, to general manager of the Schenectady Railway, was announced in Rochester recently by James F. Hamilton, president of both railway systems. Mr. Hadsell, who assumes his new duties Jan. 14, succeeds James H. Hustis, president and general manager of the Schenectady lines prior to their recent acquisition by Ellis L. Phillips of New York and associates who also control the New York State Railways.

Mr. Hadsell had supervision over all electric railway and bus lines in Rochester, Syracuse and Utica, besides the interurban routes controlled by the company. He began service in Rochester with the New York State Railways in 1917. Like President Hamilton, Mr.

R. R. Hadsell

Hadsell entered the electric railway field as a conductor on the Buffalo lines in 1899. He went to Schenectady in 1902 as cashier and became superintendent of the United Traction Company in 1913 with offices at North Troy. He left this post in 1917 to become assistant superintendent of the New York State Railways, Rochester lines. A year later he was elevated to superintendent at Rochester and six years later became general superintendent of the entire system.

Mr. Hadsell, whose home and headquarters have been in Rochester, has been active in community and civic work, being a past-president of the Safety Council of the Chamber of Commerce and a leader in the New Industries Bureau movement of the Chamber. He is popular socially, being a member of the Rochester Club and the Monroe Country Club. Golf is his favorite recreation.

H. L. Mitchell Continues as West Penn President

At the meeting of the board of directors of the West Penn Power Company held recently in New York, Harry L. Mitchell, Pittsburgh, was elected president, succeeding G. M. Gadsby, resigned. Mr. Mitchell has been identified with West Penn oper-

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ations for more than 25 years. He has been president of the West Penn Railways since 1927 and will continue in that capacity.

A. W. Thompson Leaves U.G.I.

Arthur W. Thompson has presented to the executive committee his resignation as president of the United Gas Improvement Company. It was written on the eve of Mr. Thompson's departure from New York on Jan. 20 with his family on the White Star liner *Laurentic.*

An announcement explained that Mr. Thompson's action was taken "on the ground that his continued ill health does not warrant his again undertaking the arduous duties which the administration of the office involves."

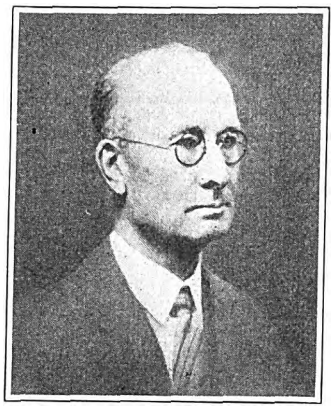
A successor to Mr. Thompson, it was said, will not be considered for the present, but the executive function will continue to be exercised by John E. Zimmerman, chairman of the executive committee.

Mr. Thompson went to the United Gas Improvement Company as president in July, 1926. He has previously been president of the Philadelphia Company, which operates the Duquesne Light Company, serving electric light and power; Equitable Gas, furnishing natural gas; Pittsburgh Railways, operating the railway system, and the Allegheny County Steam Heating Company, which provides steam for heating.

He did much to work out the plan for the reorganization of the Pittsburgh Railways and the lifting of the receivership there, and played no small part in the rehabilitation of that property, which resulted in its being selected to receive the Coffin Award in 1925, and it was Mr. Thompson who personally accepted the award at the Atlantic City Convention of the A.E.R.A., in behalf of the company, its employees, and the city.

His training as an engineer, educator, railroad executive, and federal executive gave him the perspective, experience and judgment adequately to plan for the needs of one of the greatest industrial regions of the country, and the policies followed while he directed the work of the utilities in that district and adhered to since his resignation from the company there give complete evidence of the value of his time and efforts.

The resignation of Mr. Thompson as president of the U.G.I., was accepted on Jan. 23, but no action was taken to fill the vacancy. Mr. Thompson also resigned as chairman of the boards of the Philadelphia Electric Company, the Philadelphia Electric Power Company and the Susquehanna Power Company, all subsidiaries of U.G.I. In the three chairmanships, John E. Zimmerman, chairman of the executive committee of the U.G.I., was elected as his successor. Mr. Zimmerman also succeeded Mr. Thompson as a director of the Public Service Corporation of New Jersey.



Edward Anderson

Edward Anderson Succeeds A. W. McLimont in Winnipeg

At the meetings of the boards of directors of the Winnipeg Electric Company, Winnipeg, Canada, Manitoba Power Company, Ltd., Northwestern Power Company, Ltd., and associated companies, held on Jan. 9, the resignation of A. W. McLimont as director, president and general manager, was accepted and Edward Anderson, K.C., general counsel for the companies, was elected a director and appointed president and general manager to succeed Mr. McLimont. Mr. McLimont's decision was advised by physicians who suggested that he be relieved of his responsibilities and as soon as possible take a long rest and vacation of possibly a year's duration.

Emulating the sucessful example of the Canadian Pacific Railway, the Winnipeg Electric Company has appointed an eminent lawyer to occupy the presidential chair of the company and its subsidiaries, in the person of Edwerd Anderson, K.C.

During the twenty years that Mr. Anderson has been connected with the Winnipeg Electric Company he has actively participated in the many important developments promoted by the company in that period, and he steps into office at the commencement of the greatest development the company has yet undertaken—the construction of the 225,000-hp. hydro-electric plant at Seven Sisters Falls on the Winipeg River.

A. W. McLimont

Mr. Anderson is, to all intents and purposes, a Manitoba product, having left his birthplace, Dorchester, Quebec, in 1879 at the age of twelve to make his new home in Portage la Prairie. After attending the public schools he was graduated from Manitoba University and was called to the Manitoba Bar in 1889. For several years he was crown prosecutor at Portage la Prairie and in 1906 became associated in Winnipeg with the legal firm of Moran, Anderson & Guy. In 1909 he was made a K.C. and during the same year became asociated with the legal department of the Winnipeg Electric Company. He has served as president of both the Manitoba Bar Association and the Manitoba Law Society and has taken an active interest in public affairs generally.

The selection of Mr. Anderson as president and general manager of the widespread Winnipeg Electric enterprise is a very popular choice.

Mr. McLimont's career in public utility enterprises has covered assignments both in North and South America. His service record at Winnipeg started in 1917 when he took over the active management of the company. Later he became vice-president and in 1926 was made president. Among the important executive positions he has held might be mentioned—general manager of the Dubuque Light & Traction Company, Dubuque, Iowa; transportation engineer of the Public Service Commission for the First District of New York; general manager of the Chicago & Milwaukee Electric Railway; vice-president and general manager of the Michigan United Railways; vice-president and general manager of San Francisco-Oakland Terminal Railways, now the Key System Transit Company; and vice-president and general manager of the Georgia Power Company.

A few years ago Mr. McLimont's utility accomplishments in Winnipeg were reviewed in the *Financial Post.* He was lauded for restoring the credit of the company which, when he took it over, "was the favorite hate of disappointed citizens."

Mr. McLimont was born in Quebec City and is a member of one of the oldest of Canadian families.

At its meeting on Jan. 9 the board issued a statement in part as follows:

> The board wishes to express its appreciation of Mr. McLimont's outstanding services to Winnipeg Electric Company, Manitoba Power Company, Ltd., and associated companies during the past eleven years. His ability and the results of his efforts are too well known in Greater Winnipeg and, in fact, throughout Canada, to require laudation at this time.
>
> In appointing Mr. Anderson to succeed Mr. McLimont, the board does so with the knowledge that the affairs of the companies will be directed by one thoroughly familiar with the business of the company and with local conditions and that the personnel of the companies' organization are and will continue to be definitely behind him in the effort to insure a continuance of reliable service to the community.

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Obituary

James J. Doyle

James J. Doyle, president of the Washington, Baltimore & Annapolis Electric Railroad, with headquarters in Baltimore, died on Jan. 19 of heart disease.

In 1907, when the Washington, Baltimore & Annapolis Electric Railroad was being constructed, Mr. Doyle became connected with the company as a construction expert. He remained with the company after the road was built, filling the position of superintendent of track and overhead. He was made general superintendent in 1909. In 1911 he succeeded John N. Shannahan as vice-president and general manager.

Shortly before the Baltimore property was purchased by the Consolidated Gas & Electric Company, Baltimore, in 1926, Mr. Doyle was made president of the railroad. In addition to heading the railroad Mr. Doyle also was president of the Annapolis & Chesapeake Bay Power Company, a subsidiary of the railroad, which was taken over by the Consolidated at the same time the railroad was purchased.

Mr. Doyle was 53 years old. He was a native of Cleveland. After attending the public schools of that city he became connected with the Pennsylvania Railroad. In 1899 he joined the Eastern Ohio Traction Company as a construction engineer and assisted in building that railway.

W. O. Wood

William O. Wood, well known in the public utility field and recently vice-president of the Waterbury Cable Service, Inc., of New York and Chicago, died at his home in Jackson Heights, Long Island City, on Jan. 21.

"Bill" Wood, as he was generally known, was a former president of the New York Electric Railway Association. He was one of a group of officials brought out of the West by Col. E. W. Winter, when the rehabilitation of the Brooklyn Rapid Transit Company was entrusted to the Colonel years ago. Others in the group who threw the weight of their experience into the work of saving the property from receivership at that time were John F. Calderwood, Dow Smith, W. G. Gove, W. S. Menden, A. N. Dutton and J. F. Folds.

Each of these men subsequently made a name for himself, and in the work that was done by them in Brooklyn Mr. Wood played an important part. So much so that it was not long before responsibility for the operation of the entire elevated system of the company devolved upon him. Subsequently he was made assistant general superintendent of the entire property. From that post he went to the New York & Queens County Railway, the position in which he became widely known as an operator and for his unfailing good humor. His activities with this company covered a period of fifteen years, ending with his retirement from the company following its receivership.

For many years before coming to New York Mr. Wood was identified with railroads and electric railways in the Middle West and the South. Following service with the Louisville & Nashville and the Illinois Central Railroad he entered the electric railway field as general superintendent of the Rapid Railway System, comprising the interurban lines of the Detroit United Railway, Detroit, Mich. Subsequently he was superintendent of the rapid transit lines in Brooklyn and later assistant general superintendent with charge of transportation in Brooklyn. For one year he was operating statistician of the Interborough - Metropolitan Company, New York.

Mr. Wood was born in Evansville, Ind., Jan. 8, 1870. After graduating from Evansville High School he obtained employment with the surface lines in Chicago. He was also at one time in his early career secretary to that well-known steam railroad operator, J. T. Harahan.

H. A. Clarke

H. A. Clarke, vice-president of the Penn-Ohio system, which controls the Youngstown Municipal Railway, and a director and officer of various other public utility properties, died in East Orange, N. J., on Jan. 16.

With 25 years' experience in construction management and valuation of public utilities, Mr. Clarke was well known as a financier and valuation expert. He has been identified with the Hestonville, Mantua & Fairmount Passenger Railway, Southwestern Street Railway, Central New York Southern Railroad, and Ithaca Street Railway. He conducted some special investigations for the North American Company and while with Republic Engineers, Inc., he examined reports on utility properties for bankers and took part in appraisals and rate proceedings before commissions of New York, Pensylvania, Ohio, and Vermont.

Mr. Clarke was a graduate of Central Manual Training School, Philadelphia, Pa., where he took a special course in electrical engineering.

T. H. Miller, 95, the oldest employee of the Nashville Railway & Light Company, Nashville, Tenn., died recently. An unusual feature of Mr. Miller's service record was that he was 70 years old before he became affiliated with the company and then lived to become a member and a faithful attendant at the meetings of the Twenty-Year Club.

E. A. Batwell

Edward A. Batwell, for many years publicity director of the Puget Sound Power & Light Company and its affiliated organizations, died on Jan. 13 at his home near Seattle, Wash., ending a long career spent in newspaper, dramatic and architectural accomplishments. Mr. Batwell was born in Michigan eleven months before the outbreak of the Civil War. He was graduated from the University of Michigan in 1884 with an architectural degree, and the early years of his business career were spent in the creative work of that craft. Attracted to Port Townsend, Wash., during the boom period in the late '90's he was responsible for the design of many of the business structures erected in that city as well as in Victoria, B. C.

With the collapse of the building boom in the Northwest he returned to the East and organized a theatrical booking agency which handled many shows traveling out of Chicago. The West called him again and in 1904 he established his permanent home in Seattle, where he engaged in dramatic criticism and general newspaper work. For the last twenty years "Bat," as he was known to hundreds of his friends, had been in charge of the publicity work for the Puget Sound Power & Light Company and had acted as editor of the company's official house organ, the *Puget Sound Electric Journal*. For several months he had been a sufferer from heart disease, which finally proved fatal. A widow and son survive him.

L. A. Mitchell, 71, pioneer street railway developer of Macon, Ga., and a former commissioner of Bibb County, is dead, following a long illness. Coming to Macon early in the 90's, Mr. Mitchell, as an officer of the Metropolitan Street Railway, saw the present line to Bellevue constructed. That company later was merged with the Consolidated Street Railway, and following that merger other railway lines were constructed. A short time later Mr. Mitchell and his associates formed the Athens Street Railway at Athens, Ga. That subsequently was sold, however, to other interests. In recent years Mr. Mitchell had turned his attention to the promotion of a chain of theaters.

Capt. Robert A. Speed, at one time president of the Memphis Gas & Electric Company, Consolidated, Memphis, Tenn., predecessor of the present Memphis Power & Light Company, died recently in that city. Captain Speed had a long and notable career in business of the South. For years he was interested in the ownership of various steamboats on the Mississippi River, and for more than 30 years managed a large company that supplied steamboats with fuel. He was a bank director and for four years commissioner of fire and police in Memphis under Mayor W. L. Clapp. Captain Speed was born in Louisville, Ky., in 1844.

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Equipment Market Improves

Orders of track, line and car equipment increase in volume. Safety door controls for Long Island Railroad. Regina to order seven cars. Extension probable in Fresno

INCREASE in the volume of equipment and supplies purchased, particularly as to track and line materials and car equipment has been noted recently. In general, it appears that it is the small railways rather than the large companies which have increased their purchasing activities. According to reports received from numerous railways, there is an upward trend from the recent dormancy in the supply market. At the same time construction projects and new equipment orders continue to be announced, revealing prospects of great activity for the coming season.

According to E. A. Devereaux, superintendent of the Fresno Traction Company, Fresno, Cal., this company may build a new line to serve the northwest section of that city. To date no details are available as to the actual plans made. Another construction on the Pacific Coast is that of the Pacific Northwest Traction Company, Seattle, Wash., which will rebuild its bridge over the Skagit River at Riverside at a cost of $60,000. With the exception of the draw span which is of steel, the entire bridge will be rebuilt. When finished all spans which are now of wood will be of steel construction.

Long Island Railroad Improvements

The Long Island Railroad, New York, N. Y., at a recent meeting of the Transit Commission agreed to the last of four requests made by the commission involving improvements on this company's system. The railroad stated that it is prepared to equip its 970 cars with safety devices intended to prevent train operation while the car doors are opened.

The devices to be installed are of the interlocking type, controlled from each car. It provides for a light signal installed in the motorman's cab as well as lights on the sides of the cars. It is also requested that an addition of an automatic power control be made to this equipment so that the power would be shut off in the event that any door is opened while the trains are in operation. This also was agreed to by the railway. A cut-out switch will be installed to enable discontinuance of safety devices along lines of the road where station platforms are below train platforms.

Another recent hearing gave approval of the railroad's proposal as to the manner by which 111th Street should be carried across the track of the north side division of the railroad in Flushing. The railroad will elevate its tracks with a clearance of 14 ft., thus maintaining the street grade.

The New York Transit Commission also approved plans for the improvement of the Marcy Avenue Station of the Brooklyn Manhattan Transit Company, Brooklyn, N. Y. These plans include extending the station platform to accommodate eight car trains and widening the platform.

Cars for Regina

The Regina City Commissioners, Regina, Saskatchewan, have reported to the City Council on the specifications of the seven new street cars to be purchased by the city this year. It was recommended by the Commissioners and approved by the City Council that cars similar to those obtained by the city last year should be secured this year. It was also recommended that at least three of these cars should be equipped with roller bearings. The cars ordered for the Regina Street Railway last year were obtained from the Canadian Car & Foundry Company.

The Chicago, South Shore & South Bend Railroad, Michigan City, Ind., will build an addition to its general office building at Michigan City to be ready for occupancy about May 1. The addition will enlarge the floor space of the accounting department which now occupies the east wing of the building, by approximately 2,000 sq.ft. P. H. Lorenz & Company has the contract for the construction.

The South Shore Line has also put into service during the past week three new freight connections with steam railroads. Completion of the Monon-Michigan Central Interchange, just west of Michigan City, opened up a 6,000-ft. four-track transfer which has required three months to construct. Both this interchange and that with the New York Central Railroad are electrified for use of the South Shore Line electric locomotives. A light type catenary overhead is employed.

A new despatch freight terminal in the rear of the present passenger station at Illinois and Market Streets, Indianapolis, Ind., has been opened. The terminal will accommodate shipments over the leading railway lines in the central part of the state. The companies using the new facilities are the Terre Haute, Indianapolis & Eastern Traction Company, the Union Traction Company of Indiana, the Interstate Electric Railway and the Indianapolis & Southeastern.

Track Material Orders

Among track material purchases the Louisville Railway, Louisville, Ky., contemplates the purchase of 15,000 white oak ties. This company has also just purchased 5,000 of these ties. Fifteen thousand white oak ties have been purchased by the Twin City Rapid Transit Company, Minneapolis, Minn. This company has ordered 10,000 cedar ties, 14,000 ft. of 3-in. oak bridge planks and 10,000 4½-in. standard granite paving blocks.

The Toronto Transportation Commission, Toronto, Ont., has placed orders for 15,000 standard ties, 550,000 granite blocks, and 250 barrels of quicksetting cement. The Connecticut Company, New Haven, Conn., has ordered 400 rail braces, 250 rail joint plates and three sets of split switch points complete with rail braces, tie plates and ground throw. Ten thousand 6-in. x 8-in. x 8-ft. oak ties and 9,000 creosoted ties have been ordered by the Pittsburgh Railway, Pittsburgh, Pa. This company has also ordered 30 kegs of boat spikes, two carloads of screenings, 65 tanks of acetylene gas, 265 tanks of oxygen gas, 76 drums of Tarmac, twelve carloads of granulated slag, and ten carloads of slag ballast.

The United Electric Railways Company, Providence, R. I., has ordered 1,000 5-ft. 2-in. round tie rods and 1,000 5-ft. 2-in. flat tie rods, 400 grinding bricks, 300 36-in. bonds and 300 46-in. bonds. The company has also ordered two concrete breakers, 75 Corundum wheels, 150 red and yellow flags and 25 gross of 12-in. hacksaw blades. Other track orders by this company include 144 switch brooms, 150 tons of salt, 8 pairs of compromise joint plates, 1,000 lb. of ⅜-in. welding steel, 521 repair parts for Dunham boxes, 300 36-in. cable bonds, 300 lb. magnesium welding rods, 50 heel fasteners and special track work. The Milwaukee Electric Railway & Light Company has ordered 193,000 lb. of salt and 250 ties. One No. 138 Verona eccentric rail bender was ordered by the Capital Traction Company, Washington, D. C.

Line Equipment Purchased

Fifteen miles of copper trolley wire and 5 miles of ¼-in. galvanized strand were ordered by the Louisville Railway, Louisville, Ky. The Toronto Transportation Commission, Toronto, Ont., has placed orders for twelve tons of No. 00 round Phono-electric trolley wire. Two thousand and sixteen feet of 1,000,000 c.m. single-conductor, lead sheath cable has been ordered by the Twin City Rapid Transit Company.

Six cars of poles, two cars of cable and one car of weatherproof wire have been purchased by the Milwaukee Elec-

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tric Railway & Light Company, Milwaukee, Wis. The United Electric Railways Company has placed orders for 200 porcelain strain insulators, two miles of No. 00 hard drawn trolley wire, 3,000 ft. of ⅜-in., 7-strand galvanized iron wire, 100 wood strain insulators, 50 right hand frogs and six drawbridge frogs. Other orders placed by this company include 25 adjustable crossings, 5,000 ft. of 7/16-in., 7-strand span wire, 250 lb. of solder and 100 No. 00 splicers.

The Louisville Railways has purchased approximately $40,000 worth of miscellaneous car equipment and supplies. 130 3-in. motor wheels, 230 2-in. motor wheels, 120 6-in. motor wheels and 7,500 brake shoes have been ordered by the Toronto Transportation Commission. The Milwaukee Electric Railway & Light Company has ordered one car of brake shoes.

Among the purchases of car equipment made by the United Electric Railways, Providence, R. I., are 4,000 brake shoes, 1,000 compensating fingers, sixteen journal boxes, 240 101-watt lamps, 20 drums of electric car oil, 1 barrel of dry orange shellac, 1,000 cable straps, 300 lb. of 1½-in. friction tape, 300 yd. of 22-in. duck, 50 pinions, one roll of 32-in. Pantasote, 5 sets of Westinghouse armature coils, 26 boxes of window glass, 1,000 ft. of single braid rubber covered wire, size 20, 5 drums of engine oil, 15 gal. mahogany gloss paint, and 30 gal. white undercoat paint. The Twin City Rapid Transit Company has ordered 1,000 34-in. steel car wheels, 1,000 steel billets and 20 sets of armature coils.

The Pittsburgh Railway Company is remodeling 22 No. 4300 type two-man cars for one-man operation. The Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has ordered three 21-passenger street car type Studebaker buses. The Transit Supply Company, St. Paul, Minn., has received four Mack four-cylinder buses equipped with Eckland bodies. The United Electric Railways Company has ordered eight Twin coaches and the Capital Traction Company has ordered 4 type 2 Yellow coaches. The Louisville Street Railway has ordered two 21-passenger street car type Studebaker buses and the Denver Tramway Corporation has purchased two Mack four-cylinder, 25-passenger buses. The Connecticut Company has ordered six Mack four-cylinder buses and 2 Yellow 24-passenger coaches.

The Northwestern Pacific Railroad, San Francisco, Cal., has been inquiring for a 15-ton overhead traveling crane. It is reported that the Jamestown Street Railway, Jamestown, N. Y., is planning to rebuild part of its car shops which were recently destroyed by fire. The Louisville Railway has purchased $5,000 worth of shop and garage equipment and contemplates the purchase of approximately $20,000 worth of miscellaneous equipment.

The Milwaukee Electric Railway & Light Company contemplates a new terminal at 27th Street and Hopkins Street. Pittsburgh Railways has received 2 Bleeker blacksmith hammers.

Exhibitograph No. 2

BUDGET and PLAN
your exhibit NOW
for the

A.E.R.A. Atlantic City Convention

Sept. 28 to Oct. 4

SPACE
will be charged for at 60 cents per square foot.

Preservative Treatment of Ties Growing

Statistics recently released by the Department of Commerce in co-operation with the Department of Agriculture on tie and pole purchases for the year 1927 show that the steam and electric railroads purchased 103,438,354 crossties and 330,367,000 ft., board measure, of switch and bridge ties, and 3,624,833 wood poles were purchased by the same companies along with electric light and power companies, and commercial telegraph and telephone companies. The statistics do not include purchases by small rural telephone lines having incomes of less than $10,000 per year.

Converting the quantities of switch and bridge ties into crosstie equivalent on the basis of 32 b.ft. per crosstie, the total crosstie equivalent for 1927 is 113,762,323 for the year, an increase of 2.2 per cent over 1925. The number of poles purchased in 1927 is an increase of 10.5 per cent over 1925. No records are available to show how many of these poles were used by electric railways.

Analysis of the poles purchased in 1927 shows that out of the total reported 2,681,545, were treated, or nearly 74 per cent. Subdivision of these poles as to kind of timber would show the cedars leading with nearly 49 per cent, pine following with nearly 31 per cent. The actual figures are as follows:

	Number	Per Cent
Western red cedar....	1,140,983	31.48
Northern white cedar..	581,492	16.04
Southern white cedar..	30,302	.84
Southern red cedar....	14,510	.40
Pine	1,120,228	30.90
Chestnut	645,888	17.82
Cypress	35,930	.99
Douglas fir	15,609	.43
All others	39,891	1.10
Total	3,624,833	100.00

The statistics as to crossties are separated so as to show the quantities purchased by the electric railways; and again reducing the bridge and switch ties to a crosstie equivalent on the same basis as above, we find that in 1927 the electric railways purchased a total of 5,076,184 ties, of which 1,227,618, or about 24.2 per cent, were treated. During the same period the steam railroads purchased a total of 113,762,323 ties, of which 21,591,471, or about 18 per cent, were treated. It will be noted that in neither case do the figures show how many ties were treated by the railways.

The statistics of the U. S. Forest Service Bureau show that the total number of ties treated during 1927 was 74,231,840, to which must be added the crosstie equivalent of 5,700,750 ties for switch ties that were treated, or a total of 79,932,190, which does not include bridge ties, of which there is no record. This, however, is nearly 73 per cent of the total; and, while no records are available of the number of ties treated by electric railways, it is doubtful if this would materially affect their percentage figure, certainly not to the same extent as in the case of the steam railroads. However, it is gratifying to note that the electric railways are using creosoted ties to the extent of approximately one quarter of their total requirements, and it is expected that this use of preservative treatment will increase materially as their financial condition improves.

Exhibit Committee Announced

President James P. Barnes of the American Electric Railway Association has announced the personnel of the exhibit committee for the 48th annual convention, scheduled to take place in the new Atlantic City Auditorium, Sept. 28-Oct. 4, inclusive, as follows:

J. H. Hanna, chairman; president Capital Traction Company, Washington, D. C.

T. W. Casey, vice-chairman; president National Pneumatic Company, New York, N. Y.

J. W. Welsh, general secretary A.E.R.A., New York, N. Y.

Frederick C. J. Dell, director of exhibits A.E.R.A., New York, N. Y.

L. G. Avery, manager sales promotion division, The White Company, Cleveland, Ohio.

L. D. Bale, superintendent of power Cleveland Railway, Cleveland, Ohio.

John Bender, secretary and works manager The Bender Body Company, Cleveland, Ohio.

Bertram Berry, eastern sales manager railway sales division, Heywood-Wakefield Company, New York, N. Y.

O. A. Broten, Western manager National Pneumatic Company, Chicago, Ill.

John H. Cain, assistant superintendent Atlantic City & Shore Railroad, Atlantic City, N. J.

Charles C. Castle, vice-president The A. C. F. Motors Company, New York, N. Y.

C. H. Clark, superintendent of way Cleveland Railway, Cleveland, Ohio.

S. J. Cotsworth, sales agent The Lorain Steel Company, Philadelphia, Pa.

C. R. Ellicott, vice-president Westinghouse Traction Brake Company, New York, N. Y.

A. H. England, vice-president and treasurer Electric Service Supplies Company, Philadelphia, Pa.

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L. E. Gould, president Economy Electric Devices Company, Chicago, Ill.

R. A. Hauer, vice-president Mack-International Motor Truck Corporation, New York, N. Y.

C. S. Hawley, president and treasurer Consolidated Car-Heating Company, Albany, N. Y.

B. A. Hegeman, Jr., president National Railway Appliance Company, New York, N. Y.

A. P. Jenks, vice-president Cummings Car & Coach Company, Chicago, Ill.

A. L. Kasemeier, vice-president The Cincinnati Car Company, Winton Place, Ohio.

H. J. Kenfield, president and treasurer Kenfield-Davis Publishing Company, Chicago, Ill.

G. L. Kippenberger, vice-president St. Louis Car Company, St. Louis, Mo.

H. E. Listman, vice-president, General Motors Truck Company, Pontiac, Mich.

J. C. McQuiston, advertising manager, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

C. S. MacCalla, vice-president and general manager, the Pennsylvania-Ohio Electric Company, Youngstown, Ohio.

A. L. Price, manager, Ohio Brass Company, Mansfield, Ohio.

A. J. Purinton, general superintendent, Atlantic City & Shore Railroad, Atlantic City, N. J.

Samuel Riddle, vice-president, Louisville Railway, Louisville, Ky.

A. M. Robinson, publicity manager, the J. G. Brill Company, Philadelphia, Pa.

Ross Schram, vice-president, Twin Coach Corporation, Kent, Ohio.

L. W. Shugg, advertising department, General Electric Company, Schenectady, N. Y.

C. W. Stocks, editor, *Bus Transportation*, New York, N. Y.

W. E. Wood, president, Virginia Electric & Power Company, Richmond, Va.

Weekly Business Conditions

The volume of money turnover during the week ended Jan. 19, as reflected by check payments, was smaller than in the preceding week but showed a substantial gain over the corresponding period of 1928, according to the weekly statement of the Department of Commerce. Operations in steel plants showed some curtailment from the previous week but were on a higher level than in the same week of last year. Factory employment in Detroit, indicating activity in the automobile industry, showed substantial expansion as compared with both the previous week and the same week of 1928. The output of crude petroleum, covering the latest reported week, showed further gains over both the previous week and the same period of last year. The production of bituminous coal was also greater than in either prior period.

The general level of wholesale prices was fractionally higher than in the previous week, showing a gain also over the corresponding period of a year ago. Copper prices, though showing no material change from the previous week, were 20 per cent higher than last year. Iron and steel prices showed no change from the previous week but were higher than a year ago.

Loans and discounts of Federal Reserve member banks showed a further contraction from the previous week but were larger than a year ago. Interest rates on both time and call money averaged higher than in either the previous week or the same week of last year. Prices for stocks were higher than in the preceding week. Bond prices, reflecting higher interest rates, were lower than in either the preceding week or the same period a year ago.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	Jan. 22, 1929
Metals—New York	
Copper electrolytic, cents per lb.	16.575
Copper wire, cents per lb.	18.875
Lead, cents per lb.	6.65
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	49.
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.50
Central, Ill., screenings, Chicago, net tons	0.975
Kansas screenings, Kansas City, net tons	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.75
Weatherproof wire base, N.Y., cents per lb.	19.5
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.5
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.2
Turpentine (bbl. lots), N. Y., per gal	.6575

Weekly Business Indicators

(Weeks ended Saturday. Average 1923–25 = 100)

	1929 Jan. 19	1929 Jan. 12	1929 Jan. 5	1928 Dec. 29	1928 Jan. 21	1928 Jan. 14	1928 Jan. 7	1927 Dec. 31
Steel operations	109.2	110.5	110.5	107.9	97.0	93.0	88.0	75.0
Bituminous coal production	.....	119.8	101.1	70.7	99.8	111.5	101.1	81.5
Lumber production	.....	96.4	74.5	45.0	101.4	97.3	72.7	57.3
Petroleum production (daily average)	.....	124.5	124.4	123.9	114.3	113.9	114.2	116.2
Detroit employment	.....	127.4	125.9	121.4	99.9	97.8	96.8	92.6
Bldg. contracts 37 states (daily average)	109.6	93.4	64.4	116.7	104.3	109.2	56.2	104.4
Price iron and steel composite	87.5	87.5	87.6	87.5	85.3	85.1	84.7	84.7
Copper, electrolytic, price	.....	119.6	119.6	117.4	100.0	100.0	100.7	100.0
Check payments	141.3	154.8	164.2	119.3	130.0	138.0	154.9	103.4
Bank loans and discounts	129.3	130.9	135.7	131.2	122.6	123.6	125.1	123.5
Interest rates, call money	169.7	154.5	200.0	251.5	97.0	100.0	115.1	133.3
Interest rates, time money	177.1	174.3	182.9	191.4	102.9	97.1	97.1	97.1
Federal reserve ratio	86.5	85.5	79.9	79.5	93.8	91.2	86.7	86.2

Bok Award Jury at Work

The jury for the Harvard Advertising Awards will commence its work on Jan. 31, in the Baker Library of the Harvard Business School where the material is on exhibit. More than twice as many firms have submitted material for this competition as competed last year.

Following are the awards to be made this year: (1) a gold medal for distinguished services to advertising; (2) four prizes of $1,000 each for distinguished individual advertisements, most effective in illustration, in text, in display line and in typography; (3) four prizes of $2,000 each for advertising campaigns, for a national campaign for a specific product, for a local campaign for a specific product or merchandise; for a general or institutional campaign; for a campaign of industrial products.

Winners will be announced at a dinner in their honor at the Harvard Business School, to be held about March 1. It is planned, according to W. B. Donham, dean of the Harvard Business School, to publish a book containing a summary of the five years of the awards, giving full information concerning winning material, as well as reproductions of the advertisements which were awarded prizes.

Harvard Advertising Awards were founded by Edward W. Bok in 1923. Men prominent in the business field are on the committee to pick winners for the fifth annual series of prizes.

Large British Locomotive Order

The Metropolitan-Vickers Electrical Company, Ltd., announces that it has obtained a contract for the supply of 21 electric passenger locomotives, each weighing 100 tons, for the Great Indian Peninsula Railway. Three trial locomotives were originally ordered, two from England and one from the continent of Europe. The present order is the result of trials which have been carried out.

These locomotives are of the 1-6-2 type, there being three driving axles, one four-wheel bogie truck, and one two-wheel pony axle working in conjunction with the nearest driving axle. The motors and their gearing are rigidly mounted on the frame of the locomotive, and transmit the power to the driving axles through a universal motion flexible link drive. All the weight is spring-borne. The normal maximum service speed will not exceed 75 m.p.h., but all parts are designed for 85 m.p.h. The electrical equipment includes six 360-hp. motors and electro-pneumatic control. The pneumatically-operated switches are arranged in a high-tension chamber, while those for the line and main resistances are of single-unit type arranged in groups, and those for the motor combinations and reversing are of the camgroup type.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL, *Publishing Director*

Volume 73 New York, Saturday, February 2, 1929 *Number 5*

$50,000,000 Co-ordination Plan for Boston

UNUSUAL interest attaches to the announcement of the ambitious project recommended by the Special Transit Commission for improvements to the Boston Elevated Railway at a cost of about $50,000,000, a sum that does not include additions to rolling stock. While the present Boston Elevated Railway would form the backbone of the system suggested, the matter appears to have been considered on a basis sufficiently broad gaged to provide adequately for the co-ordination of other means of transport, notably the ten lines of railroads extending from Boston in a fan-like formation to practically all sections of the metropolitan area. Some of these lines provide a substantial and satisfactory suburban service to the territories through which they pass, but upon several of them suburban service has been abandoned or curtailed because of the competition with the Elevated, or because of the increase in the use of the automobile.

The new plan contemplates a series of so-called trunk lines extending in all directions from Boston for a distance of about 5 miles, but readily accessible through a series of radiating bus and railway lines with relatively short individual runs. This is the physical side of the proposal. On the financial side the plan intimates a very moderate possible call on taxable funds to pay for the new facilities with tax levies to meet the deficits, a 10-cent fare limit, and an exchange of securities of the Boston Elevated, involving the replacement of preferred stocks by bonds, or a cash alternative, on a basis that would seem at first blush neither oppressive nor over generous. As the Boston News Bureau points out, the main present question would appear to be whether an assumption of a 4 per cent credit basis for the new district's bonds would wholly work out in practice. In its report the commission states that it considers it unwise to use state credit for the benefit of a particular district; consequently, it recommends the creation of a transit district to acquire the properties of the Boston Elevated. It is the bonds of this Transit District that Boston Elevated Railway owners would be entitled to receive in exchange for their present holdings.

This, of course, is not the first time a somewhat similar proposal has been advanced at Boston. In the past there have been periodic but futile attempts to remedy conditions, with political inability hitherto to agree on a policy or details, despite the many successive investigations. Still, as the News Bureau again points out, the previous efforts were not wholly wasted. They supplied bases on which to build and furnished tested items to incorporate into a new scheme.

In the preparation of the present report, the commission has consulted with the Governor of the Commonwealth, the Mayor of Boston, and other public and private parties interested in the Elevated situation in its endeavor to work out a plan fair to the public and thought to be so fair to the stockholders of the elevated that they cannot in reason fail to accept it. Whether or not this may prove to be true it would be foolhardy to attempt to predict. It is not, however, too much to say that, as a whole, there has emerged a thoughtful, well rounded and apparently workmanlike attempt at a general or comprehensive solution, the fate of which hinges on a series of public hearings scheduled to start next week.

Constructive Ideas Advanced by Business Men

JUDGED by the recent report of the traffic and transportation section of the City Club of Los Angeles, the business men of that city are taking a fair-minded and helpful attitude toward their community transportation problem. The subject has been under investigation by a committee of the club during the past year, and a report just made embodies the result of this study. Emphasizing the fact that the public streets are the most valuable land in the central business district, it points out that their use should be developed from the greatest good for the greatest number.

The committee believes that the electric railway must be retained for mass transportation. In the committee's opinion, the bus is not a substitute for the street car but is rather an auxiliary vehicle to be used as a feeder, or to provide additional facilities. Railway service, however, has been handicapped by earnings insufficient to provide adequate and attractive transportation. The public is spending far more for the use of its private automobiles than for the use of public transportation vehicles, thus indicating that there is opportunity for cars and buses to cater to the demand for better transportation by providing improved service. The committee suggests that cars can be speeded up by means of skip stops and the creation of reserved strips in the centers of the streets. Interurban cars should not make local stops. Most important of all, the fare should be made sufficient to encourage improved service. Later it may be desirable to construct a rapid transit system, but the committee is of the opinion that existing facilities should first be co-ordinated and improved to obtain maximum benefit from them.

Several specific recommendations are made to increase the efficiency of the downtown streets. These include an immediate restriction of parking, tending ultimately toward an absolute ban throughout the central business district. Traffic signals should be progressively timed. Street obstructions and pavement openings should be avoided wherever possible. Special privileges should not be allowed where they interfere with public rights.

Not everyone will agree with every feature of the

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committee's recommendations. In general, however, these recommendations are well considered and thoroughly practical. The men behind the movement are representative citizens of high standing in the community. Their report indicates careful study of the problem and a fair-minded attitude toward the public transportation agencies. Recommendations emanating from an organization of this kind should meet with widespread approval.

Expenditures on Upward Path

NO ONE can study the budget figures which appeared in the Annual Statistical and Progress Number of this paper without receiving an optimistic impression of the future of the electric railway industry. Expenditures are a true barometer of business conditions for any industry, and it is highly significant that the figures for the past two years and the estimates for 1929 indicate not only a stabilization but a definite upward tendency. The 1927 total of $225,271,000 was almost $8,000,000 lower than the year before. But the 1928 figure showed an increase of almost half a million dollars and the 1929 figure an increase of $4,000,000. Although the increases are not particularly large, they are sufficient to indicate that the low ebb was reached in 1927 and that expenditures will continue to rise, slowly but steadily, in the future.

Analysis of the individual accounts reveals several interesting trends. Expenditures for way and structures charged to capital account reflect the large amount of track activity that has taken place the past few years. The figure for 1927 surpassed all previous figures, but the 1928 total reached a new high mark, exceeding the old by almost $13,000,000. While the companies have been rehabilitating their track, the car account has receded. In fact, the total spent for the cars has decreased steadily from 1925 to and including 1928, dropping from $50,400,000 to $18,900,000. This drop is partly explained by the necessity for rebuilding track before buying new cars.

Of course, much track will be rebuilt after cars have been purchased, but it appears that most operators have been waiting and watching the experimentation in new car design, and meanwhile improving their track. The estimate for new cars for 1929 was placed by the industry at $31,100,000, an increase of 62.5 per cent over the 1928 total. This figure, which is extremely conservative, shows that the managements have postponed the purchase of new cars as long as they possibly can and that they plan now to resume active buying of rolling stock.

Bus manufacturers sold more buses to electric railways during the past year than in any previous year. Following a slight recession in 1927 from the previously high figure for 1926, the total mounted to $19,100,000. That this wave of buying was not temporary is proved by the estimate for 1929 which shows a further increase of $1,200,000.

The decrease between 1926 and 1927, although large, was less than occurred the year before and was a good indication that the bottom had about been reached. It is highly significant that the 1928 total and the estimate for 1929 prove this conclusion to be true. Of course, no startling increases can be expected in the next few years, but it is reasonable to expect a steady climb in expenditures. The process of development within the industry seems to be definitely under way and the budget figures will continue upward.

Recording Accomplishments Is Profitable

FOR the seventh time the invitation has gone to all electric railway executives to enter the contest for the Charles A. Coffin Award. In his letter accompanying the circular of invitation, President Barnes, who also is chairman of the committee on the award, points out that the past year has been one of progress and that there should be many companies which can make just claims for the recognition of the committee.

Nothing could be more stimulating than the presentations which have been made in the last six years by the companies competing. Not only the winning briefs, but practically all that have been submitted, have been replete with statements of accomplishment which not only indicate the excellence of the records made, but also tell the industry as a whole of methods that can be adopted to advantage elsewhere. Were all of the successful plans of building revenue, of improving public relations and of reducing expenses, adopted generally, it is safe to say that the status of community transportation would be elevated greatly.

But it is in the reaction of the company itself in preparing its presentation that the greatest good comes. As Mr. Barnes says, the executives of practically every railway which has sent in a presentation in previous years have testified that its very presentation has tuned up the organization, has given new impetus to the efforts for better performance and has brought facts to the attention of the management which previously had been overlooked. Even the company is lacking in unusual accomplishment, by stopping to take stock, will be spurred on to do better work in the coming year, so that perchance it will be in line to win the prize a year hence. By all means every executive should do his part in furthering his industry's interests and his own as well by entering his company in the contest.

As the Noise of the Traffic Battle Grows Louder

RAYMOND S. TOMPKINS of the United Railways & Electric Company, Baltimore, waxes facetious in the *American Mercury* for February, 1929, in an article headed "Are We Solving the Traffic Problem?" One does not have to read the entire article to get the answer, for the author has reversed the usual process by promptly answering "no" and then proceeding to lay bare the facts on which he bases his conclusion.

It is a stimulating article. It shows the hardihood of the author in digesting facts. It is interesting, for instance, to be reassured that a bibliography of articles on the subject in the technical journals shows more than 2,000 treatises in the past two years, most of them dealing with local troubles in particular cities and offering sure-fire solutions. A stimulating picture is drawn showing the horde of checkers, counter checkers and others following in the wake of the traffic expert whose tomes gather mildew because, at the rate traffic is increasing, most of the reports are worthless six months after publication.

Incidentally he feels that the 167-page report of the committee on street traffic economics of the American Electric Railway Association, should it happen to fall into the hands of a man in the street, would astound him who thinks of the traffic problem in terms of his own daily movement around town and hence believes he could solve it all in fifteen minutes if left alone in a room with

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a pad of paper and a pencil. Most likely this report would startle the jay-walker, but the contingency that the report will fall into such hands is remote. The parking controversy he characterizes as one of the most difficult things in the whole traffic tangle. Certainly it is so in Baltimore.

Mr. Tompkins appears to subscribe to the idea of Colonel Sherrill, city manager of Cincinnati, that the proper order of preferences in the streets is first, street cars; second, motor buses; third, taxicabs; and fourth, private motor cars. As a street railway man he cites with apparent elation the suggestion for street car boulevards where cars may zoom along without hindrance while the lucky straphangers thumb their noses at the motorist. He also takes cognizance of the fact that ELECTRIC RAILWAY JOURNAL and *Liberty* fling editorials back and forth at each other. In the author's own words, the noise of the battle grows louder—but it does not settle the traffic problem.

Reverting again to the document of the committee on street traffic economics of the A.E.R.A., Mr. Tompkins quotes from the report to the effect that "the most important purpose to be served by this year's report is to stimulate interest in the lines of investigation suggested, as well as interest in formulating the complete program of approach to this intricate problem." In other words, says the author, having tried to lay the enemy low with one crack and failed, we must now resort to bicycling backward around the ring. To him it looks like a long wait. Discounting the fact that the author of an article intended for use in the *Mercury* could hardly be as prosaic in the arrangement of facts as the traffic expert is in presenting his data and conclusions, it is difficult not to feel at times as does Mr. Tompkins that, compared to the traffic problem, the farm problem is as clear as crystal and the prohibition problem as simple as rolling off a log.

The New Morality in Business

OWEN D. YOUNG has again done big business a real service. As a contribution to a symposium on "What Is Right With the World," he has said some pertinent things about "What Is Right With Business." They needed to be said, and as usual Mr. Young has said them the way they should be said. Business is on a new plane. By and large, it is the plane of the "Golden Rule." There is no lack of good intent. The only trouble in applying the "Golden Rule" is the complexity of the situation. Certainly much of the astuteness and cleverness and sharpness of the old days has disapperared. It is this fact that makes the occasional dereliction of the present day stand out in bold relief. Actions that are just inside the shadow of the law will not do. It is not enough that the act shall be technically within the law. Pusillanimity inflicts its own penalty. It always has. The court of public opinion is more powerful than the verdict of the jury charged with carrying out the letter of the law. From the era of almost unbridled license in railroading and industry with its public-be-damned attitude which arraigned business before the bar of an outraged public opinion and brought in its wake the Interstate Commerce Commission and the Sherman anti-trust law, business has gone a long way.

Business still makes mistakes. It still presents the occasional throwback to the period of the dark ages of trade, but the instances are few and far between. And they are easier to detect because of their contrast with the accepted practices of the day of the new morality. No, business is not perfect. It can never be more nearly perfect than are the individuals of which it is composed. But the individuals that make up business today have a sense of the verities more acutely attuned to their day than did their predecessors. In that transformation the schools of business administration have played no small part. It is so with the engineering schools, from which so many executives of the present day in this industry are recruited. Thus young men coming into business today are being provided with examples from the experience and the mistakes of the past. And they are profiting from these examples. They know that chicanery is not a substitute for knowledge. Big business and big responsibilities need to be welcomed. They are the order of the day. They do not make for wrong. As Mr. Young has said, they tend to make big business right.

Safety in Train Operation—At What Price?

INTERLOCKING of the doors of rapid transit trains with the control of the propulsion motors, which has been used for a number of years on some American systems, continues to grow in popularity. The latest addition to the list is the Long Island Railroad, which, at the request of the New York Transit Commission, has agreed to install such equipment on all of its 970 multiple-unit passenger cars running in New York City. The request of the commission follows observations of the Interborough Rapid Transit Company's subway trains, which have been equipped with a similar device for several years. With the device to be installed on the Long Island cars it will be possible to connect the motors to the power supply only when all the doors are closed and locked. If any door is opened while the train is in motion the power will be disconnected automatically. With this arrangement door accidents should be eliminated.

While the safety of passengers should be enhanced by the new arrangement, it will be necessary to use care to prevent a serious reduction of schedule speed unless the control system is carefully worked out. On the Interborough cars, to eliminate any chance of injury to a passenger who might get his body or his clothing caught in the door while he is entering or leaving, a release was incorporated so that the door would automatically reopen by the exertion of a slight pressure on its edge. As a result it is possible for a few passengers entering or leaving one door to prevent the train from starting. This may be kept up for an indefinite time; in fact, it has been found necessary to employ platform guards to prevent delays at important stations.

In this connection it is interesting to compare American practice with European. On rapid transit trains in those countries it is customary to permit the passengers to open the doors, although ordinarily they are closed by platform or train guards. Despite the apparent opportunities there are comparatively few accidents. The same is true of steam railroad suburban trains in this country. Many of them have open platforms, and even when there are vestibules they frequently are not closed until a trainman walks through the train some time after it leaves the station. On such trains the passengers frequently open the vestibule doors before reaching the stop. Yet there are remarkably few accidents.

A comparison of the accident records of the Long Island before and after the installation of interlocked doors, together with the effect on schedule speed, should throw considerable light on the desirability of this method of control on trains in suburban service.

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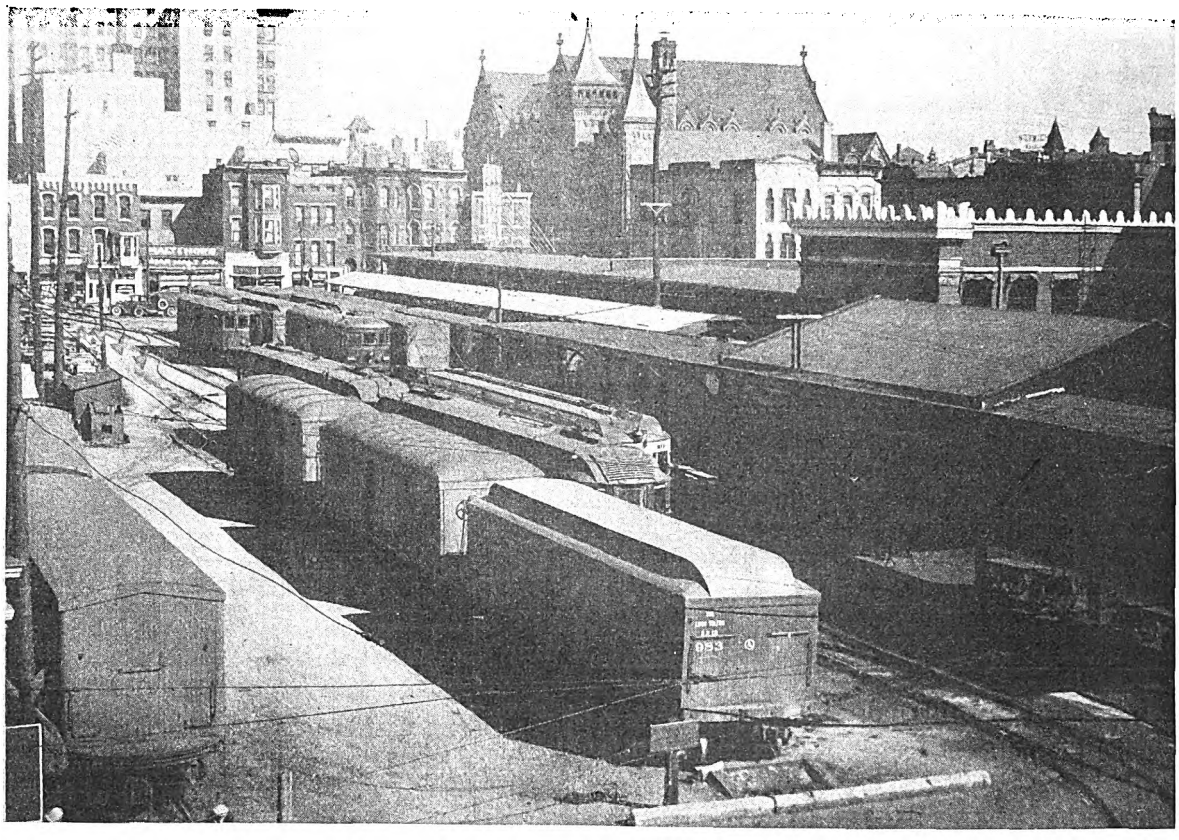

Electric railways in the Central territory have developed extensive terminals to handle freight business

Freight Business

Offers Possibilities in Central States

Electric railway companies prepare for increasing tonnage. By means of mergers and pooling of interests economies are being effected and more efficient service renderd to shippers

By J. W. McCloy
Assistant Editor *Electric Railway Journal*

COMPRISING nearly 5,000 miles of track, the great network of interconnected interurban railway lines in Ohio, Indiana and the lower Michigan peninsula obtained their main revenue for many years from the passenger business. The older employees of these lines like to tell of the great volume of travel which, beginning on Decoration Day and continuing until Labor Day, used to tax the carrying facilities to the utmost, and could be depended on year after year as a substantial part of the revenue. The advent of the automobile and the coincident construction of hard-surfaced roads put an end to this era. While passenger traffic is still a source of considerable revenue, it has been decreasing for a number of years and new sources of business have had to be developed. The manner in which the situation has been met is an inspiring example of what determination and good honest plugging can accomplish in the face of conditions none too promising.

It has taken more than a strategic location, more than mere physical equipment, more than the natural growth of a great industrial section, to do the job. The stiffest sort of competition has had to be overcome. Intensive solicitation, some very effective advertising, all of the conventional influences have been brought to bear, but in the last analysis it has been a carefully built up policy of service that is bringing results—careful handling and inspection, promptness in notifying consignees of the arrival of shipments, expeditious and fair settlement of

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claims, and punctuality in the dispatch and arrival of trains. Interchange tracks, connections with steam line industry tracks, the establishment of freight houses and auxiliary receiving and delivery stations at convenient locations have placed at the service of shippers facilities which insure prompt, reliable, careful and economical handling of merchandise and produce. Fast freight trains, some of them designated by distinctive names, move over the lines on schedules that are adhered to as closely as those governing the movements of passenger cars. Freight houses are kept open 24 hours a day, and shipments are received up to within a few moments of the leaving time of trains.

Where the haul is made over more than one line the general aim is to complete the movement in the original car, thus minimizing the delay and expense of handling. Through cars are being moved without transfer for distances up to 400 miles, often passing over the tracks of five or six separate companies. A feature which is assuming notable proportions is the handling of dispatch freight, small shipments being carried in the baggage compartments of the passenger cars at a charge somewhat higher than that for freight. This has recently been supplemented by the handling of these small shipments on a C.O.D. basis, a nominal charge being made for collection and remittance. This has proved to be a great convenience to merchants and has brought considerable revenue to the roads.

Making an Ally of the Motor Truck

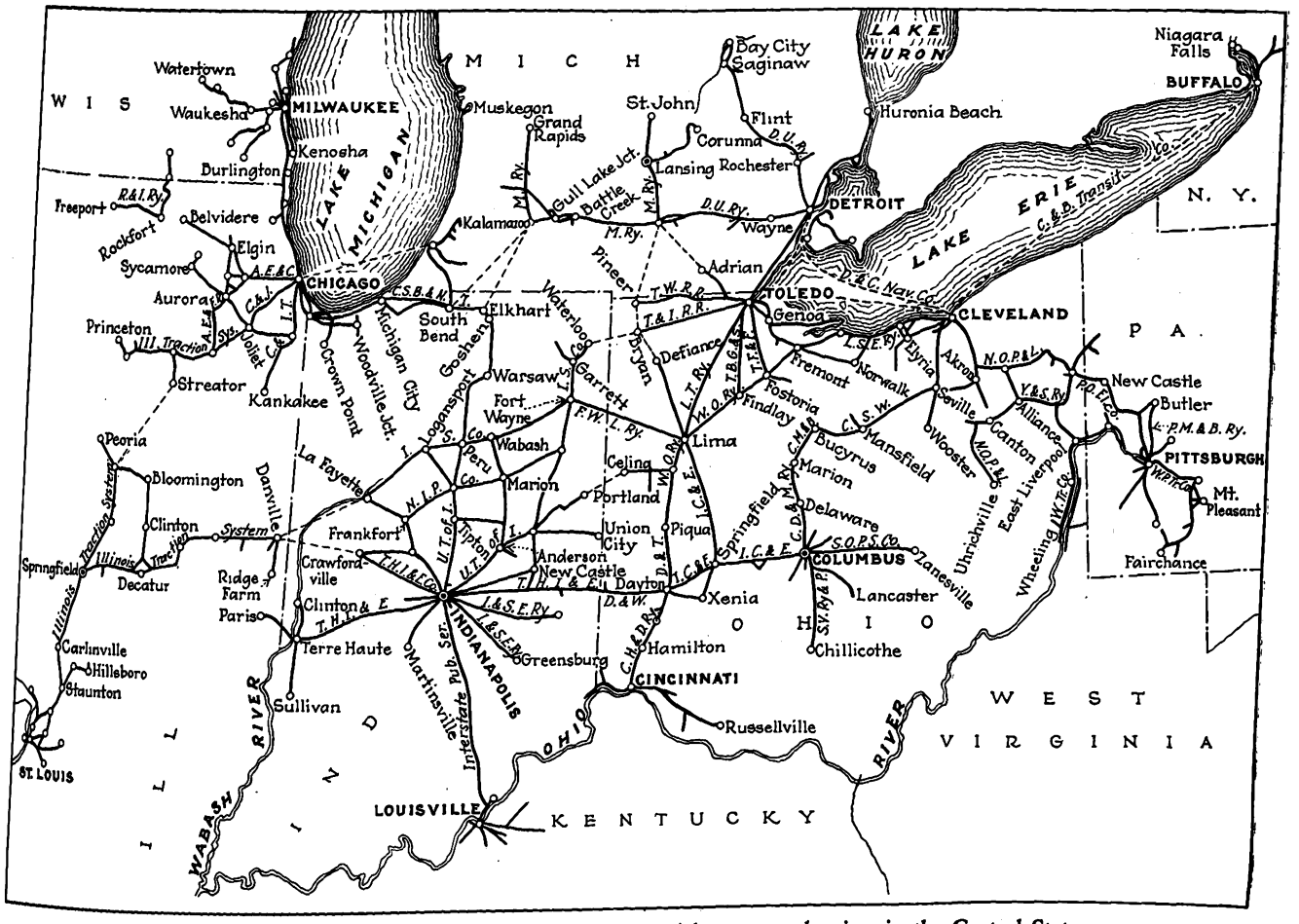
The perplexing problem of store door pick-up and delivery has been solved by arranging for this service with local truckmen in the larger cities and smaller towns. The cost of pick-up and delivery will vary between 5 cents and 15 cents per 100 lb., according to the length of haul. In nearly every instance where it has been tried this supplementary service has resulted in an increase in business and greater satisfaction to the shippers. In some situations it has proved profitable to the railway even where the charge has been absorbed.

Nor does the end of the rail any longer impose a limit on the shipper. Responsible truck lines have been enlisted as auxiliaries, affording an extension of service to points remote from the larger centers and heretofore dependent on the transient carrier. Trucks have also been found useful in concentrating less than carload freight at central points and in transferring merchandise between the freight houses of the various lines.

Convinced as they are that the pre-eminent field of the truck is in urban pick-up and delivery and in the short haul, forward-looking railway executives are endeavoring to bring this idea home to their truck competitors in the hope that they will see the advantage and advisability of turning the long intercity shipments over to the trolley lines rather than attempting to handle them themselves.

Progress Has Been Made in Face of Competition

It is not to be assumed that the electric roads have had an easy task in securing and holding the less than carload business in this highly competitive territory. The motor truck has at all times been an aggressive contender. Rates quoted are often as low as or lower than those of the rail lines, while the ability to render door-to-door service is a distinct advantage and one which is difficult to overcome.



Interconnected lines permit of through-routing between widely separated points in the Central States

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More than ever before the farmer is hauling his own stock and produce to market, uncontrolled by any purely economic considerations. Much stock that formerly moved to the Indianapolis abattoirs by interurban is now being conveyed by truck and the farmer, on his return trip, is likely to pick up small shipments for himself and neighbors. This competition, if it can be called competition, will probably become more intense, and is apparently beyond any power or influence to correct. The spread of the chain store movement, which is often followed by the disappearance of the independent dealer, has also worked to the disadvantage of the rails, as the tendency is to effect distribution by contract trucking from centrally located warehouses. The truck is also favored by shippers for the movement of furniture and household goods.

But the fact is widely recognized that the effectiveness of the truck is limited to distances up to 50 miles. Beyond that distance the haul becomes unprofitable, and even more so unless a return load can be assured. Opinion among electric railway men as to whether the motor carrier is losing ground, holding its own or gaining is influenced by local viewpoint with the weight of authority favoring the theory that, as the responsibility among the truckmen grows and realization of this economic limitation is brought home, there will be a tendency to co-operate with the railways in an interchange of freight which should work out to the advantage of both parties as well as the shipper.

Among the truckmen themselves the road to success has been by no means an easy one. The business is highly individualized, there is little co-operation or co-ordination, and success is won only at the expense of long hours and arduous labor. In Ohio, the fact that carriers for hire are obliged to secure certificates of convenience and necessity has checked the activities of the fly-by-night element but has, at the same time, strengthened the position of the more responsible operators.

Railway Service Co-ordinated With Steam Roads

Joint through rates have recently been established and through billing is provided for with a number of steam railroads, which serve hundreds of cities and towns in the Central Freight Association territory south of the Ohio River and east of the Mississippi, the exchange being made either at Cincinnati or Louisville. A similar arrangement with the Monon Route permits of an exchange of freight at Indianapolis for Chicago. Points on the Great Lakes are reached during the summer months by a connection with boats operating out of Toledo, Detroit and Cleveland. The establishment of joint rates with the steam road carriers is significant in that it opens the way for still greater co-operation which will open up new markets for both parties to the agreement.

For a number of years all new rolling stock bought for service on the Central Electric lines has been built to certain standards, so as to permit of ready interchange, and many of the older cars have been gradually conformed to this standard. Interchange with steam roads is effected to only a very limited extent, however, due to difference in draw bars, wheel flanges and curve radius. It is true that much steam-road equipment is hauled for short distances, notably between Cincinnati and Mt. Healthy, and even for long distances over open track. The development of an interchangeable drawbar which would pass inspection and meet all physical requirements would greatly extend the possible use of steam railroad equipment, and offers an opportunity which is being given serious consideration.

Overnight delivery for shippers from Columbus to Indianapolis, Detroit, Fort Wayne and Cleveland; second morning delivery from Columbus to Chicago, Louisville and Terre Haute; third day delivery guaranteed from Indianapolis to points as far east as Warren, Ohio, and as far north as Bay City, Mich.; in short, a recognition of the fact that speed is an all-important element in American business today—this is the factor that is winning the support of shippers and is at the same time putting new life and hope into managers and traffic men of the interurban railway lines in the Central West. The result has been a constantly increasing tonnage until on some of the properties freight revenues constitute more than 50 per cent of the gross.

In spite of the optimism induced by the increasingly favorable freight receipts, there is an undercurrent of uneasiness in certain quarters due to a fear that the limit has been reached in the movement of freight cars over city streets. Already there are objections on this score. Certain municipalities have curbed the practice by legislation; in others it is tolerated but viewed with disfavor. The companies are meeting the situation by voluntarily limiting the length of their trains and restricting the hours of movement. The ultimate solution will probably call either for the construction of belt lines around the cities or the electrification of short sections of existing steam railroad belt lines so as to permit of their use by the trolleys. The Illinois Traction system has resorted to this expedient at Urbana and Champaign, Ill. It is entirely feasible but would probably involve much negotiating and trading with the steam railroads. In the last analysis the economic phase will probably be the determining factor. Mid-Western industry is being so well served by the rails that it would not be likely to approve of any curtailment of their efficiency. If future economic development demands further co-ordination of railroad and interurbans, quite probably ways and means will be found and sufficient pressure brought to bear to bring it about.

With all that has been accomplished in the way of increasing freight tonnage and receipts the Central Electric traffic men realize that there is still much to be done and they are by no means resting on their laurels. Admitting that handling costs are too high, a constant and successful effort is being directed toward economies in this department. A creditable showing is also being made in reducing claims arising from damaged shipments. It is also conceded that the load factor on certain of the load distance scheduled runs is not all that it should be—that more freight could be carried with very little additional expense.

In the field of public relations the freight business has been a powerful factor in influencing public opinion. Business men who would be indifferent to the fate of the trolleys, if passenger traffic alone were at stake, are interested and concerned at the threat of any possible curtailment in freight service, the importance of which

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from an economic standpoint is too evident to be ignored. The railway executives have not been slow to grasp the significance of this fact and to turn it to their advantage.

Much of the tonnage now handled consists of merchandise in small shipments. The carload business, except in certain favorable localities, has not assumed large proportions. It is realized that this business is highly profitable and that much of it would be available if suitable facilities for handling could be provided. Unfortunately, the outlay required to secure and handle this business adequately would be considerable, involving the construction of additional team tracks and industrial sidings not only by the originating line but also by the line to whose trackage it was consigned. Additional rolling stock and power would in many cases be required. The possibilities are there, however, and eventually there is no doubt means will be found to take advantage of them.

Samples of shippers' guides distributed by Central Electric Railway properties

Accomplishments of the Illinois Traction System, where the hauling of freight has assumed a position of primary importance, show what can be done. This property has effected traffic agreements with more than 1,600 railroad and boat lines throughout the country. It has established part time off-line agencies in traffic centers as widely separated as New York, Minneapolis, Kansas City and Tulsa. Many of its freight cars are equipped with M.C.B. standard devices for interchange with steam roads, in addition to which they are so designed as to be able to negotiate the company's own short-radius curves. Belt lines have been run around Granite City, Decatur, Edwardsville and Springfield, Ill.

Investigators in the field of freight hauling in the Central territory invariably stress the importance of further consolidations. The advantages are obvious and have been frequently pointed out. For a number of years, following the failure and receivership of some of the larger companies, the tendency was in just the opposite direction and there was a disposition to regard the separate lines, once the part of a unified system, as distinct and individual units. This made for heavier overhead, duplication of effort, delay in the movement of freight and differing policies, a situation from which the industry suffered much. Fortunately, in the handling of freight the community of interest and the necessity of working toward a common end has been sufficient to overcome these unnatural barriers. Now that some of the properties are so obviously making good and have arrived at a point where their balance sheets are again beginning to attract favorable attention the old dreams of consolidation are being revived, and there is a great deal of quiet discussion going on as to ways and means to bring about the realization of this ideal.

Lines in Northern Ohio Point Way to Consolidation

In northern Ohio this dream has recently been realized through the organization of the Electric Railways Freight Company, providing for the joint operation of the freight interests of the following properties:

Pennsylvania-Ohio Power & Light Company, serving the territory in which are located the cities of Sharon and Newcastle, Pa., and Youngstown, Niles, and Warren, Ohio. Northern Ohio Power & Light Company, serving the cities of Bedford, Warren, Ravenna, Kent, Akron, Cleveland, Uhrichsville, Massillon, Canton, Alliance, Barberton, and Wadsworth. Lakeshore Electric Railway, extending from Cleveland to Toledo by way of Lorain, Sandusky, Norwalk and Fremont; Lorain Street Railroad, extending from Lorain to Elyria; Port Clinton division of the Ohio Public Service Company, running from Toledo through Marblehead and Port Clinton to Oak Harbor, on Lake Erie; the Toledo & Indiana Railroad, extending westerly from Toledo through Wauseon to Bryan.

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The trackage involved comprises 429 miles of interurban route (513 miles of single track) and 65 miles of city track which will be used for freight purposes. The combined companies own 47 motor cars, 3 locomotives and 131 trail cars of various descriptions. The first four roads named do a distinctly electric railway freight business, utilizing electric railway equipment exclusively, but the bulk of the tonnage over the Port Clinton division and the Toledo & Indiana Railroad will be handled with steam railroad M.C.B. equipment.

It is planned to paint all freight rolling stock a uniform color and subordinate the name of the owning company to that of the Electric Railways Freight Company. A uniform and simplified system of way-billing is to be put into effect. Present plans contemplate neither the purchase of additional rolling stock, the construction of additional warehouse facilities nor the laying of additional track, beyond a possible industrial siding or two, but should business warrant it is believed that the necessary financing could be accomplished by the new company to better advantage than by any of the individual companies. As at present organized the activities of the Electric Railways Freight Company extend no further than the solicitation and handling of freight; actual operation, as heretofore, will be under the jurisdiction of the operating departments of the respective roads.

While it is too early as yet to determine just what the financial results of the pool will be, it is hoped to effect a reduction in expenses by a consolidation of the soliciting and accounting activities, and a more efficient use of the existing rolling stock. More efficient solicitation and the benefits to shippers, due to faster and more dependable service, should result in greater tonnage and increased revenues. This freight merger has been sponsored by some of the most influential and progressive groups in the territory. Its success, which seems assured, will go a long way toward re-establishing the prestige of the trolley lines throughout Ohio and Indiana.

The consolidation of the Cincinnati, Hamilton & Dayton Railway, the Indiana, Columbus & Eastern Traction Company and the Lima & Toledo Railway lines, recently authorized by the Ohio Public Utilities Commission, is another significant move toward the unification of service in this territory. This group of properties, comprising 332 miles of track, brings under one management a direct route extending from the Great Lakes to the Ohio River, and connects the cities of Cincinnati, Dayton, Springfield, Columbus, Lima and Toledo, as well as a number of smaller towns and villages. The route crosses nearly every important east and west steam railway trunk line in the United States.

This consolidation is expected to quicken freight deliveries and make possible the provision of additional freight equipment, the enlargement of existing freight facilities and the construction of additional sidings and extensions. On the operating side substantial economies can be looked for, including the elimination of considerable overhead and much of the duplication in waybilling that was necessary under divided management. Freight schedules can be speeded up and repair work can be concentrated at some central point.

It has been pointed out that the building of but a few miles of line, for instance, from Crawfordsville, Ind., to Danville, Ill., would connect the entire C.E.T.A. system with the trackage of the Illinois Traction System, while the construction of a connecting link between South Bend or Elkhart and Kalamazoo would greatly facilitate the movement of freight by electric traction between Chicago and Detroit.

Freight business is increasing in the Central Electric territory and will continue to do so. The steam railroads, the trucks and the interurbans are all actively competing for this business. Aggressive, forward-looking management and a disposition to meet the requirements of the shippers should enable the electric railways to hold and improve upon the position which they have attained.

Denver Survey Shows Street Car Economical User of Space

COUNTS were made recently in Denver of pedestrians, automobiles and street cars using the downtown streets, for the purpose of determining the best possible location for a belt street to surround the business district. Some interesting data were collected in the survey, relative to the widths of sidewalks required on certain streets and the amount of street space used by automobiles and street cars.

The three principal business streets in the surveyed section of Denver are Fifteenth Street, Sixteenth Street and Seventeenth Street and all have double-track car lines. Like all other downtown streets in Denver they are 80 ft. wide between property lines and have 48-ft roadways and 16-ft sidewalks. One purpose of these studies was to determine whether a reduction of sidewalk width from 16 ft. to 12 ft. and a corresponding increase in width of the street of 8 ft. was desirable.

Sixteenth Street, the main shopping street, was found to have, in 24 hours, between the points counted, 50,000 pedestrians, 14,200 street car passengers in each direction and 12,800 travelers in automobiles in each direction. With this number of pedestrians it was not considered wise to reduce the width of the sidewalk.

Fifteenth Street is primarily a street of grocery stores and contains no department stores, and Seventeenth Street is a bank, railroad office and realty office street, also largely without department stores. Both carry heavy street railway traffic, indicating that such car lines can serve department stores without actually being on the same street.

Some calculations were made in regard to street space used for each type of traffic. In Sixteenth Street the middle 20 ft. of the street devoted to car tracks carried 28,557 passengers, or 1,223 people per foot in width. The automobile lanes on this 48-ft. roadway were found to be uneconomical of street area. They carried 25,412 passengers on 16-ft. widths (from the street width two lanes of parked autos must be substracted), or 1,558 people per foot of street width. These figures must not be confused with maximum capacity figures. The automobile traffic winds in and around street car traffic and takes up part of the street allowed for it.

On the street west of the department store street the proportion is different, 20 ft. of roadway space used by the street cars carrying 42,058 or 2,103 persons per foot of street width. The number of motorists figured on the previous basis is 20,528 on a 16-ft. width, or 1,283 persons per foot of street width.

As a result of the study it was decided to reduce the widths of the sidewalks from 16 ft. to 12 ft. on the outer edges of the downtown district where pedestrian travel is lightest, but not on the main traffic streets.

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Regulation Must Be Related to Economic Law

By R. N. Van Doren
Vice-President and General Counsel
Chicago & Northwestern Railway

This analysis, presented before the winter convention of the Central Electric Railway Association in Indianapolis last week, treats of both theoretical and practical considerations involved in the regulation of public and private enterprises

ECONOMIC forces, even in this day of complex industrial development, still operate in all fields where normal and healthy conditions exist. In the rearing of an industrial structure, under the pressure of a rapidly advancing commerce, errors and unfortunate practices enter in and true economics are for the time ignored or defied. This inevitably weakens the structure, and if not discovered and remedied by the industry itself occasions and justifies the intervention of legislative law. As industry advances under the influence of progressive thought, new and improved standards of performance are demanded. If these standards be not accepted and applied, regulation under legislative direction enters the processes of production and enforces compliance therewith. These errors and practices are not the results of economic law, but are defiances thereof. Wise public regulation of industry finds its justification only in the failure of business to conform to proper rules and in seeking to eliminate those conditions inimical to healthy progress.

Justification for Regulation

If all laws dealing with industrial problems had as their aim the restoration of economic freedom there could be no serious objection thereto. But while unhampered economic forces are inexorable, legislative fiat is not so. One law, aimed at a real or imaginary evil, fails of its mission and thereby opens the floodgates of unscientific and uneconomic regulation.

Private industry, as distinguished from public service, has been measurably free from this ultra-regulative process. It has been curbed, it is true, in some of its activities, but only to an extent deemed necessary to prevent a denial of economic justice. There are indications now and then, however, that even private industry is to be subjected to this regulative process. United States Senators are heard in argument in support of the proposal to regulate the prices of commodities, upon the theory that because such commodities are essential to the public weal the industries producing them are impressed with a public purpose. Of course, if this be true there is no basis of distinction between public and private enterprise. We believe it to be both economically and legally unsound. Yet it is perhaps but the natural development of the course of events which has marked the advance of the regulative idea.

It is an increasingly popular habit for our people to assign responsibility for all industrial disorders to the government. This also tends to ease the conscience of those who are defying economic forces. Once an industry is committed to the thought that the government is to blame for its losses, it is the logical thing for it to demand relief from that government. This tendency is being augmented by men in positions of authority who do not, or will not, see the fundamental distinction between regulation of public and private enterprise.

Bituminous Coal Commission

A bill is now pending in Congress by which the private character of the bituminous coal industry is to be legislatively destroyed and that industry is henceforth to be classed with other so-called public service corporations. Without so declaring, the evils of that industry—not its essential qualities—are made the occasion and basis for governmental regulation. A commission to be known as the Bituminous Coal Commission is proposed to be created to regulate that industry; to fix the grades and prices of the products. This, by fiat, places all coal corporations not accepting the act in a class of almost outlawed activity. Primary licenses are to issue to those companies employing union labor, and secondary licenses are provided for open-shop mines with the obvious purpose of forcing all bituminous coal operations into the union fold and placing under a handicap those which choose to maintain the open-shop principle.

Of greater significance and of forboding consequences is the idea which the bill embraces of making that which is in essence a private industry a public service corporation. Evils may exist in the bituminous coal business, but surely there is some way by which such evils may be corrected without revolutionizing the whole concept of American industry. If this step be taken, then there is no limit to which Congress may not go in socializing American industry.

One of the most effective means of preventing an unwise and uneconomic extension of the theory of public regulation to purely private enterprises is to confine the regulation of public service corporations strictly within the limits of its original and fundamental conception. If we permit such regulation to go unbridled and to rove unrestrained, we shall bring discredit to the system and cause it to lose its significant and essential qualities. It is important, it seems to me, that we shall, from time to time, restate the principles of public

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regulation, and take stock of our progress to know if we are still within the confines of legitimate and wise political action.

Purposes of Public Regulation

No one who has given serious thought to the subject would now contend for a return to the days of unregulated railroad operation. The conditions which occasioned, and the evils which demanded, the intervention of the public in the operation of the railroads are too well known to admit of a desire for their restoration. Regulation of railroads has come to be acknowledged as a necessary and economic system for the proper and efficient operation of these systems of transportation.

The basic idea of regulation is, of course, that railway transportation shall be furnished to all upon reasonable and non-discriminatory rates; that rebates, concessions and the like shall not be permitted and that the corporate affairs of railroads shall be an open book. At the outset the sole idea was one of restraint. As experience revealed new possibilities of evil the acts of regulation were broadened to include such new problems. Thus the restraints upon the issuance of securities; upon extensions and abandonments; upon interlocking directorates; upon the dealing in commodities transported; and kindred subjects, came to be considered wise and necessary extensions of the laws. Still the predominant idea was one of repression—to curtail those practices which were thought to be inimical to fair and honest operation.

Responsibility of Regulation

The thought that with this repressive regulation there should be some measure of responsibility for the successful operation of the railroads was not entertained prior to the transportation act of 1920. That act contained the significant and important and much misunderstood provisions now embodied in Section 15a of the interstate commerce act. Here was congressional recognition of the fundamental justice of giving some assurance of fair dealing with railroad properties. Of course, it was not a guaranty. But it did most emphatically proclaim a policy which is inherently just and economic. If the transportation act may be permitted to function unhampered by extraneous influences, there is reason to believe that railroad regulation may prove successful both to investors and shippers.

Uneconomic Practices Discouraged

Theoretically, railroad regulation is strictly economic. It aims to prevent those practices which hinder the operation of economic rules. The granting of a rebate or the enforcement of discrimination is uneconomic. Economic law knows no favorites and rigorously enforces its decrees. An unreasonable rate is contrary to economic principles because it retards free movement and reduces carrier revenue. An inadequate rate is not economic, because it fails to provide compensation for valuable service and unduly stimulates the preferred industry. Regulation steps in and fixes the maximum rate, and to the degree to which the determination is wisely reached does regulation recognize economic rule. Since the power to fix minimum rates has been recognized, regulation likewise prevents economic waste by requiring industry to pay for service rendered, and prevents uneconomic carrier competition. It is not in keeping with the economic conservation of industry for unnecessary and duplicated service to be furnished a given community. Regulation asserts that fundamental economics be recognized in railroad extensions and abandonments. Over-capitalization is unwise, and unnecessary security issues are wasteful. Therefore, regulation aims to preserve the economics of finance by supervising such issues.

Transportation—an Element in Production

The point at which railroad regulation breaks down and fails to recognize economic law is in ignoring the essential and integral factor of transportation in production. If the American public can once be brought to a realization of the absolute economic dependence of industry upon transportation, the boasted quality of fair play ought to solve many of our pressing and embarrassing problems.

Industry pays a high scale of wages, because it has come to know that the best service comes from contented and prosperous labor. It wants the best machines, for thereby are ultimate economies effected. It pays current market prices for raw materials and accepts the market as its guide. But while it appreciates the importance of good transportation service it regards the carriers as something apart from the processes of production and pays its charges only because its goods must be moved.

Take agriculture, for example, because it is paramount in the public mind at this time. We erroneously talk about production and transportation as though they were separate and distinct elements in the economics of wealth. When we consider that production is the creation of economic value—the making of wealth available for human wants—we must recognize that production is not complete until the products of the soil are made available for human wants by placing those products where men can utilize them. The price of the farmer's grain is fixed at the central market, and until his grain reaches such market, or is available therefor, it is valueless. Transportation enters into his industrial processes, and does for him what he would otherwise have to do for himself.

When prices of farm produce are high the farmer gives little thought to expense. He expands his operations, buys high-priced land, pays high wages and increases production. When the inevitable recession in prices comes the farmer is naturally discouraged, perhaps resentful, and perforce looks about for means of reducing expenses. More often than not he is encouraged to believe that freight charges are responsible for his misfortunes, or at least that reductions thereof would materially ameliorate his condition. Immediately there appears on the political horizon a host of Moseses who have panaceas for agricultural relief, and chief among them are measures aimed at reduction of transportation charges.

While, of course, freight charges have entered into the sum total of farming expense, they have been proportionately far less than other factors, and constitute an item in the cost of production which justifies itself abundantly. Yet this essential and integral part of production is the one which is made to sustain the chief burden of deflation, notwithstanding the fact that the carriers have also been subjected to many of the same elements of inflation as has the farmer. Complaints of excessive rates are filed and extended hearings are held. Members of Congress are active with bills to force rate reductions, and the whole gamut of uneconomic regulation is run.

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I maintain that there is no more economic justification for a compulsory rate reduction in such cases than for a legislative reduction of wages, interest rates or commodity prices. All are essential ingredients of production. Each should respond in due proportion to any program of relief. Especially is this true when the railroads are not allowed, during the period of inflation, to store up excess earnings against the day of diminishing returns. With their rate of return limited, and rarely reached, they are not accorded the benefit of that principle of industry, as well as of frugality, of guarding against the time when deflation reduces traffic and earnings. The theory that railroad rates should be made to fluctuate with the rising and lowering tides of industrial conditions can never be scientifically or economically justified so long as the rate of return be arbitrarily limited. In the larger and more important aspect of the question there can be no sliding scale of rate levels to fit the temporary vicissitudes of commerce. The fact that railroads are public service corporations does not justify an uneconomic treatment of rates. The power to regulate, unlike the power to tax, does not include the power to destroy.

There is no basis for a policy of regulation which uses a public service corporation as an economic gyroscope. Railroads are parts of our economic structure and must be accorded that same measure of economic freedom which other industries enjoy. They should be regulated only to the extent to which they violate or threaten sound business principles, or when they fail to keep pace with modern and approved standards of operation.

Regulation of Motor Vehicles

With this thought in mind, what, then, should be our attitude toward the regulation of motor vehicles using the public highways?

I believe I accurately state the position of the large majority of those concerned in either electric or steam transportation in saying that the railroads have, and claim to have, no vested right in transportation; that whenever a new form of public carriage can transport the inhabitants or products of the nation more expeditiously and more economically than can the railroads the public is entitled to such new form of transportation. In fact, the public has the right to avail itself of such mode of transportation as it chooses, whether or not such mode is faster and cheaper. The only limitation to such right of the public is that vested rights of other carriers—and, some politicians to the contrary notwithstanding, some such rights still exist—shall not be infringed. At the outset of the problem there may have been a thought in some quarters of trying to legislate bus lines out of existence, but it certainly no longer prevails. The enlightened thought of the day, if not one of co-operation, is at least not antagonistic. This position has been most clearly emphasized during the last three years in the hearty co-operation and constructive efforts upon the part of the railroads to work out with the bus interests a satisfactory and workable bill for the regulation of interstate motor bus operations. Starting out with the original Cummins, Parker and Dennison bills, which placed the buses under quite complete control of the Interstate Commerce Commission and afforded real protection to the railroads against this new form of competition, there has evolved the present Parker bill (No. H.R. 15621), which prescribes a minimum regulation of the buses and gives to the railroads but scant consideration. This has been accomplished through compromises upon the part of the railroads in an effort to secure some form of regulation which would to a degree put the carriers more nearly upon a parity of competition. Of course, this object has not been fully accomplished in the proposed bill, nor would it have been the result of the original bills referred to. It should, however, silence the ill-founded charges that the railroads are seeking to kill the bus business by legislation.

The present bill provides that motor bus operators shall obtain certificates of public convenience and necessity from joint boards constituted of representatives of the interested state commissions. Such certificates are transferable, and upon the death of the holder pass directly to his heirs. All motor carriers in *bona fide* operation on Nov. 1, 1928, and continuously down to the date of their application, are entitled to such certificates as a matter of course and without a hearing. Protection to the traveling public is required in the form of bonds approved by the commission. Rates and fares must be published in the form of tariffs, which must be adhered to until changed upon due notice. Operation of the buses is to be made subject to reasonable rules and regulations prescribed by the commission. In substance, these are the provisions of the bill, and surely no one can intelligently claim that they unduly restrict the operation or development of the bus industry. The only provisions of the bill which may be said to give consideration to the interests of the railroads are that in deciding applications for certificates due consideration shall be given, among other pertinent matters, to existing modes of transportation; and that any person, including railroad companies, may acquire certified bus lines without violating the provisions of the anti-trust acts.

Thus is presented a minimum of regulation of motor buses and a mere recognition by Congress of the fact that railroads still exist. Yet this bill is having the earnest support of nearly every railroad in the country.

Let the Fittest Survive

What the future of bus regulation will be no one can foretell. We could not be so vindictive as to wish upon them such a degree of regulation as railroads now enjoy. If, however, the motor bus industry is in harmony with the economic development of the nation and its operators are to be regarded as public service corporations, using the public highways for which they have not paid, and are to continue to compete with other recognized and long-existing forms of common-carrier transportation, they should be required to place such competition upon a basis which will be just and equitable to their competitors. Then let the fittest survive.

It would appear that our friends, the state commissions, do not want the railroads to compete with buses. At the convention of the National Association of Railroad and Utilities Commissioners at New Orleans, on Nov. 16, 1928, a report submitted by Mr. Morgan of Alabama was adopted criticizing the railroads for granting excursion rates in bus competitive territory and calling for an investigation as to the lawfulness thereof.

Fair, or Subsidized Competition?

In the beginnings of railroads, competition with then existing canal routes was effectively prevented by prohibiting railroad rates being less than competing canal rates. Even with this handicap the railroads won out through superiority of service. That law was designed

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to preserve investments in canal properties. Now Congress is reversing the current of economic trend by declaring a national policy in favor of inland waterways. By a law enacted at the last session of Congress it is proposed to develop inland waterways at the expense of the government, operate barge lines thereon at the expense of the government until they have proved to be profitable and then to sell them to private interests. In order to assure the success of the barge lines the steam railways are required to establish joint through routes and joint rates with the barge lines and to afford divisions of such rates from the railroad revenue. Because of the inferiority of service on such through routes due to the factor of barge-line carriage such through rate must be lower than the all-rail rate. Clear principles of economic law would require the factor which is responsible for the poorer service to bear the decrease in the rate. But in this case such principles are ignored and the railroads are required to absorb such decrease. Thus has the government again gone into the subsidy business; but for the first time in our history one industry—the government itself—is to be subsidized at the expense of its competitors. This is government ownership with a vengeance.

Commission or Congressional Regulation?

Rate making and other public utility regulative functions are primarily legislative in character. For years this legislative power was exercised by direct action of legislative bodies. The books are full of statutory enactments dealing with almost every feature of railway operation and management. Maximum rates and fares statutes are still in force in many states; even in those states which now have regulatory commissions. There came a time, however, when legislators realized their lack of time and capacity to handle properly such a specialized and complicated problem; consequently the commission form of regulation.

There are doubtless many defects in commission regulation of railroads, and at times we are prone to rail against what at the time appears to be a gross misapprehension of the facts and of the remedy to be applied. But with all its shortcomings it is a decided improvement over the former plan of direct action by Legislatures. It is the best method of public regulation yet devised, but will continue to merit the confidence of the public and of the railroads only so long as it is permitted to carry out the purpose and plan of its original conception, namely, regulation by an impartial specialized body, removed, so far as a governmental department can be removed, from the effects of party or political influence.

Being an arm of the legislative branch of the government there is danger that it will not be permitted to work out its problems in an impartial and scientific way. There is a growing tendency to override acts of commissions by direct legislative acts and to give to the commissions arbitrary directions not founded upon well-considered or economic study.

Instances of such direct action are afforded by the 2-cent passenger fare law of Wisconsin, passed after the creation of the Railroad Commission, and after that commission had conducted an extensive investigation into the matter of such fares, resulting in an order fixing $2\frac{1}{2}$ cents as the basic fare. The passage of the Hoch-Smith resolution was an ill-advised, and I think an unwise, piece of legislation, and marks a tendency which, if extended, will completely undermine the whole structure of commission regulation. That there are indications that it may be extended is evident from the action of the Senate committee on interstate commerce, in reporting for passage the bill to repeal the so-called Pullman surcharge after the Interstate Commerce Commission had, upon full investigation and after extended hearings, found such surcharge to be justified and the amount thereof not unreasonable.

As indicating a more enlightened and statesmanlike attitude on the part of the Senate the recent confirmation of Commissioners Aitchison, Porter and Farrell, without discussion in committee or on the floor, is most encouraging, and, we may hope, marks a renewal of adherence to the principle of disinterested and specialized regulation of public service corporations.

The commission, being an arm of the legislative body, it is of course within the legitimate province of that body to prescribe the jurisdiction and organization of its agent. But having once determined upon the policy of scientific regulation, divorced so far as possible from political interference, Congress should respect that determination and leave the development of the regulative idea to those whom it has designated as best qualified for the task. The railroads have but one recourse against unfavorable determinations of the commission. That same limitation of remedy should apply to shippers and to the public generally. There should never, under any circumstances, be a resort to Congress to undo or overrule a determination once formally made by the commission. What may under extreme circumstances seem to justify a congressional appeal will but afford justification for similar appeals where conditions are not extreme.

Congress will, of course, always retain and doubtless exercise the right to amend or repeal the whole or any part of the law. While we may question the wisdom and challenge the validity of a particular amending or repealing bill, we may not consistently or intelligently doubt the power of Congress so to act. But when the particular bill proposes to overturn a decision once formally made by the commission, or seeks to substitute congressional for commission judgment, we may, and should, vigorously protest and oppose such action.

The whole public, shipper and investor alike, have the right to rely upon the impartial and honest determination of their rights in transportation. They have been repeatedly assured through 40 years of public regulation of the permanency of the commission form of regulation. It will utterly destroy confidence in public regulation if Congress shall, at this late day, retake jurisdiction of this complicated and delicate task.

There are two methods of exerting legislative interference with commission action. One is by direct legislative act; the other is by coercion. It is regarded as unethical for attorneys of record to make public comment of cases pending before courts, but such conduct is at worst but a breach of that respect and deference which should be maintained between bench and bar. There is no element of intimidation or improper influence in it. But when a member of Congress makes a speech upon a matter then pending before the Interstate Commerce Commission, and with reference to which no bill is pending in Congress, it can have but one purpose—the exerting of a coercive influence upon the commission. Unfortunately, this practice is becoming too common and should be condemned by all fair-minded men.

Unless we can preserve that respect and confidence in the commission which is its strength and pride, we can-

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not hope for a maintenance of its past record of conscientious and impartial effort. We cannot afford, by carelessness and indifference to these matters, to lend sanction to practices which can but eventually destroy all confidence in commissions.

Twenty-five years ago the railroads were told to get out of politics and to stay out. In return they were given every honorable assurance that their affairs would thereafter be regulated by an impartial governmental body removed from political influence. In 1905 President Roosevelt announced his famous doctrine of a square deal, just prior to the passage of the Hepburn act which was designed to give vitality to the Interstate Commerce Commission. I cannot do better in submitting this subject to you than to quote that virile American statesman, whose pronouncements were usually consonant with safe and sound economic laws. He said:

"It must be understood as a matter of course that if this power is granted it is to be exercised with wisdom and caution and self-restraint. The interstate commerce commissioner or other government official who failed to protect a railroad that was in the right against any clamor, no matter how violent on the part of the public, would be guilty of as gross a wrong as if he corruptly rendered improper service to the railroad at the expense of the public. When I say a square deal I mean a square deal; exactly as much a square deal for the rich man as for the poor man; but no more. Let each stand on his merits, receive what is due him and be judged according to his desserts. To more he is not entitled, and less he shall not have."

El Paso Reduces Accidents

For important progress in safe operation made during 1927, company wins honorable mention in Brady contest

SO NOTABLE was the record of the El Paso Electric Company in the prevention of accidents during 1927, that it received the Brady Safety Award, given to companies operating between 1,000,000 and 5,000,000 vehicle-miles during the year. When the time for the 1928 safety contest came around, based on the records during 1927, it was found that the El Paso Company had bettered its remarkable 1926 record. While the committee on awards for the Brady prize decided to give the first prize to another company in the properties operating from 1,000,000 to 5,000,000 vehicle-miles a year, it is not surprising that the El Paso Electric Company should have received honorable mention.

Particulars of many of the safety practices of the company, as followed a year ago, were given on Page 193 of ELECTRIC RAILWAY JOURNAL for Feb. 4, 1928.

SEVEN-YEAR ACCIDENT RECORD, EL PASO ELECTRIC RAILWAY OPERATIONS

Year	Total Accidents	Accidents per 10,000 Car-Mile	Accidents per 100,000 Passengers
1921	1,867	5.83	9.81
1922	1,401	4.34	6.60
1923	1,022	2.94	4.84
1924	611	1.82	3.16
1925	546	1.65	2.85
1926	452	1.42	2.43
1927	445	1.35	2.42

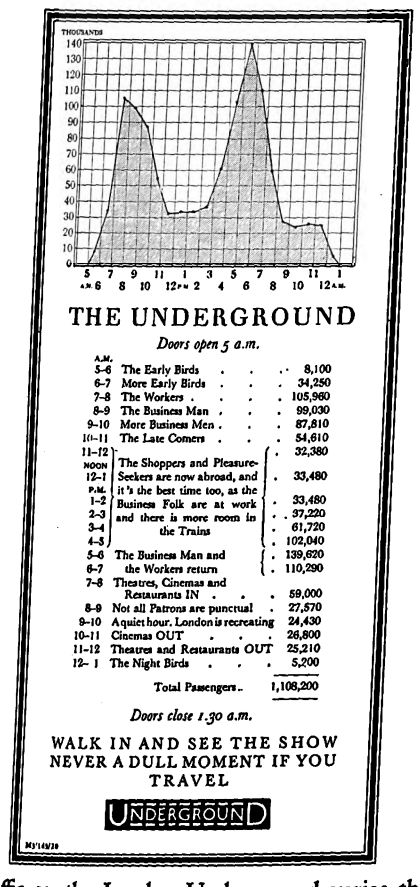
Most of the methods then followed are still employed. In addition, the company has introduced a number of other plans. Following is a summary of those not previously mentioned.

A great deal of attention is given to the protection of school children because of the well-known heedlessness of children of that age. Activities within the schools include the showing of motion picture films on safety subjects. The company makes arrangements to secure these films and furnishes a projector and an operator whenever required. Pamphlets dealing with different phases of safety are distributed in the public schools and are often used as the basis for themes in class work. The company also frequently furnishes students with safety and other data covering its own operations. Safety calendars are provided for all classrooms, and every effort is made to encourage the children to think of safety.

During the year, students in all the high schools in Texas were invited to prepare art posters in a state-wide contest. The art teacher in the El Paso High School, having noted some excellent safety posters on the dash boards of the electric cars in El Paso, suggested to some of the students that they might use the topics of safety for their posters, and a number did so. Later these posters were exhibited in El Paso. Another teacher wrote a text book on safety for schools, and copies of this book were placed with each teacher in the school system as a guide in safety work. These two incidents show the prevalence of the safety influence in El Paso.

The efforts of the company, however, do not end here. In all cases where children are found playing near the car tracks, stealing rides, or in any other way molesting the company's equipment, their names are secured and a letter is sent to the parent. Frequently, personal calls

Traffic Distribution Shown in Clever Advertisement



How the traffic on the London Underground varies throughout the day is interestingly told in this newspaper advertisement

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are made upon parents in reference to such cases. The point is made that the company's interest is to protect the youngsters from possible harm and that they should be warned of the danger of such practices.

The company's line to the high school ends at the top of a rather steep grade. To guard against the possibility of an accident in case of brake failures, and to provide a greater factor of safety in the event that students should tamper with the equipment while the operator is changing ends, all cars on this line have been equipped with wheel blocks of oak. When the car stops at the end of the line the wheel block is immediately put in place. The result is, if any of the boys should board the car and release the air, or if the brakes do not hold, the wheel block will prevent the car from running away.

Other Simple Precautions

The rule governing the operation of cars at street intersections has been found to help reduce accidents. The rule provides that two cars shall never be in the intersection at the same time. The question of right-of-way is not covered by any rule but is left to the judgment of the operators. Another rule to prevent collisions says that cars on the same line shall remain at least a block apart, especially in the down town section or when passing an important junction point. Cars are permitted to approach sidings and curves only at a speed not exceeding 4 m.p.h.

At two places, car lines cross bridges on trestles at points where children are in the habit of congregating. One of these bridges is close to a school. The other is near a point where caddies gather on their trips to and from the golf courses at the El Paso Country Club. It was noticed that the youngsters at play around the trestle would sometimes put their heads through the open spaces between the ties, thus placing themselves in positions of danger. When this practice was discovered the company eliminated this accident hazard by boarding over the open spaces.

Precautions against accident are not confined to the highways but have been extended to the shops. Thus, where belts and gears are used on machines, they have been properly inclosed in wire nettings, wooden cases or other protective equipment. The workmen painting the cars with the spray process use respiratory apparatus for greater safety. Outside construction is done as much as possible at night, and all tools and material required are kept at one side of the street so that the other side may remain open. On a double track line, when one side of the street is finished, the materials and tools are moved to the other side of the street.

A great deal of interest is given to safety contests and no-accident periods. All street cars and buses were operated for six consecutive days without accidents of any kind in February, 1927, and again in March, 1927. The previous best record was five consecutive days. The company had a total of sixteen no-accident days in 1926 and 127 no-accident days in 1927.

Various Contests Are Staged

During the year, various contests are staged, lasting for one week or three months at the most. To a large extent these were the outcome of wagers between the various inspectors and operators who became "pepped up" over results already accomplished. An accident bogey of 450 was set with a total of 125 no-accident days for the year 1927. A chart, prominently displayed, showed the accidents as they occurred, indicating at a glance the status of the accident situation and its relation to the bogey at all times. This kept interest in the contest at a high pitch. The results were very close in October with everyone working to beat the bogey. At this time the manager promised all inspectors a dinner if they made 20 additional no-accident days between that time and the end of the year, which would put them well over the bogey. Everything went well until Dec. 23, when they had made 19 of the no accident days, but during the holiday rush the men failed in their attempt to make another no-accident day during the year. However, they had the dinner, partly because of their untiring efforts to win it, but more because they had accomplished the original objective by completing the year with 127 no-accident days and a total of only 425 accidents.

The bogey contest proved to be one of the most effective plans employed in the accident reduction campaign and was adopted as a regular feature of the company's safety program.

In addition, the company has an honor roll and safety star merit system, both of which have proved very successful in reducing accidents. The honor roll is compiled every month and contains the names of all operators who have worked during the previous month without having an accident. A trainman who has been on the honor roll for two consecutive months has a day off with full pay. For each consecutive month thereafter that he is on the honor roll he has an additional day off with pay. If he has an accident he has to start over again.

In addition, a trainman on completing twelve consecutive months operation without an accident receives a gold star. Individual stars are given for each year up to and including four years. When a trainman completes four years operation without an accident, he receives a large gold star with a numeral worked in the center, indicating the length of time he has operated without an accident. The system is known to the patrons of the road and the possession of these stars is a source of pride to trainmen.

The honor roll system has been in effect for eight years, and at present 70 per cent of all trainmen are gold star operators.

In addition, the company has division contests, with small horses on a miniature race track to stimulate interest in the records of the divisions. Every day that a division has no accidents, its horse is moved forward 5 notches on the track. In the case of one accident he is moved up four notches, two accidents, three notches, and so on. The horses bear the name of inspectors on the different divisions to make the contest more personal. The winning division receives a banner and the operators and inspectors are entertained at a banquet.

Assets of Employees' Loan Association in Milwaukee Increase

ASSETS of $10,323,129 are shown in the annual report of the Employees' Mutual Saving, Building and Loan Association, comprised of employees of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. This represents an increase of 12.8 per cent for the year. Mortgage loans amounting to $2,266,922 were made during 1928, and $1,229,413 in mortgage loans were retired. At the close of the year the association had outstanding 3,359 loans totaling $10,017,316.

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Concreted Track

for New York City Subway

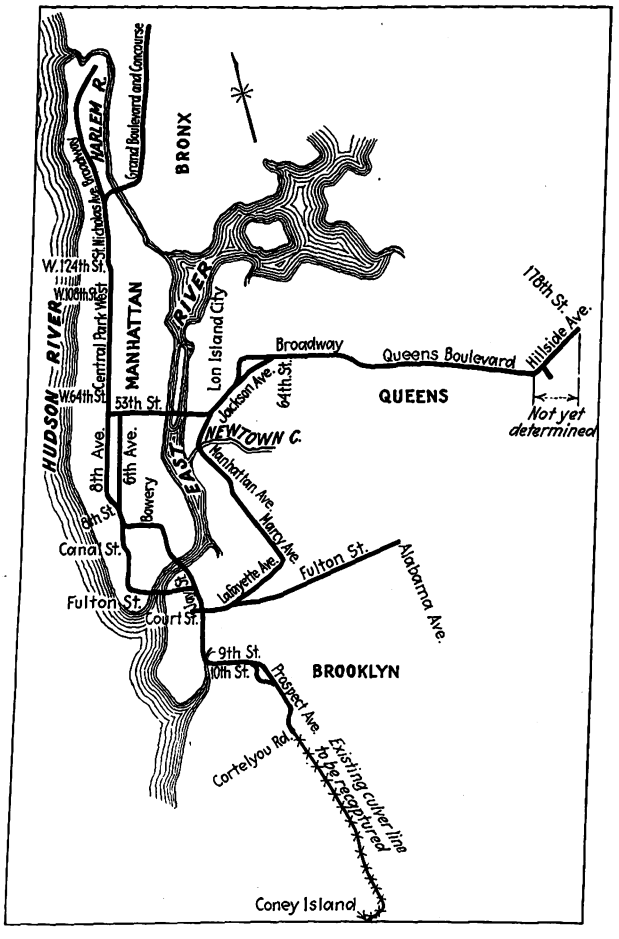
By Robert H. Jacobs
Division Engineer Board of Transportation, New York City

Extensive study led to the adoption on the new subway of wooden blocks set in concrete for the rail support except under special work. In this article the author outlines the numerous advantages of this type of construction

WHILE the fundamentals of all track construction are largely the same, from the pioneer work in the West to the present-day subways, tracks for rapid transit subway operation involve several aspects that are not entirely paralleled by steam railroad. Subway tracks are installed over a rigid floor instead of on a yielding subgrade and are not affected by frost and other climatic conditions, as is the case of open track on steam railroads. While provisions for drainage must be made, they are of an entirely different character from those usually required for other railroads. Likewise, the smaller temperature range in subways requires providing for less expansion in the rails, and motor-driven cars react upon the tracks quite differently from the driving wheels of steam locomotives. The fundamental requirements for subway tracks are in many ways quite similar to those for street railways, although there are obviously many points of difference both as to traffic and physical conditions to be met.

The rapid transit railroad system of Greater New York now under operation by the Interborough Rapid Transit Company and Brooklyn-Manhattan Transit Corporation consists of 216 miles of structure (subway and elevated) and 631 miles of track, exclusive of yards. The new independent city subway system was started in 1925 and, as at present laid out, consists of about 55 miles of structure and in the neighborhood of 175 miles of running track, exclusive of yards.

The contract drawings for the construction of the original subway (now operated by the Interborough Rapid Transit Company and known as Contract 1) indicated that in the underground portions of the railroad the track should consist of rails laid on a continuous bearing of wooden blocks, the blocks to be held in place by steel channels secured to metal crossties imbedded in concrete. This contemplated type of rigid construction required less depth below the base of rail than for ballasted track, and the subway structures were built accordingly. Although no such type of track had been used for high-speed railroads, a short stretch of it was installed and tested out under traffic on the Long Island Railroad. When the time came for laying the tracks in the subway the conservative attitude of the operating company toward the adoption of this new type of track resulted in the final adoption of the ballasted type of track in place of that originally contemplated. This necessitated raising the base of rail to provide for ballast, thereby reducing the overhead car clearance. At the same time it permitted only a very shallow track construction with but 5-in. ties and 5 in. of ballast beneath the ties. On later work 6-in. ties with a $7\frac{1}{2}$-in. layer of ballast were adopted as the standard construction.



Route of the New York City subway now under construction

The tracks for the original subway and elevated railways (Contracts No. 1 and No. 2) were installed with 100-lb. modified A.S.C.E. rail, using ribbed tie plates pressed into the ties. The tracks for the elevated extension of the original subways were constructed somewhat similar to the existing Manhattan Elevated Railroad lines, except that 100-lb. modified A.S.C.E. rail

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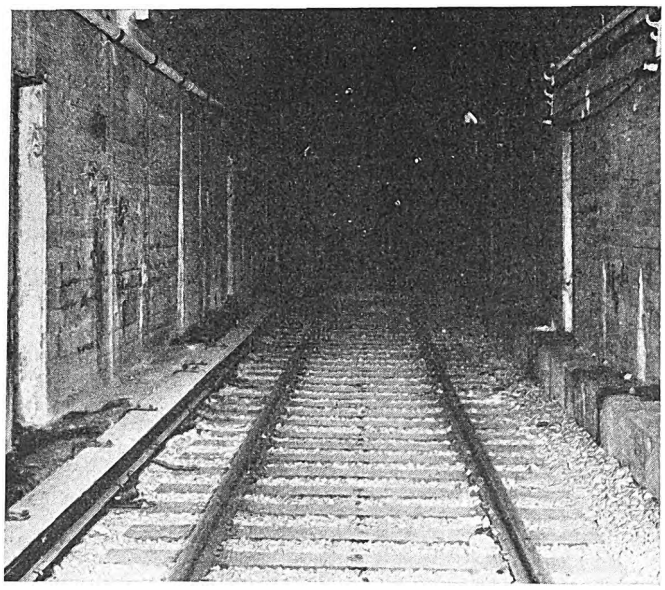

Ballasted track, known as type I, is used only for special work, for short stretches between special work, for lay-up tracks and in yards

was used instead of the 90-lb. special section in use on the Manhattan Elevated lines.

Prior to the preparation of track standards for the additional lines for the present operated dual system, conferences were held between representatives of the city and both operating companies. This resulted in the adoption of uniform standards except for certain items on which the two companies did not agree, the most important of which were the types of switches and the sizes of ties and guard timber for elevated railroads. Separate standards were therefore adopted where affected by these items for track to be operated by each of the companies. Housed switch points were adopted for Brooklyn-Manhattan Transit Corporation lines, and lapped switches for Interborough Rapid Transit Company lines; 6x8-in. ties and 6x6-in. outside guard timber were adopted for Brooklyn-Manhattan Transit elevated lines and 8x8-in. ties and 6x8-in. outside guard timber were adopted for Interborough Rapid Transit elevated lines.

After the completion of the original rapid transit system (Contracts No. 1 and No. 2) and prior to the installation of the tracks for the dual system, an interesting type of track construction had been adopted and installed in the Detroit River tunnels and in the Grand Central Terminal of the New York Central Railroad, as well as in the Pennsylvania Terminal and in a portion of the tracks of the Pennsylvania Railroad between the terminal and Long Island City, and also for portions of the Hudson-Manhattan Railroad. This special type of track, while differing somewhat in detail in the various localities, consisted essentially of short wood blocks imbedded in concrete for the support of the rails, with a trough between the rails. This type of construction was adopted by the city and installed at the stations of the dual system as well as in the Montague Street, Fourteenth Street and 60th Street river tunnels, where it proved so satisfactory that its use has been greatly extended for the new city subway system.

Track Standards for New Subway

For the new city subway it is planned to install concreted track throughout, except that ballasted track will be used for special work and for short stretches of track between special work, also for lay-up tracks and for tracks in yards.

The ballasted track, known as type I, is laid in a concrete trough, provided under the subway construction contracts for a planned depth of 7½ in., for ballast under the ties. Eighteen 6x8-in. ties to the 33-ft. rail and 7½x9-in. shoulder tie plates with cut spikes are standard construction. A view is given of a section of such track.

The concreted type of track, known as type II, is installed in a concrete trough identical with that provided for the ballasted track. The rail is laid on separate 6x10-in. creosoted wood blocks, spaced eighteen to the 33-ft. rail, imbedded in concrete to approximately the tops of the blocks, and sloping toward the center of the track for drainage. This construction provides a trough between the blocks and extending below the level of the bottom of the blocks. Screw spikes instead of cut spikes are used throughout. Tie plates are used with bosses to support the heads of the screw spikes so as to provide a space of $\frac{1}{16}$ in. between the flange of the rail and the underside of the head of the screw spike, as will be explained in more detail later.

In extending the use of concreted track it was realized that we were entering upon a program of the most extensive use of rigid track construction undertaken anywhere in this country. This decision was made after a careful study of the tracks of this character, which had been in operation for the last twelve years. During this period these tracks required practically no maintenance except rail renewals and the tightening up of track bolts. There is every reason to expect that this condition will continue for a great many years or until it is necessary to renew the ties.

Six Marked Advantages of Concreted Tracks

The advantages of concreted track are:

1. *More satisfactory drainage.* In our ballasted track, drainage is through the ballast into drain boxes connecting with a drainage system below the subway floor. With the concreted type of track, the greater part of the drainage is carried in the track trough, and it is only necessary to provide under drains in special cases where it is expected that the flow will be such as to make it undesirable to carry it all in the track trough, as well as in certain localities where the grades are very flat. When ballast is used, it soon becomes clogged and is therefore unsatisfactory for drainage purposes.

2. *Better riding qualities.* Due to the permanency of alignment and grade, continuous good riding qualities of the track are assured with resulting favorable effect upon the rolling stock.

3. *Better maintenance conditions.* In the case of subway tracks, the depth of ballast is necessarily limited, due to the large expense of increasing the depth of the subway, the standard depth being but 7½ in. under the ties, whereas in ordinary railroad construction, with ballast placed on an earth subgrade, the depth of ballast varies from 12 in. to 24 in. The frequency of train movements in subways and the constant tamping of ballast required to keep the track in surface and line causes a certain amount of stone dust, which, if allowed to accumulate, eventually blocks the drainage. This necessitates frequent renewals of stone ballast under very difficult conditions. The Interborough replaces ballast between stations about every ten or twelve years, and through the stations more frequently. This maintenance work has to be done during a few hours at night

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with large gangs of men and with materials handled directly from work trains. All of this work is dispensed with in the case of concrete track. In many places there will be little or no flow of water, and the track trough of the concrete track provides a very convenient space for the storing of rail for renewals.

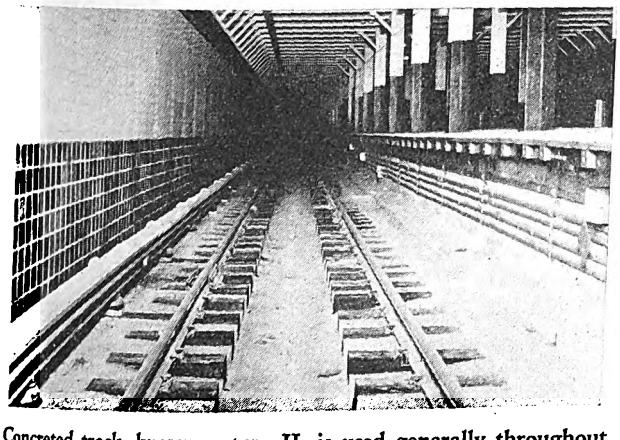
4. *Better sanitation.* Concreted track provides a surface that can easily be kept clean, whereas the filth and debris which accumulates in the ballasted track can be removed only by taking out the ballast.

5. *Safety.* From the point of view of safety this type of track has distinct advantages. The newspapers from time to time report that passengers fall off the platforms and are killed by passing trains. In several instances where such accidents occurred at places where concreted track is used, persons have rolled into the track trough and the trains passed over them without seriously injuring them. In the case of ballasted track, the distance from the under side of the cars to the top of the ties is so small that it does not allow a train to pass over a person.

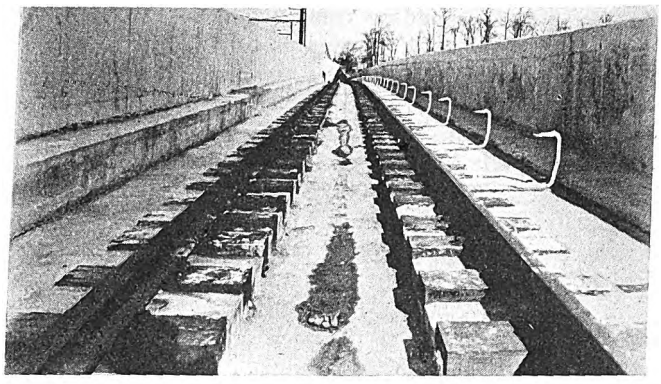
With the concreted track it is possible to reduce to a minimum the number of workmen required to maintain the surface of the track. As a large number of men are required on the maintenance of ballasted track under operation, it is expected that the adoption of the concreted track will result in reducing very considerably the number of accidents to operating employees.

6. *Economy.* Concreted track, in providing for drainage in the trough between the rails, makes it possible to effect a large saving due to the omission of under drains, which with their manholes and connections require excavation, in earth or rock, below the subgrade of the structure at considerable cost. Taking this into account, the cost of concreted track has been estimated as being slightly less than for ballasted track. The labor cost of maintenance, however, is very much less for the concreted track according to our estimates, based upon the very conservative assumption that the wood blocks will not have to be renewed for 36 years. This makes concreted track much more economical than ballasted track.

Although it is believed that train resistance is considerably less on rigid concrete track than on ballasted track, no tests under rapid transit conditions have been made to substantiate this belief. A somewhat limited test on the Père Marquette Railway under steam road conditions over about 1,200 ft. of concreted track indicates a reduction of about 15 per cent in train resistance.



Concreted track, known as type II, is used generally throughout the subway. On curves of 500-ft. radius or less, four 7-ft. 5-in. cross ties to every 33 ft. of rail are substituted for an equivalent number of blocks



Tangent track on vertical curve

With the concreted track brought to proper alignment and grade, the wear and tear on the cars should be considerably less than is the case with ballasted track, which, even under the best conditions practicable, is more or less out of surface.

The adoption of separate wood blocks for the support of the rails was, of course, a radical departure from the standard railroad practice of supporting the two lines of rails on the same tie in order to assure the maintaining of the gage. This situation, however, is entirely taken care of by the backing up of the ties with concrete. On the earlier construction, 1-in. anchor bolts were placed at both ends of every tie block. These anchor bolts extended down into the concrete bed of the track construction. It has been shown from observation of the tracks over a period of twelve years under operation that these anchor bolts serve no useful purpose, with the possible exception of helping to anchor the ties supporting the guarded rail on sharp curves. In our present work anchor bolts are omitted except for the low side of guarded curves where they are provided to obviate the possibility of tight gage due to the pressure of the wheel flanges against the guard rail.

Long Life of Wood Blocks Expected

It has been realized from the first that every reasonable effort should be made to defer as long as possible the renewal of the wood blocks in the type II track. We have, therefore, endeavored to obtain blocks of the best lumber and creosoted them for longer life. By having most of the holes in the ties drilled before creosoting and by providing spikes of practically exact dimensions, we have minimized the effect of spike-killing. In addition, we have provided ties 10 in. wide instead of the usual 8 in., which makes it possible to plug spike-killed holes, shift the tie plates and drill new holes in the ties. We have found that to date with our 7½x9-in. tie plates, there has been very little tie plate cutting.

Although it appears that the time for the renewal of the ties is far distant, we have given this matter serious consideration. There is no question but that it will involve a large amount of work. In a few cases where reconstruction of this track has been necessary the blocks have been removed and replaced under traffic without serious difficulty and with satisfactory results. We have also constructed a considerable amount of concreted track under operation. In the event of general renewal it is expected that somewhat smaller ties will be used that can be placed in the grooves left in the concrete and secured in positions with grout or some asphaltic compound.

In general, regardless of ties and roadbed, there are

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several types of standard construction based on curvature. They may be designated as follows:

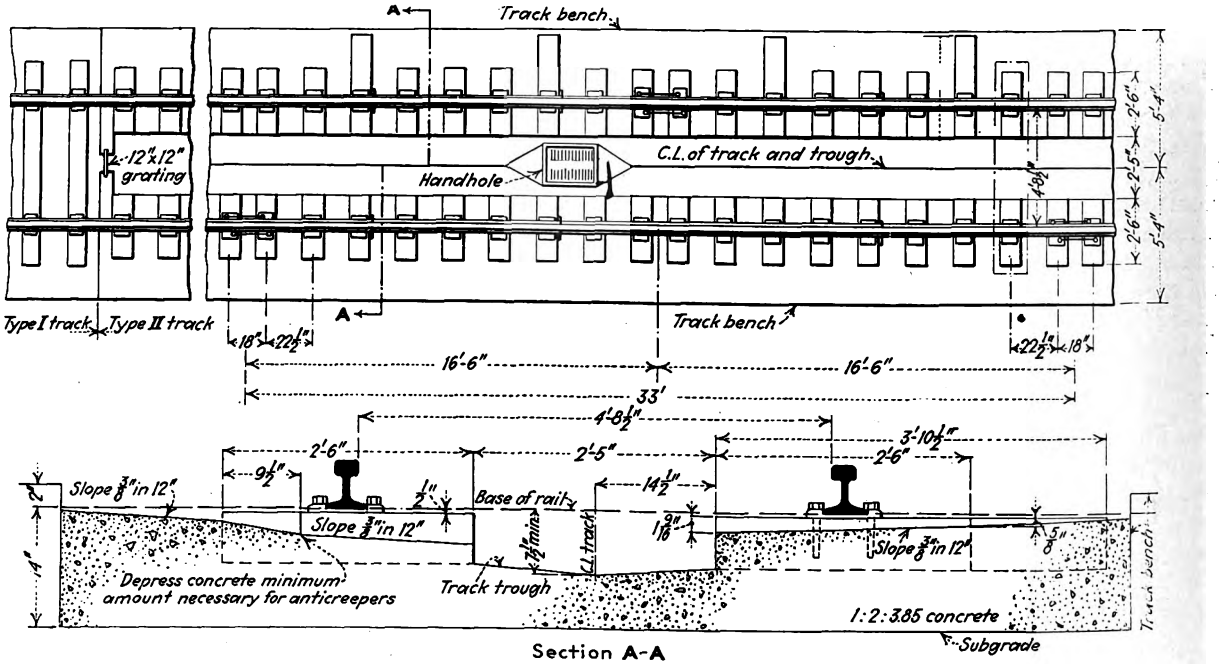
1. Tangent track and curves of more than 3,000-ft. radius. This track is installed in accordance with general practice, with 4-ft. 8½-in. gage and single spiked—that is, with one spike on each side of each rail.

2. Curves of from 3,000-ft. to 2,300-ft. radius. The only material difference in this type of construction from the above mentioned type is that an additional spike is installed on the inside of both rails.

3. Curves of 2,300-ft. to 1,000-ft. radius. Guard rails are installed adjacent to the gage side of low rail on all curves of less than 2,300-ft. radius, including transitions. The inside of the unguarded or outside rail is double spiked, while the running rail and guard rail on the inside of curves are single spiked. No rail braces are used on curves in this classification.

4. Curves of 1,000-ft. to 500-ft. radius. Rail braces are placed on the outside of the rails on the high side at every other tie on all curves of less than 1,000-ft. radius, and on the inside of guard rails at every third tie on all curves from 1,000-ft. radius to 500-ft. radius. The rail braces are spiked through the tie plates with three 1x5¾-in. screw spikes. On this type of construction we are providing extra tie blocks for the support of an additional rail toward the center of the track. The rail renewals on sharp curves are rather frequent and it has been found advantageous at the time of the first rail renewal to place the old rail inside of the guard rail. This rail is then bonded instead of the new rail, rendering it possible to make all future rail renewals without disturbing the bonds. This additional rail may have some advantage as an extra safeguard in case of derailment.

5. Curves of 500-ft. radius and under. This type of curve construction differs from that for 1,000-ft. to 500-ft. radius in that instead of installing rail braces on the guard rail at every third tie, they are installed at every other tie, and four 7-ft. 5-in. crossties to every 33-ft. rail length are substituted for an equivalent number of short blocks.



Type II roadbed on tangents and curves of 2,300-ft. radius and over

Law to Regulate Spray Painting Proposed

IN A BILL designed to apply to interstate common carriers and contractors working on federal projects, Congressman Zihlman of Maryland proposes to regulate the use of compressed-air spray-painting machines. Under the terms of the measure it is proposed that all persons required to use such devices be equipped with a breathing apparatus providing an uncontaminated supply of fresh air. It is also proposed that no person under eighteen be required to use a spray-painting machine, and that those permitted to use the machines be limited to a working period of not more than eight hours a day.

In way of a penalty, it is provided that all violations of the act shall be subjected to a fine of $1,000. In cases where it would be necessary for the operator of the spray-painting device to spray in the direction of a current of air or the source of the greatest amount of illumination, the bill would require that a turntable be provided for moving the object being sprayed.

Turkeys and Hams Awarded Again in Jacksonville

TURKEYS browned to a deep golden glow graced the Christmas tables of more than 100 employees of the Jacksonville Traction Company, Jacksonville, Fla., winners of two safety contests staged within the organization. Eighty-nine of the employees were trainmen. They operated cars 80 working days without a single chargeable accident. The remaining employees staged a record for maintenance of cars in the southeastern district of Stone & Webster, Inc.

Large juicy hams were also presented to eleven conductors, who performed their duties without having an accident charged against their record. Eighteen trainmen operated without chargeable accidents during the contest, but they did not work the required number of days. For that reason they were not rewarded.

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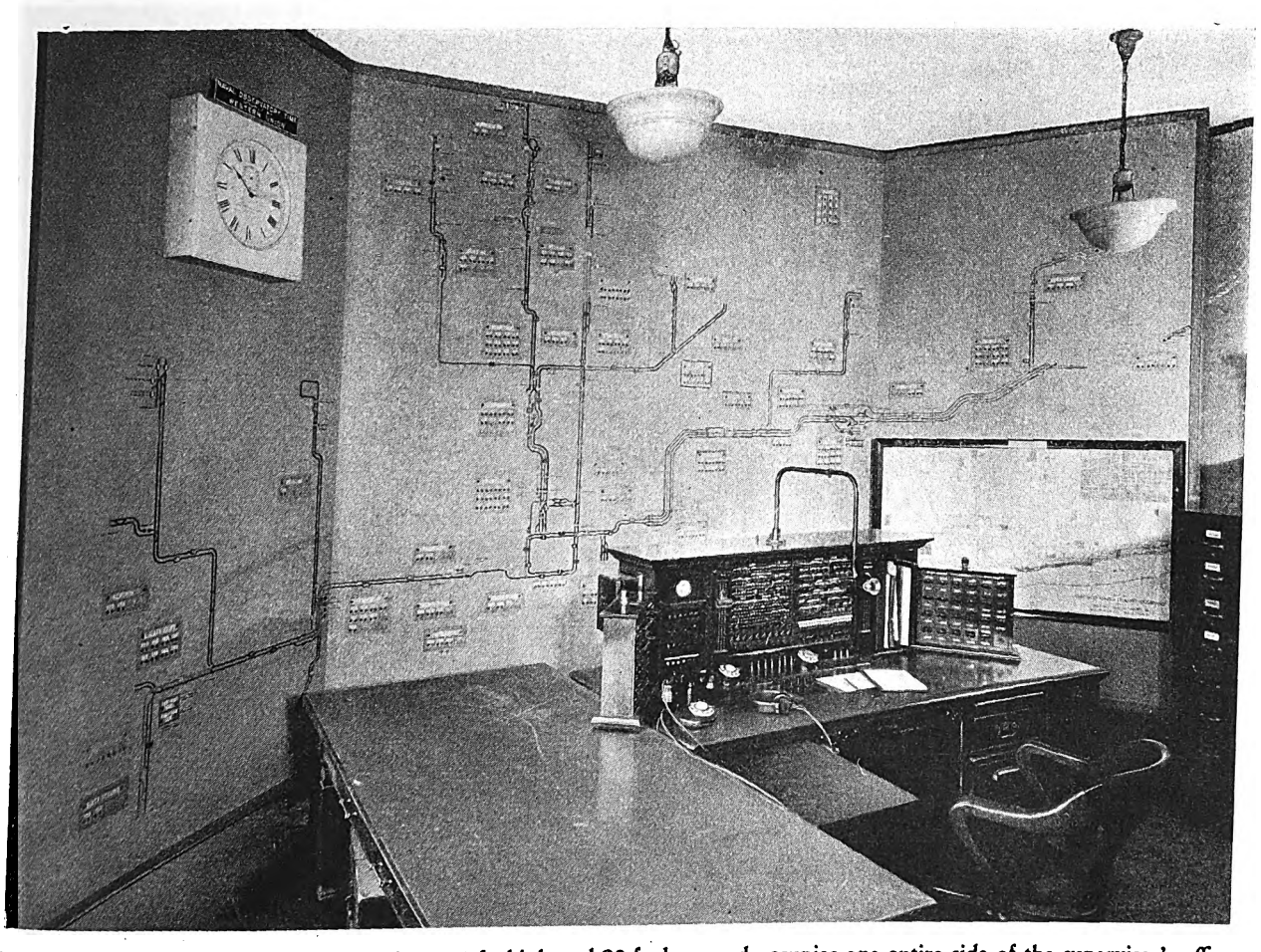
Power Supervising Grows with Chicago Rapid Transit

Increasing concentration of traffic loads has made a system of power supervision economically advisable. It is also an important factor in the maintenance of good train service



This electrically-operated feeder diagram is about 10 ft. high and 20 ft. long and occupies one entire side of the supervisor's office

TWENTY years ago, although the trackage which now constitutes the Chicago Rapid Transit system was not much less than it is today, the entire supply of power was from six sources, four of which were direct-current generating stations. With only one or two sources of feed for each of the separate railways, each of these sources supplied energy to all portions of its line at all times. It was only necesasry for the chief engineer at each of these power houses to know the variations in demand on his plant to put on or take off the necessary generators to handle it. At that time there was very little sectionalizing of feeders. This, of course, made it impossible to segregate trouble; either the railway was alive or it was dead.

Fifteen years ago the demands for power were such that several rotary converter substations and storage batteries were added to the two substations already used by the Lake Street division. A sectionalizing program commenced which split the feeds up into shorter sections and into single tracks. At that time there were fourteen sources of feed. The total number of feeder sections was twenty, and of feeder panels it was 41. Each division was still operating independently, the power house on each division was still the main source of feed and the substations and storage batteries were operated principally to maintain the best load factor at the power house.

In 1911 the operation of the elevated properties was

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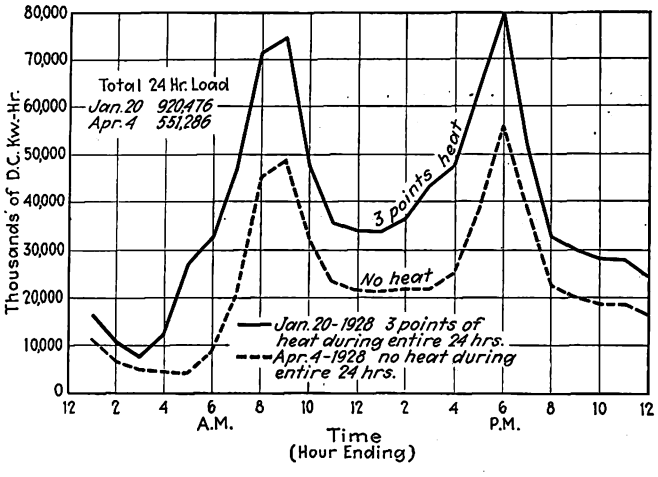


"Three-point" heat load and no heat load for 24-hour period of typical 1928 day on Chicago elevated lines

unified and a consideration of the operating problems under a unified management indicated that considerable advantage could be gained by combining power systems rather than handling each division separately as heretofore. In the following year a power contract with the Commonwealth Edison Company was concluded, and the way cleared for the addition of sources of feed which by this time were badly needed. A further program of sectionalization was entered into, working toward an eventual scheme of a section for each single track, averaging about 2½ miles in length. In 1912 one substation and 22 additional feeder panels were added; in 1913 three more substations and twenty more feeder panels. Some of these points of feed were, of course, required only during the morning and evening rush hours. During the balance of the day the power house, with some additional help, was able to handle the load and maintain adequate line voltage at all points on the system.

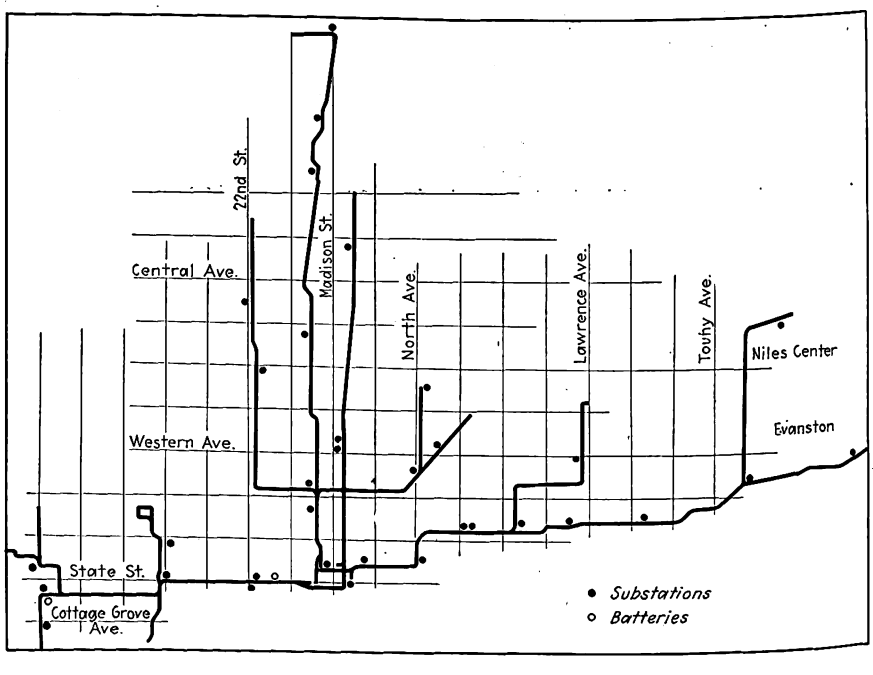
The number of sources and the number of feeder sections were increasing so fast and the layout was getting so complicated that the power house staffs were no longer able to handle them properly. The interchange of energy between divisions, each of which had its own power house staff, was difficult to handle under the existing conditions. Even if normal operation could have been handled properly, special switches in case of trouble could not be co-ordinated between five separate authorities. It became apparent that an organization was needed whose primary duty it would be to handle this more and more complicated switching situation. For this reason a power supervisor was installed in an office in the Loop, and the existing power house and substation operating forces were instructed that in the future they would be under his orders and would control their operation and switching solely at his direction.

At the present time the Rapid Transit system is served by 36 sources of power, rotary converter substations, two mercury arc rectifiers and several storage batteries. The system is separated into 77 feeder sections. The majority of these sections are connected into at least two sources of power and in some instances more. There are a total of 174 feeder panels. Energy consumption has grown from 114,000,000 kw.-hr. in 1905 to more than 210,000,000 kw.-hr. last year. The maximum demand, which in 1913 was 37,500 kw., last year reached 76,000 kw. and the greatest one-hour demand was more than 85,000 kw.

The load has two very marked peaks, from 7 to 9 a.m. and from 5 to 6 p.m. on each week day. The demand in the summer varies from 3,500 kw. in the middle of the night valley to 50,000 kw. in the morning peak, then drops to 23,000 kw. in the mid-day valley and goes up to 55,000 kw. in the afternoon peak. The annual load factor based on the maximum demand is about 40 per cent. In winter the electric heat used on the cars, and which amounts to about 15 kw. per car when all is in use, increases the maximum demand and kilowatt-hour consumption during its use by about 50 per cent over the summer condition. The amount of energy actually used for electric heat is about 15 per cent of the total used in a year.

During the rush hours every source of power is used. During winter practically 100 per cent of the connected converter capacity is required to supply the peak demands. In the summer peaks, while the total capacity is not necessary, load concentrations are such that all sources must be in operation to maintain line voltage necessary for good train operation. These demands taper off into the medium valley in the middle of the day and the very low valley in the middle of the night. It is not only uneconomical to operate rotary converters at low loads, but the interconnection of substation over the very heavy feeder systems when there is little or no load is dangerous. To take care of this condition necessitates switching operations to vary the condition from fifteen sources of feed utilized in the valley to the full number utilized in the peak. Not only are substations put on and taken off, but feeder section switching is done varying from 80 feeder panels closed in the valley to 130 closed in the peak.

This normal switching, to follow the changing loads, includes more than 100 normal changes every day, all of which are made on orders from the power supervisor.



Chicago Rapid Transit substation locations

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His telephone facilities have grown from the three instruments with improvised connections which obtained in the beginning to a switchboard equipped with private lines to each source of feed, together with a sufficient number of trunk lines, outside lines, and private lines to the load dispatcher of the Commonwealth Edison Company and the system operator of the Public Service Company of Northern Illinois. A recent check of the amount of business over this switchboard showed about 500 telephone calls per day in normal business, or an average of a call every three minutes throughout the 24 hours.

The power supervisor's diagram has grown from a pencil one on a drawing board to an electrically operated diagram about 10 ft. high and 20 ft. long which fills one entire side of his office. This diagram includes a representation of the railroad system and of individual feeder sections in colors, together with their numbers. It has a frame for each source of feed, with sub-frame for each feeder section which can be fed from that source. Each source and each feeder section frame have a red and green pilot light. The red light indicates that the station is in operation or the feeder closed. The green light indicates that the station is shut down or the feeder open. Up to the present time the majority of these indications are controlled by a plug jack system in the power supervisor's switchboard, and the indications can be changed upon receipt of telephone information without it being necessary for him to leave his desk.

A few of the indications are operated by a supervisory control system and automatically indicate any change which may occur. This system not only furnishes automatic indication but actually gives the power supervisor control from his desk of the machines and the feeders at such stations. Seven locations are so equipped at the present time, four of them automatic substations and the others tie breaker locations. A turn of the proper key located in front of the power supervisor is sufficient to perform whatever operation he wishes, and the indication of its actual performance automatically shows up on his diagram within a few seconds.

This supervisory control is of the utmost assistance in handling power and while it is used as yet only at stations where no attendant is located and where it would not be possible to get this information in any other way, it will probably be extended eventually to many of the feeders at manually-operated substations. The savings in seconds of getting an automatic indication at once rather than waiting for an operator to restore interrupted service and then report by telephone is of immense value.

The power supervisor also acts as a trouble dispatcher. All cases of trouble in distribution system or lighting are reported to him, and the maintainers who are on duty constantly on each division of the road report to him by telephone. Each case is entered on the record sheet and assigned to the proper maintainer for necessary repair work, and when the repair work is completed checked off with the proper notations.

Several of the power supervisors are employees of twelve years' standing or more. All of them have had substation operating experience and all of them are familiar at first hand with the properties of the Rapid Transit System.

Records available in the office contain everything that is necessary for power control, including complete information as to cable sizes, connections and locations, switches, switchboard buses, wiring diagrams, etc, all of it in such shape that instant reference can be made.

C.E.R.A. Sees More Prosperous Times Ahead

New money, modernized equipment, improved methods of passenger and freight handling contribute to better business relations with public

ELECTRIC railways can claim no vested right in transportation. Whenever a new form of public carriage can transport the people or products of the country more conveniently, expeditiously, and more economically than can the present systems, the public is entitled to such new form of transportation, declared J. P. Barnes, president A.E.R.A., in addressing the opening session of the Central Electric Railway Association in Indianapolis last Thursday. Mr. Barnes stressed the paramount importance of convenience of service and detailed the principal factors involved in rendering such service. There was a time, he continued, when in considering the convenience and necessity of a mode of transportation the emphasis was placed on the latter, a time when the service as such was justified on the basis that it fulfilled a need of the community. If electric railways are to continue operation in the face of competition from automobile and bus, it must be because their efforts are directed toward rendering convenient as well as necessary transportation. It must be made easy for patrons to use the passenger and freight-handling facilities of electric lines.

There are many encouraging indications, said W. S. Rodger, general traffic manager Eastern Michigan Railways and president C.E.R.A., in summarizing the progress of the electric railway industry in the central territory during 1928, that the industry is surmounting the difficulties which have beset it. With new methods of operation and equipment all possible economies in capital outlay and operation must be exerted to keep rates at a minimum for the transportation of passengers and freight. A great deal has been accomplished in operating economies, but more can be done by the maintenance of rigid supervision over all items of expense and by introducing so far as possible labor-saving devices, curtailing unnecessary train mileage and exercising every economy that can be practiced without detriment to the service.

In Mr. Rodger's opinion, jitney competition, which for a while caused much difficulty, is being eliminated as communities learn it has no legitimate place in modern transportation facilities—that it only tends to cripple, if not destroy, regular transportation agencies. Referring to the competition of the long-distance bus lines, he said, this type of competition could be met by the electric railways only by giving similar accommodations and rates of fare by operating through cars over the most direct routes and on limited train schedules. It was not apparent, he continued, why electric railways should sit still with their facilities not fully occupied and watch the buses absorb most of the so-called day-coach traffic which is moving and also create a lot of new business through the medium of low fares and through runs over publicly-furnished highways.

If all laws dealing with industrial problems had as their aim the restoration of economic freedom there could be no serious objection thereto, declared R. N. Van Doren, vice-president and general counsel Chicago

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& Northwestern Railway, in presenting an analysis of governmental regulation as related to economic law. In Mr. Van Doren's opinion, regulation of private as well as public business is being enlarged unjustifiably, and no one can forsee the extent to which the movement will go, if an intelligent and forceful influence is not exerted to direct the leaders of industry and of politics back into the natural channels of economic thought. Mr. Van Doren's paper is published in abstract elsewhere in this issue.

Service the Only Commodity the Railways Have to Sell

Variable operating costs, within the control of electric railways, are determined, in a large measure, by the number of car-miles and car-hours operated, declared Joe R. Ong, transportation engineer Cincinnati Street Railway, in discussing the elements of traffic analysis and schedule making. In order to live the electric railway must give service, for that is the only commodity it has to sell. In order to prosper it must give good service. The right amount of service, in the right place, at the right time is the objective to be sought. Correct schedules can show profitable operation on a given fare and satisfy the public with adequate service. The four principal elements comprising adequate service, according to Mr. Ong, are:

1. Sufficient cars to handle the traffic.
2. Cars operated frequently enough to serve a reasonable convenience.
3. Adherence to schedules.
4. The speediest operation consistent with safety.

In a paper dealing with the management problems of electric lines, C. T. Dehore, president Indianapolis & Southeastern Railroad, summarized the factors which, accumulating over many years, have complicated the satisfactory operation of railway properties, and cited the experience of his own company to substantiate the practicability of new equipment and new methods in securing profitable business.

The trend in the development of pick-up and delivery freight service was analyzed in some detail by L. G. Tighe, assistant general manager Northern Ohio Power & Light Company. The problem, according to Mr. Tighe, has been and still is to co-ordinate the movement of less-than-carload freight shipments to give a complete service from consignor to consignee. In other words, in addition to handling merchandise by rail from one terminal to another, to embrace also the handling of this merchandise from the door of the man who ships to the door of the man who receives, and to handle this shipment as one complete transaction.

Too Much Lost Motion

Under the present system there are too many fingers in the pie, too many people among whom to divide the responsibility, too much lost motion and too little efficiency. This is all very expensive and adds to the cost of every commodity transported. The short-distance truckers have solved it to a certain extent. It is fine transportation service when a truck can back up to a man's door, load his goods and deliver it to the door of his customer in a neighboring city, or in cities say within a radius of 100 miles, but that does not answer the whole question and it does not take into consideration the rail carriers which are, when all is said and done, the backbone of the country's transportation system.

There are places where trucks have certain advantages and will do the job more economically than the rail lines. In those situations the trucks should have the business. Commodities should be handled always in the most efficient manner, i.e., at the least cost consistent with the class of service desired. Fast movements should be more costly than slow movements, where the fast movement is of a special nature requiring individual attention. There are certain kinds of shipments, however, that can be more economically handled by rail lines. Electric railways fit into the picture in several ways. They have the bulk capacity of the steam roads and the rapidity of movement of the truck for short and medium distances. They need only to co-ordinate the rail and the truck to present to the shippers in their territory a service that will have all of the advantages of both.

Continuing, Mr. Tighe pointed out that men in long-distance truck service realize and appreciate the advantage held by the electric railway lines. They realize that electric lines can beat their costs on account of bulk handling ability and that bulk freight can be handled more cheaply in a train of three 40-ton cars than they can in a caravan of trucks and trailers. The truckers' advantage comes only in their ability to collect the goods at the shipper's door and make delivery at the door of the receiver of the goods. The railways' problem is to devise ways and means of co-ordinating these functions so as to obtain the maximum advantages of both types of service.

Advantages in Consolidating Freight Facilities

The advantages to be derived through consolidating the freight facilities of otherwise separately operated interurban electric railways were presented in a paper by D. R. Thomas, president Electric Railways Freight Company of Cleveland. Methods were discussed whereby the benefits of consolidation among the electric railways would be obtained without actually consolidating either the corporations or the physical properties of the systems involved.

The new system of color light signals on the Chicago, South Shore & South Bend Railway was described in some detail by B. L. Smith, superintendent of signals, who supplemented his presentation with a number of lantern slides. Color light type signals, he summarized, make for better train service. They are positive in action, economical in operation and free from mechanical defects. Trains operate on an average of from 93 per cent to 95 per cent on time since the installation of the signals on the South Shore lines. Signal failures have been reduced from 50 per day with the semaphore type to almost none with the color light type.

Reports of committees and of the activities of the three affiliated associations—Master Mechanics, Accountants, and Traffic—preceded the election of officers.

L. M. Brown, vice-president Interstate Public Service Company, was elected president; L. G. Tighe, assistant general manager Northern Ohio Power & Light Company, first vice-president; R. R. Smith, receiver Chicago, South Bend & Northern Indiana Railway, second vice-president; L. E. Earlywine was re-elected secretary-treasurer. Ralph W. Emerson, general manager Cleveland Railway, and C. T. Dehore, president Indianapolis & Southeastern Railroad, were elected to fill vacancies in the executive committee.

Michigan City, Ind., was selected for the June 27-28 meeting of the association.

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American Executive Committee Meets in Indianapolis

PROGRESS on the program for the next convention of the American Electric Railway Association, to be held at Atlantic City, was reported to the American executive committee at a meeting of that body held in Indianapolis on Jan. 25, 1929, in connection with the annual meeting of the Central Electric Railway Association. A complete outline of the program and a list of the tentative speakers selected was presented by E. P. Waller in the absence of Chairman T. A. Kenny of the committee on subjects and meetings.

Every assurance of a successful convention was given by the broad scope of the subjects selected by the committee and the national prominence of the speakers who will be invited to address the convention. In addition to the morning meetings of the American Association, a series of informal luncheon conferences, similar to those which have proved so popular during the past several years in Cleveland, will again be included. The actual drafting of the program for the American meetings was in the hands of Sub-Committee Chairman H. C. Clark. The luncheon meeting program was prepared under the direction of Sub-Committee Chairman H. V. Bozell. These tentative plans were enthusiastically approved by the executive committee. President J. P. Barnes expressed his appreciation of the work of the program committee and pointed out that every promise of a successful convention is offered by the subjects and speakers selected.

One major change in the schedule of events is to be made this year. The American program will open on Monday morning of convention week, but the afternoon of the first day will be set aside for the inspection of exhibits. The American program will then continue on Tuesday and Friday mornings, with Wednesday morning again reserved for the inspection of exhibits. In this way exhibit day will be split between two half-day periods, one in the afternoon at the beginning of the week, and one in the morning between the second and third American sessions. By this arrangement the affiliated association sessions, starting on Tuesday afternoon, will not be interrupted by the interposition of exhibit day. It is hoped that this will enable members of the affiliated associations who only have a limited time available for attendance at the convention to attend all of their affiliated association sessions. Another purpose in splitting exhibit day is to discourage the use of this time for other purposes than that for which it is set aside —actual study of the instructive exhibits that are brought to the convention by the manufacturers.

Other reports of standing and special committees submitted to the executive committee included that of the finance committee by C. E. Morgan, chairman; national relations by J. H. Hanna; publications by C. E. Morgan; exhibits by J. H. Hanna; entertainment by Samuel Riddle; manufacturer contact by E. B. Meissner in the absence of E. F. Wickwire; co-operation with state and sectional associations by J. W. Welsh in the absence of Chairman Frank Coates; insurance by H. B. Potter; taxation by Leslie Vickers in the absence of Chairman H. L. Geisse. A report for the Accountants' Association was made by President O. H. Bernd, and for the Engineering Association by Vice-President C. H. Jones.

In reporting for the finance committee Chairman Morgan called attention to the healthy condition indicated by the fact that payment of dues by operating members is ahead of the schedule of last year. On national relations, Chairman Hanna said that efforts to obtain passage of the new Parker bill for the regulation of interstate buses, which was prepared through the co-operation of all agencies interested in this subject, are being made at this session of Congress. Mr. Hanna also announced that a committee representing the National Association of Railroad and Utility Commissioners and the Interstate Commerce Commission is being formed to study the electric railway situation with a view to determining the need for a modification of the transportation act with respect to electric railways.

L. M. Brown, newly-elected president of the Central Electric Railway Association, expressed the appreciation of his organization to the American Association executives for their co-operation in holding their committee meeting in Indianapolis.

The time and place for the next executive committee meeting were set for 10 a.m. at association headquarters in New York on March 22, 1929.

Seventh Coffin Award Contest Announced

CIRCULARS of invitation announcing the seventh annual contest for the Charles A. Coffin Award have been sent to all electric railway executives, accompanied by personal letters from President James P. Barnes of the American Electric Railway Association, who also is chairman of the Coffin Prize committee. In his letter Mr. Barnes suggests that, since the executives of every electric railway company at this time review what has been done and prepare their final financial summaries, it would not be a great burden to them if each and every company in reviewing its accomplishments followed the form suggested in the circular. It would, he says, be a boon to the industry.

The award is given by the Charles A. Coffin Foundation, established by the General Electric Company, to "that electric railway company within the United States which during the year has made a distinguished contribution to the development of electric railway transportation for the convenience of the public and the benefit of the industry." The award consists of a gold medal to the company and $1,000 in cash to the company's employees' benefit association or similar organization.

It is suggested by the committee that a chapter arrangement be adopted for the briefs and that the accomplishments be outlined in narrative form, accompanied by such figures, illustrations and exhibits as are necessary to support the claims made. To reduce cost it is suggested that decorative art work be avoided. The committee prefers a simple statement of the facts as concisely as possible without the elimination of essential details, and with a minimum of repetition under the various factors outlined in the invitation. The subject matter to be included in the several chapters is outlined as follows:

An introduction.—A statement of the company's broad program and a summary of why the accomplishments on the property constitute a contribution to the development of electric railway transportation for the convenience of the public and the benefit of the industry. If there has been some important development originating on the property which is entitled to special consideration a description should be given. There should also be a summary of

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the company's operating and financial statements reduced to a unit basis, covering the period of twelve months ending Dec. 31, 1928, in comparison with the corresponding periods for the preceding five years. This should include the financial and operating statistics covered by the A.E.R.A. regular statistical form.

I. *More riders and more revenue.*—The initiative, skill and enterprise manifested in popularizing electric railway service and in meeting the competition of private automobiles by improvement of the service rendered, and by the use of merchandising methods for selling this service.

II. *A friendly public.*—Success in winning the co-operation of the public, together with the methods employed. If possible, concrete evidence should be shown. Success in winning relief from unfair franchise conditions, inflexible rates of fare, paving burdens or excessive taxes will be considered evidence of a better understanding by the public of the value of the company's service. The value to the industry of the methods and principles successfully adopted on the property for improving public relations will be given particular weight.

III. *Lower costs and increased reliability of service.*—(a) Economies effected resulting from original ideas or application of ideas originating with others, including improvements in accounting or record keeping which permit closer supervision or better control; (b) improved engineering, construction or maintenance practice originating on the property or successfully adopted from the ideas of others.

IV. *Increased safety for riders, employees and the public.*—Development or application of ideas for increasing safety, and success obtained in actually reducing accidents.

V. *Co-operation between management and employees.*—Progress made in building an improved *esprit de corps,* in better qualifying employees for their work and in training them as salesmen of the company's service.

VI. *Financial accomplishments.*—Readjustment of the financial structure, or other measures which tend to improve the company's credit and reduce the cost of new capital.

Presentations must cover accomplishments during the calendar year 1928, although a definite program extending over a period of years and showing its first notable results during that year will be considered. All presentations must be in the committee's hands at association headquarters, 292 Madison Avenue, New York City, on or before June 30, 1929. Submission of a presentation carries with it to the committee the privilege of publication in whole or in part over the name of the company. If desired a company may mark certain parts as confidential and these will not be published without permission, although they must be available for reference at association headquarters to anyone desiring to study them. The award will be announced at the annual convention of the association in Atlantic City during the week beginning Sept. 28, 1929.

London Tape Recorder Faster Than Telephone

FOR a great transportation concern like the London Underground, it is highly desirable that important news should be made available to all interested parties without the loss of time and possible inaccuracies due to hasty and multifarious telephoning.

Since Aug. 13, 1928, the Underground has been making use of the Exchange Telegraph Company's tape and column printing instruments, widely known in Great Britain for the transmission of news and stock market quotations. The purpose of this tape recorder is to give urgent information simultaneously to any desired number of stations from a central office. The printing of the message is a great advantage. For example, after the chief dispatcher at Earl's Court has telephoned a message to the transmitting station at Leicester Square, he can see almost immediately from the printed record whether the message is being correctly distributed.

At present, the transmitter communicates with eighteen statistical points. These include six receivers in the general offices, two in the control (dispatching) offices, four in the rolling stock department, and one each in various departmental offices, as well as in the power station. Arrangements have also been made for a similar system on the lines of the associated tramway companies.

The Underground Railways installation is rented for £305 ($1,482) a year, based on £35 for the transmitter and £15 each for the receivers. These costs are exclusive of wiring.

To secure greater efficiency from the installation, the company has devised a series of abbreviations to cover the names of the various routes and the more common items likely to appear on the tape. The accompanying table shows the abbreviations used.

KEY TO ABBREVIATIONS OF LONDON TAPE NEWS TRANSMISSION

LINES AFFECTED

D	District	B	Bakerloo
C	City	P	Piccadilly
CL	Central London	H	Hampstead

DIFFERENT CLASSES OF FAILURES, ETC.

CF	Current failure
CO	Train changed over
DT	Defective train
NO	No rolling stock available, trip canceled
OS	Train taken out of service
PF	Point (switch) failure
SE	Staff error
SF	Signal failure
T	Traffic
TF	Track failure
X	Passengers detrained
EB	Eastbound road
WB	Westbound road
NB	Northbound road
SB	Southbound road

Thus, a message may come over the tape like this:

B. DT. No. 20. 6.40 p.m. Oxford Circus NB. 6 min. X 200 OS. Queens Park NO.

Translation or decoding of the foregoing abbreviations reveals the following story:

Bakerloo Line. Defective train No. 20. 6.40 p.m. Oxford Circus northbound road, six minutes delay. Two hundred passengers detrained. Taken out of service Queens Park. No stock available to replace.

The abbreviations "ety" and "acc" will also be observed on the tape reproduced, these meaning "empty" and "accumulated" (delay) respectively. Continuity of the messages transmitted throughout the day is maintained by numbering each item.

Observation of this recording system at work revealed another superiority over the telephone, namely, the executive in whose office a receiver is placed has the advantage of reading the log of the day for several hours back to cover periods when he was out. The possibility that important operating messages will be overlooked or be garbled in reception is thus avoided. The complete tape covering the day's work presents a valuable and permanent record of operation.

Railway Publishes Boarding House Guide

FOR several years past the transport department of the city of Edinburgh has published a book containing a list of apartments and general boarding facilities available for visitors. Persons wishing to advertise their lodgings are listed in the guide on payment of 1 shilling (24 cents) per entry. The guide also carries facts about the various transportation services, prominent buildings, parks, theaters, golf links and other matters that would be likely to interest the stranger. Advertising is included, and the guide is sent post-free to all inquirers.

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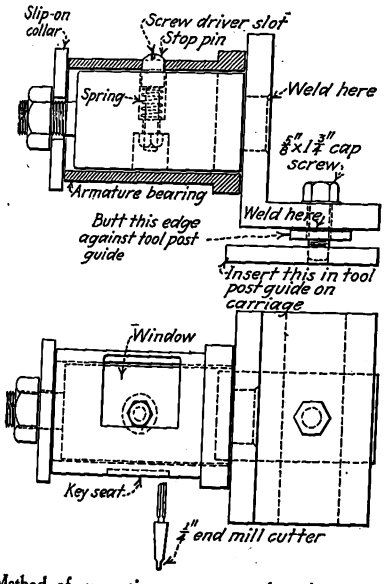
Maintenance Helps That Have Proved Valuable

Key Seats for Armature Bearings Milled in a Lathe*

By Charles Herms

General Foreman
San Diego Electric Railway,
San Diego, Cal.

BECAUSE the shops of the San Diego Electric Railway are not provided with a key seater or milling machine, key seats are cut in armature bearings on a lathe. This method has been found less expensive than that of cutting them on a shaper. An accompanying sketch shows the set up used for cutting key ways.



Method of mounting armature bearing so as to cut key seats in a lathe

A jig is mounted on the lathe tool post carriage. The stop pin on the jig engages in the window of the bearing and serves to locate the key way in the correct position. The bearing is given a left turn until the edge of the window strikes the stop pin, and the slip-on collar is then dropped into place. By a few turns of the clamping nut the slip-on collar is clamped firmly against the bearing, so as to hold it rigidly during the milling operation. The nut is never removed entirely from the jig because the slip on collar is slotted so as to drop over the threaded stud on the jig.

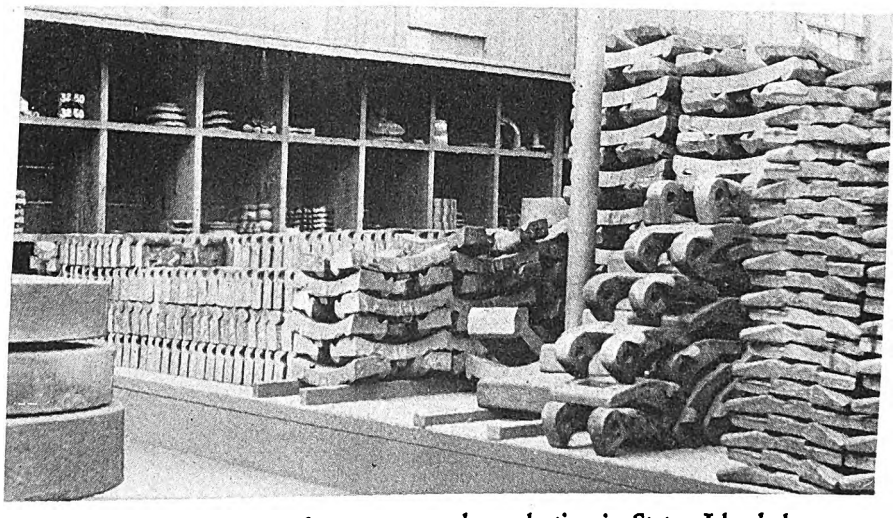
By manipulating the lathe lead screw the entire assembly is moved into the end milling cutter. A stop is provided on the carriage so as to allow the milling cutter to cut the key seat to the exact depth needed. Then, by using the cross feed screw, the carriage is moved in and out for the correct length of the key way. Stops are provided on the cross feed of the carriage to limit this movement. The end milling cutter is chucked in the lathe chuck.

After the set up has been completed key seats can be cut in bearings at an average rate of twelve minutes each. The entire unit is mounted on the carriage instead of on the tool post. The method previously used for cutting key ways required a shaper and took a machinist an hour to make the set-up and cut the key way. With the new jig, when the set up has once been made, a helper can do the machine work.

*Submitted in Electric Railway Journal Prize Contest.

Outdoor Storage Arrangement Speeds Shop Work

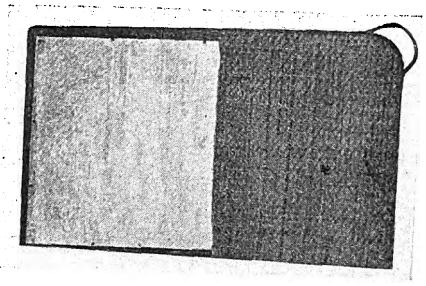
CARE and thought in the outdoor storage of material has facilitated work in the shops of the Staten Island Rapid Transit Railway, Staten Island, N. Y. The storage space is enclosed by a high wire fence, and on all four sides of the space bins are provided for small parts. Brakeshoes, third rail shoes and other heavy items are piled neatly on raised platforms, a large number of which have been built. Broad aisle room has been provided for hand trucks, and the entire space is effectively drained. A section of the outdoor "storeroom" is shown in the accompanying illustration.



Systematic storing in outdoor space speeds production in Staten Island shops

Metal Under Rattan Saves Seat Backs

DESTRUCTION of rattan-covered seats by cutting with a penknife reached such a stage in Omaha that the Omaha and Council Bluffs Street Railway decided some effective measures were necessary. To overcome this difficulty, a sheet of No. 22 gage galvanized metal has been placed beneath the rattan covering on the rear side of the seat back. Knives which once cut easily through the yielding rattan now find the going so rough that this sort of destruction has been practically eliminated.



Pocket knives fail to make progress against rattan-covered seat backs when these are underlaid with light sheet metal

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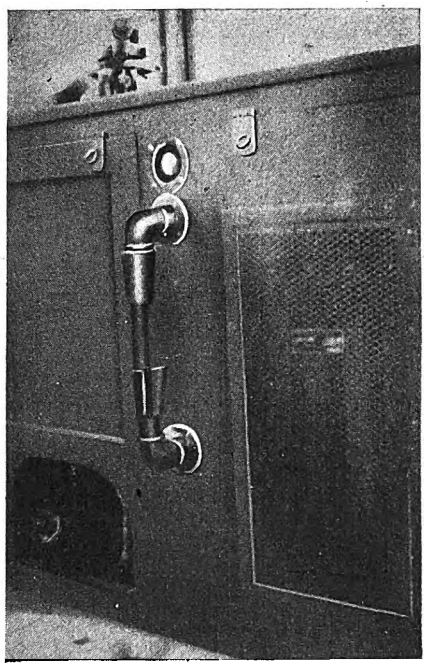


A lamp for illuminating fare box can be seen just above the fare box bracket

Convenient Light Installation for Fare Boxes*

By E. M. Lunda
Superintendent of Shops and Equipment, Grand Rapids Railroad, Grand Rapids, Mich.

BIRNEY cars operated by the Grand Rapids Railroad have been rebuilt to provide inclosed cabinets for the control and brake equipment at the front end of the cars. Fare boxes are installed on a pipe bracket projecting out from the control cabinet. To illuminate the fare boxes when installed, a standard 23-watt lamp is mounted inside the control cabinet, so as to be flush with the outside surface. The lamp is painted all over, except for a circle of ¾-in. diameter at the very tip. This allows a small beam of light to be thrown directly on the inspection plate on the fare box.

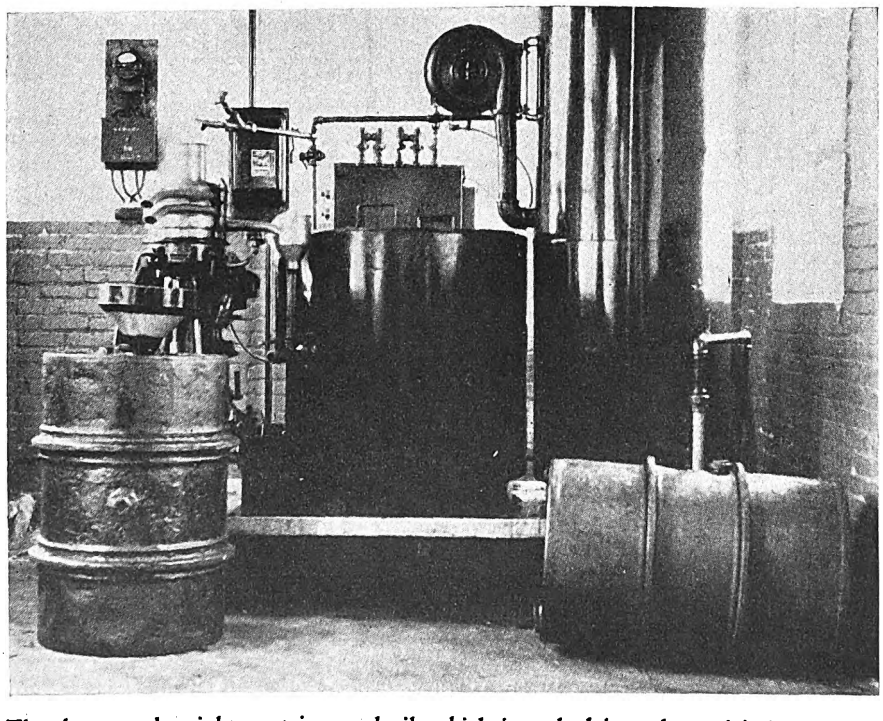
Oil Reclaiming Equipment Reduces Oil Purchases*

By C. B. Hall
Chief Clerk Mechanical Department, Virginia Electric & Power Company, Norfolk, Va.

RECLAMATION of lubricating oil for bus engines by the Virginia Electric & Power Company, Norfolk, Va., has produced noteworthy economy. The consumption of oil by buses of this railway averages 1,500 gal. monthly. The oil is drained and replenished every 3,000 miles. The reclamation equipment includes a De Laval separator, together with some other necessary apparatus. Three motors operate the heater and blower assembly, the pump and separator.

A new fireproof building, immediately adjoining the bus garage, houses the reclaiming equipment. Although this has been in operation only a short time, 14 days' operation produced 540 gal. of reclaimed oil. The approximate cost of running the machine has been estimated at 33 cents per gal. It is expected that this equipment will effect a saving of approximately $2,000 per year.

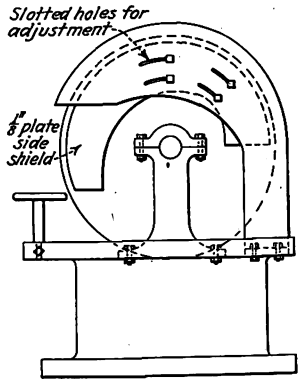
Submitted in Electric Railway Journal Prize Contest.



The drum at the right contains used oil, which is sucked into the reclaiming machine vat, while the drum standing upright to the left receives the finished product

Shield to Prevent Side Grinding on Emery Wheel

NUMEROUS emery wheels were destroyed in the shop of the Richmond Railways, Staten Island, N. Y., because certain employees habitually used the side of the emery wheel for certain grinding operations. This side grinding was the primary cause of a number of rather serious accidents. To avoid this trouble each wheel has been equipped with side shields, as shown in the accompanying sketch. This shield is made from ⅛-in. plate, circular in form and fastened to the wheelguard. The supporting holes are slotted so as to permit adjustment of the shield as the diameter of the wheel is decreased.



Since this shield has been installed accidents due to side grinding have ceased

Keeping Lantern Wicks From Hardening*

By John L. Spencer
Foreman Duluth Station, Twin City Line, St. Paul, Minn.

TRAINMEN of all suburban lines use lanterns for flagging a car following in case of a trolley break or other obstruction. Trouble is experienced frequently due to the lanterns going out, even though the best oil is used, as the wicks harden.

To overcome this trouble a method has been used at the Duluth Avenue Station in St. Paul on the St. Paul & Stillwater lines for the past six months, which has proved satisfactory. Lantern oil cups are filled with dry cotton. Kerosene is then poured in the cup until it is full, and the excess kerosene then poured out, leaving the cotton saturated. A hole is made for the wick in the cotton with the finger, and the wick placed in position and the holder screwed on.

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News of the Industry

Big Business a Builder

Owen D. Young discusses the aims of industry. Finds fraud dwindling, but fears errors of judgment

SPEAKING on Jan. 20 in the pulpit of the Park Avenue Baptist Church in New York, Owen D. Young voiced his belief in the aims and development of "big business" and its growing moral aspects and forces. Dishonesty in business, he argued, is exploited in the press because it is unusual, so that the dishonest man is less to be feared than the honest man who makes mistakes in judgment.

On the other hand, uprightness must exist in the great business organizations of the day "on the simple ground of expediency," since modern industry has made its managers trustees, responsible not only for its material welfare but for its moral conduct as well.

Among other things Mr. Young said:

In 1905 there came round the bend, a thing known as Big Business. The roads weren't fitted for it. The drivers were quite unskilled. Dire prophecies were indulged in as to what would happen if large business units were to be permitted. It was said the masses of the people would become enslaved. But in fact it has turned out that these big organizations have become the servants of the masses—not their masters. The business machines have become better adjusted through a quarter of a century. The drivers of them have become skilled. They are, in a sense, people trained for the job, like motor-car drivers. And while we still have some reckless and irresponsible ones who are a menace to the road, by and large we manage motor cars by the millions with amazing skill and safety.

So our big business is no longer feared by the people. Exploiters no longer own the big concerns. Bankers no longer own them. Their shares are spread from one end of the country to the other. Broadly speaking, the vast organizations are in skilled hands and the road is reasonably safe.

The danger comes not from bad men or bad principles, but from the difficulty of applying right principles to increasingly complicated situations. Our greatest risk is in the mistaken judgment of good drivers where the traffic is heavy and the signals are complicated.

Mr. Young said that in principle the Golden Rule is all that a business man needs as a guide. He continued:

Yet if you ask me to apply the Golden Rule to a bank rate, I find it amazingly difficult to do. It is like telling me to apply the multiplication table to the design and manufacture of a steam turbine. What is right in business requires that the Golden Rule be applied by men of great understanding and knowledge as well as conscience in highly complicated situations. They must be as highly skilled as the turbine engineer who makes the connection between the multiplication table and the modern high pressure turbine.

I purposely omit from this discussion the immoral things done in business by weak and dishonorable men. Whenever these occur they are exploited in the headlines of the newspapers, not because they are the common thing but because they are the unusual thing.

During the last 30 years the moral standards of business have advanced. A storekeeper might short-measure or short-change his customer. He might even induce his clerk to short-weigh and short-measure, but he could not organize a vast department store on that basis. Either his employees are honest people who would refuse or he would soon have as employees a vast organization of crooks who would beat each other and soon ruin the proprietor himself. Big business does not lend itself readily to dishonesty and crookedness.

Mr. Young feels that as time goes on the right in business will more and more prevail. The larger business becomes, the more scrupulously careful the administration of it will be. There has been much difficulty with questions of technical competence and moral responsibility in the offices of Aldermen, but there has been practically none in the great office of President of the United States. Mr. Young said:

Somehow, as responsibility increases, men are found big enough to meet adequately the great questions of right and wrong which come to them. So I welcome big business and big responsibilities, not in the fear that it will make business wrong, but in the hope and belief that it will make business right.

Higher Fares in Twin Cities

Chairman dissents from opinion authorizing 10-cent cash fare with six tokens for 45 cents. Company entitled to 7½ per cent return

AN INCREASE in the rate of fare for the Minneapolis Street Railway and the St. Paul City Railway was ordered by the Minnesota Railroad Warehouse Commission on Jan. 25. Effective at midnight on that date the fare was changed from 8 cents cash and 6 tokens for 40 cents to 10 cents each and 6 tokens for 45 cents. Transfer arrangements are unchanged. As regards Minneapolis the decision is final following a hearing. In St. Paul it follows a stipulation entered into by the city, company and commission on the ground that "in the circumstances it would be manifestly unfair to the users of the railway service in Minneapolis to permit a higher fare to be charged and collected in that city than at the same time exists in St. Paul, and for that reason an emergency exists." This was aggravated by the fact that hoarding the tokens in the last few weeks by car riders had brought about such a shortage that on Jan. 24 the company was moved to direct conductors to accept a 6-cent fare when out of tokens to sell.

Meanwhile, there are pending requests for increased fare in Stillwater and Bayport, Minn., filed by the Minneapolis, St. Paul & Suburban Railway, another subsidiary of the Twin City Rapid Transit Company, Minneapolis.

The application to the commission for higher fares was filed by the companies on Nov. 15, 1928. Hearing on the Minneapolis application began on Dec. 17, 1928. Both city and company filed briefs and L. R. Bitney, chief statistician for the commission, made his recommendations. W. W. Cooper, accountant, was aid in the city's representations. He had been assistant to the late Delos F. Wilcox in the valuation hearings of 1923 to 1925.

In arriving at its decision the commission found that the fair value of the company properties was $26,787,228 as of 1926 plus improvements of $950,301, bringing the total to $27,737,529 today. It reiterated its decision that the company is entitled to a 7½ per cent return on its property, as affirmed by various courts. The order cites a group of cases decided by courts in recent years holding various utilities entitled to a rate of from 7½ to 8 per cent, the latter figure predominating. It quotes Justice Pierce Butler, of the United States Supreme Court, in his opinion in the case of McCardle vs. Indianapolis Company, in which he said:

Bonds rarely constitute the source of all money required to finance public utilities. And investors insist on higher yields on stock than current rates of interest on bonds. Obviously, the cost of money to finance the whole enterprise is not measured by interest rates plus brokerage on bonds floated for only a part of the investment. The evidence is more than sufficient to sustain the rate of 7 per cent found by the commission, and recent decisions support a higher rate of return.

The order indicates that the increased fare probably will result in a reduction in passengers carried, pointing out that passengers in 1928 totaled 107,560,072 compared with 138,632,824 in 1920, and comments that the company's estimate of 105,000,000 for 1929 is "reasonable if not a maximum estimate."

An audit by the commission found that charges to property investment of about $12,000 should be made to operating expense or accrued depreciation, and that the profit of $30,500 from operation

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of the Nicollet Avenue line by the Twin City Motor Bus Company, a subsidiary, should be added to the revenues of the railway in 1928 and 1929.

The dissenting opinion by Chairman O.P.B. Jacobson read in part as follows:

First of all, it is common knowledge that property values have decreased considerably since the 1925 valuation of the railway property by this commission.

In the instant case neither the city nor the company has given consideration to decreased land values. Such land value in my opinion should be considered and decreased to the present land values of other property in this locality before new rate of fare is promulgated, and I am at a loss to understand why the city did not offer any evidence at the hearing as affecting the real estate valuation in the city of Minneapolis.

Secondly, the estimate of passengers to be carried in 1929 and subsequent years is a matter entirely of conjecture.

I further believe street railway traffic in Minneapolis has reached a point where the percentage of decrease will not be so great.

In conclusion he believed that a cash fare of 10 cents and a token rate of seven for 50 cents would provide sufficient revenues for the continued efficient operation of the Minneapolis system.

Fare Increase Sought in Duluth

The Duluth Street Railway, subsidiary of the Duluth-Superior Traction Company, has filed with the Railroad & Warehouse Commission of Minnesota an application for increase in fare which will give it a fair return on its valuation. Both the fair return and the fare required to yield such return are left to the commission to determine.

Fare in Duluth is 8 cents cash or five tokens for 35 cents, the rate fixed by the commission Oct. 4, 1926, based on a "fair valuation" of $5,291,710. The company holds that its fair valuation as of Dec. 31, 1928, was at least $5,541,160, and that while 7½ per cent has been held to be a reasonable return, the rate of return on the Duluth property for the past two years has ranged from 4.5 to 3.45 per cent.

The present rate of fare, the application sets out, "is and in the future will be confiscatory."

Weekly and Sunday Passes for Buffalo & Erie

A series of weekly and Sunday passes will be put into effect on Feb. 18 by the Buffalo & Erie Railway, as announced by George MacLeod, receiver. The prices of the weekly passes will range from 75 cents within the cities of Dunkirk and Fredonia, N. Y., to $8 for the 91-mile high-speed line between Buffalo and Erie. Transferable passes along the interurban will supersede nontransferable, 45-day, 54-ride ticket books. Unlike these books, the passes will be sold on the cars as well as at ticket offices.

Fredonia and Dunkirk will also have a joint Sunday pass costing 25 cents for adults and 15 cents for children, effective Feb. 24.

$50,000,000 Program at Boston

Special commission outlines plan which would make Boston Elevated real factor in metropolitan transit at the Hub

AN ambitious project for extending the Boston Elevated Railway rapid transit lines in all directions is recommended by the Special Transit Commission. The commission has filed its report with the Massachusetts Legislature, and the public hearings on the proposed legislation will begin at the State House on Feb. 4.

Cost of construction of the proposed routes is estimated at $50,000,000. This sum does not include the cost of the necessary addition to rolling stock.

The fundamental suggestions made in the report are briefly summarized as follows:

1. The authorization of the construction of an adequate rapid transit system for the metropolitan district.

2. The purchase of the Chelsea division of the Eastern Massachusetts Railway and its lease to the Boston Elevated.

3. The creation of a metropolitan transit district which will issue its bonds in exchange for the preferred stocks of the Boston Elevated and guarantee the dividends on the common stock, which will acquire the present subways and rapid transit lines and structures now owned or leased by the Elevated company, and which will construct and own all rapid transit lines and extensions.

4. The immediate extensions of all leases of existing subways at the present rental of 4½ per cent per annum until the sinking fund accumulated from said rental is sufficient to pay the cost of said subways.

5. The division of the carrying charges of new subways and rapid transit lines and of the Chelsea division between the Elevated and general taxation with the following specific limitations, to wit, that the amount to be borne by taxation cannot exceed 50 per cent of the carrying charges of such new extensions and purchases and cannot in any event exceed an annual assessment of 35 cents per thousand upon the valuation of the transit district.

6. An extension of the period of public control for a definite period of ten years, such extension of public control to continue thereafter until (through the accumulation of the sinking fund) the Transit District has acquired a sum sufficient to purchase all of the common stock of the Elevated at par, with, however, one important proviso, to wit, that at any time after July 1, 1939, the trustees of the Transit District may call in the common stock of the Elevated at par and with the approval of the Department of Public Utilities as to price and other terms, resell the same to a responsible party who is willing to purchase the stock and operate the road without guarantees from the state or district and under the general provisions of the street railway laws of the commonwealth. This proviso means that after a period of ten years of continued public control, during which the rapid transit extensions authorized in the accompanying bill have been carried out, the road may be returned to private management.

7. A refinancing of the Elevated which will substitute low-rate transit district bonds for the present high-rate preferred stock, and will also reduce the dividend rate on the common stock from 6 per cent to 4½ per cent, thus effecting an annual saving in dividends and taxes (after allowing for a suitable sinking fund) of well over $1,000,000.

8. Numerous other provisions among which may be listed the following:

(a) Provision for the appointment of one additional trustee of the Elevated by the Mayor of Boston.

(b) Provision that the trustees cannot increase the fare above 10 cents without first submitting the matter to the Legislature for possible action by that body.

(c) The removal of the veto power of the directors of the Elevated on rapid transit extensions.

(d) The abolition of the right to tax the district for deficits.

(e) The substitution of district credit for state credit.

In the preparation of this report, the commission has consulted with the Governor of the Commonwealth, the Mayor of Boston and other public and private parties having an interest in the Elevated situation, and it has endeavored to work out a plan which is fair to the public and which it is thought is so fair to the stockholders of the Elevated company that they cannot in reason fail to accept it.

Co-ordination of the Elevated lines with the railroads running into Boston is proposed. There are now ten railroad lines entering the metropolitan district and extending in a fanlike formation to practically all sections of the metropolitan area. Some of these lines provide a substantial and satisfactory suburban service to the territory through which they pass, but upon many of them suburban service has been abandoned or curtailed because of competition with the Elevated or because of the increase in the use of the automobile.

The commission, however, suggests that the trustees of the Elevated be empowered to negotiate a contract by which the railroads will offer certain definite service for the Elevated over their tracks, for which they will be paid on a car-mile basis by the Elevated, all income from such service going to the Elevated. Exchange between Elevated lines and railroad suburban service could be effected at the Back Bay Station, the South Station, the North Station, and possibly elsewhere.

Finally, the commission recommends that the Transit District, hereafter described, acquire all of the Chelsea division of the Eastern Massachusetts Street Railway except a short mileage of that division near Malden Square, the ownership of which lies in the East Middlesex Street Railway.

If this program is carried out as outlined practically the entire metropolitan area within 5 miles of the State House will be suitably served with rapid transit facilities, and car lines or bus lines from all sections of the metropolitan district can reach various rapid transit terminals or stations, with relatively short runs, and without danger of undue delay. Furthermore the con-

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struction of the two proposed rapid transit routes will obviate the congestion at Park Street and will enable passengers to reach all parts of the downtown section of Boston with a minimum of transfers.

The commission believes that the entire program should be authorized and the work carried forward as speedily as it can be done with economy and efficiency.

Senator Gaspar G. Bacon, who is president of the Massachusetts Senate this year, is chairman of the special commission. Henry I. Harriman, the new chairman of the Boston Elevated Board of Public Trustees, is a member of it. The other members are Col. Charles R. Gow, Maurice Caro, Robert J. Bottomly, George A. Gilman, Roscoe Walsworth, Newland H. Holmes and William H. Hearn.

Opposition to Eight-Hour Day in Massachusetts

The proposed Massachusetts legislation, presented by electric railway employees through William H. Keating asking for an eight-hour day working time within eleven consecutive hours, is opposed by the Boston Elevated, the Eastern Massachusetts, the Worcester Consolidated, the Springfield, the Union Street Railway, the Massachusetts Northwestern, and other railways. A hearing was held before the Committee on Street Railways and the bill was explained by Representative Keating. Labor men favored the bill.

H. Ware Barnum, counsel for the Boston Elevated, declared the bill would cost his company $2,000,000 more a year, and that it could place his company in a position necessarily to increase fares 1 cent.

Bentley Warren, for the Springfield and Worcester companies, said both his companies now have eight-hour days by agreement. He declared employees know railways cannot be served with an 11-hour limit of working schedules. The bill would give men a working club to get other things than hours and wages. It was, he asserted, no time to think of such an action. Street railways were in a condition more or less precarious. Banks, he said, could invest in bonds of paying companies but street railways were in financial difficulties and could not sell bonds to banks. The Boston Elevated, he brought out, was the only company that was in a position to do business with banks.

Prize Awarded in Philadelphia

T. Elmer Transeau, an instructor in highway engineering in Drexel Institute, is winner of the first prize in the Philadelphia Rapid Transit Company. "Help Speed Up Traffic for the 80 Per Cent" letter contest. There were 1,936 contestants.

William Van C. Brandt won second prize; H. C. Crowell, third; T. H. Henkels, fourth; and John D. Follett, fifth.

Not a Jar in a Carload

Cincinnati newspapers take up the street car and acclaim its merits in poetry, prose and pencil

FROM Cincinnati comes a story that should be reassuring to publicity men who are sometimes disappointed when material submitted to the newspapers for publication appears in form so brief or so completely changed as to be hardly recognizable. Thus with results hardly anticipated Hudson Biery, director of public relations, of the Cincinnati Street Railway, Cincinnati, Ohio, recently forwarded to one of his newspaper friends, Ike Schwartz of the *Commercial Tribune,* the following letter received from a car rider:

We all know why a chicken crosses the road—and science answers many other interesting questions, but why do your car riders sit with hands folded.

I have often noticed this peculiarity and so perhaps have you. This afternoon, for example, on an East End car enroute to town I counted nineteen out of twenty persons who ran true to form and the twentieth was an unfortunate with but one arm or, I am sure, it would have been unanimous. Why is it? You don't do it in your friend's machine or notice it on the buses or in picture shows or other gatherings. But unless occupied with a paper the car rider settles himself in his seat and nine out of ten will then peacefully cross their hands and settle down to apparent comfortable relaxation.

The last two words I believe are the answer. If you are now sitting down, experiment. Fold your hands and in an instant see if the rest of your body does not comfortably relax at the signal. What a wonderful testimonial to the natural comfort and restfulness to be found upon the cars and the actual benefit to the rider. Free from cares of driving, whether actual or of the back seat variety he gains that needed rest so beneficial in these days of hustle and bustle.

Across the corner of the letter Mr. Biery made this pencil notation, "Ike—we receive all kinds of letters, but this is a new one. I know our service is good, but I didn't know that we were putting them to sleep.—Biery."

Hands in the Street Car

Cartoonist for Cincinnati *Post* inspired by patron's letter

Next morning the *Commercial Tribune* carried the following story:

Rock a bye baby
On the street car;
You can sleep soundly
With nothing to mar
Your dream so restful,
So quiet, serene;
Not a jar in a car load
In this limousine.

"I knew our new Pullman street car construction was the best thing on wheels," declared Hudson Biery, Cincinnati Street Railway official, yesterday when commenting on the foregoing parody on the famous English lullaby, "but I did not know the service had inspired people to write verse.

"The little poem is only one of the thousands of testimonials that are literally youring into our offices in praise of the new cars. Cincinnati does not realize it, perhaps, but the cars are without parallel for smooth riding qualities. I noticed one evidence of this last week when on an East End car I counted three persons dozing in complete forgetfulness of the world. It means that conductors will have more work to do waking people who doze off to the gentle rhythm of the wheels."

R. E. Havemann's letter sent to the *Post* inspired a cartoon accompanied by the following story quoting the Havemann letter, signed by Alfred Segal:

Ah, Mr. Havemann, the hands are tired. The hands of the scrubwoman are twisted and gnarled like the branches of trees that have been in the storms and the rains many years. Nothing has ever come to her hands save work.

Once they held her children, and one child died and another went away and forgot her, and now there is nothing left in her hands but work and pain. She never can get them warm, it seems, for they are like ice from the water in which she works; and she rubs them one against the other.

The hands of the old workman have been at work since they were very young. They are nervous hands, being afraid. They cannot work so fast any more, tho they were like the lightning once. But now the foreman in the shop stands beside him impatiently, and he is quite sure the foreman is saying to himself, "What slow hands! What slow hands! This is no place for slow hands. We must get rid of slow hands."

This is why the hands of the old workman are afraid. In all their days they worked for their old age; but now they are empty, what with deaths and sicknesses that took all they saved.

The old workman's hands are folded in the car.

The hands of the middle-aged business man are round and fat. He sits puffing from the effort to catch the car. We guess they have taken in much money today, but they rest on his lap, tired, like the hands of the scrubwoman in which there are only pain and work and like the hands of the old workman which are empty after all the years.

His face is red as of one who has high blood pressure and, knowing him, we speak to him, saying: "Every one looks tired on this car."

And he replies: "It's work, work, work and what do I have at the end, but high blood pressure and diabetes?"

As for the office worker, bolder hands than his always have been taking the prizes away from him. And now, tho he is getting along in his years, his hands are doing the same work he did fifteen years ago.

His hands are full of experience, but they get only raps on the knuckles. Young hands come and take all the promotions in the office.

His hands are folded, like figures of resignation in the street car.

They are so tired, Mr. Havemann. That is why they are folded.

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Single-Fare Area in Milwaukee

In response to the written request of Mayor Hoan, of Milwaukee, Wis., that the Milwaukee Electric Railway & Light Company extend its single-fare area to apply on all street car travel within the city limits, particularly the former city of North Milwaukee, recently annexed, the company has petitioned the Wisconsin Railroad Commission to fix boundaries of a single-fare area and rates which would earn a fair return on the capital invested.

The company points out that its capital employed in 1920 was $18,114,000 compared with $32,646,000 in 1928, and that its revenues have declined from year to year, until the average return for the last two years has been 4½ per cent. The rule of the State Railroad Commission calls for a return of 7½ or 8 per cent on the investment. High profits in the power division have been used to offset low returns from its transportation service, it declares.

In the event that the commission will prescribe a single-fare area and rates to yield an increased return on its transportation system, the company offers to reduce the rates of its electric utility by an amount not less than the estimated increase in revenue from the street cars. Hearings on the company's application will open shortly.

Kansas City Company Goes to Commission

The Kansas City Public Service Company, Kansas City, Mo., at a directors meeting on Jan. 25, decided to take the petition for an increased fare to the State Public Service Commission. The negotiations with the city had become so involved that the board of directors decided an appeal to the state body was the most desirable course. The statement said in part:

The board of directors, at its regular monthly meeting, directed that the entire situation relative to the method of accounting, valuation, rate structure and return of the company be placed before the Public Service Commission for investigation and determination.

This action has been rendered imperative by the fact the application of the proceeds derived from the sale of the power plant has been seriously questioned, the accuracy of the accounting methods of the company disputed, the assertion made that the franchise contemplated a fixed initial valuation of the property and the company's computations as to the income allowable on that property challenged.

The company believes the power plant proceeds have been applied in full accordance with the letter and spirit of the franchise and proper accounting practice, that no value was placed or attempted to be placed on the property in the franchise, and that it is entitled to the full permissible return stated by it in its reports to the council and industrial committee.

Under the law, the Public Service Commission is the final arbiter of the affairs of the company. The books, records and methods of accounting of the company must conform to its regulations. It is the only body which has power to make a final and authoritative ruling upon the points at issue, and steps are being taken promptly to bring the entire matter before the commission to the end that a complete investigation will be had and the questions of accounting, valuation, rate structure and return finally settled on a basis fair and just to all concerned.

Report on Los Angeles

Recommendations made by committee of local city club expected to promote interest in railway problem

AS A RESULT of meetings and conferences, the traffic and transportation section of the Los Angeles City Club is impressed with the need for the observance of certain fundamentals in connection with the traffic problem relating to the Los Angeles situation. As outlined to the club on Jan. 15, the conclusions and recommendations follow in part:

1. That the most valuable land in the central business district is the public street. The street area is limited, its use should be developed to the highest state of efficiency; special privileges interfering with the rights of the masses detract from other property values. The greatest good for the greatest number should be the rule.

2. That local, suburban and interurban systems of transportation have been handicapped by their insufficient earnings to provide adequate and attractive service to those who should use their lines. Their patronage is not increasing in proportion to the increase in our population.

3. That our citizens are spending ten times as much per capita for the use of the private automobile as they are for local street car transit, thus indicating an obvious opportunity for the street car and bus to cater to the increasing demand for better transportation by improving their service.

4. That transportation by rail must be retained for mass transportation; that the bus does not appear to be a substitute for street cars, but is rather an auxiliary vehicle to be used as a feeder to the rail systems and also to supplement the street cars when the tracks become saturated with electric cars.

5. There must be a co-ordination of the systems and improvement of existing facilities in order to obtain their maximum (use) service, as a first step rather than an additional rapid transit system of great cost. It may be wise and proper to inquire seriously as to whether or not Los Angeles is justified in initiating a program of expenditures in subways and elevated structures. It is upon the latter two phases of the problem that the section is now engaging its attention.

A—*Co-ordination* of all rapid transit systems, local street cars and buses is imperative for the best and most efficient service.

B—*Downtown Streets*—"Increase the Efficiency of the Streets."

1. Pedestrians should be favored. Sidewalks should be free of obstructions.

2. Window shopping and ticket distribution should be on private property. All merchandising where customer stands on sidewalk should be prohibited.

3. Delivery of goods across sidewalks should be prohibited during rush hours.

4. Storage garages accessible to business district should be encouraged.

5. Traffic signals should be "progressively" timed.

6. Parking should be prohibited on streets of insufficient width to permit free passage of an automobile or truck between a moving street car and a parked car. Tending toward ultimately no parking in the central business area we recommend it be prohibited on either Broadway or Hill Street as an educational movement.

7. Buses should operate on "through routes" in central business districts.

8. Sidewalk doors, manhole covers and street trenches should not be open during rush hours.

C—*Local Street Cars*—"More Cars and Better Service."

1. Local street car fare should be sufficient to encourage improved service and extensions.

2. Within approximately 6-mile radius area we should have one district, one fare and universal transfers between the red and yellow cars.

3. Vehicles should observe a "slow" sign on approaching street car intersections.

4. Where practicable, outside of central business district, the street car tracks should be curbed in between cross streets.

5. Skip stops should be encouraged to speed up main lines.

D—*Rapid Transit*—Both to "decentralize" and to "centralize."

1. Interurban lines should not make local stops outside business centers.

2. Interurban lines should be off grade in congested districts.

3. Interurban lines should have elongated terminals (not stub end) through the central business district.

4. A modern elevated railroad structure will give the same service as a subway at much less cost and "elevateds" are practical in many locations.

5. Interurban lines between subcenters should run on private right-of-way or on curbed in right-of-way with parallel roadway and no grade crossings.

E—*Buses.*

Bus transportation at present is in three classes, the feeder bus with transfer privileges to other lines of transportation.

The auxiliary or local bus which may parallel certain street car lines to cut down the number of stops on that line with transfer privileges if advantageous.

The de luxe bus for special suburban service.

The feeder rus and auxiliary buses should be a co-ordinate part of the rail transportation system and financed in conjunction therewith.

Another Extension in New York

The Board of Estimate of New York City on Jan. 31 denied the application of the Equitable Coach Company for another 180-day extension of its triborough bus franchise rights. The board cut to 60 days the time within which the company must obtain the Transit Commission's approval of the issue of securities to finance operation. It was on Mayor Walker's motion that the 60-day reprieve was granted.

On Feb. 4 the committee of the whole will resume its open hearing on the Equitable's amended petition for Brooklyn and Queens where its routes are to be merged with B.-M.T. surface lines under an agreement with the railway.

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Mechanics' Association Formed in Charleston

A mechanics' association, to be sponsored by the Charleston Interurban Railroad, Charleston, W. Va., has been formed by the company's shop men to create greater interest among them in their respective lines of work and to encourage efficiency.

Certificates of proficiency will be issued to members on various subjects in which they have qualified. After the certificates are issued to a member, or after he has procured three such certificates, he is then promoted to a higher grade in the association. There are to be three grades; namely junior, senior and associate. Suggestions submitted by members are to be investigated by an appointed committee and reports of such investigations are to be turned over to the management of the company.

In the January number of the "Interurban Messenger," the official publication of the company, F. B. Carpenter, superintendent of equipment, urges the employees to compete for the prizes in the Maintenance Contest promoted by the ELECTRIC RAILWAY JOURNAL.

Conventions of Indiana Associations

Annual joint conventions of the Indiana Public Utilities Association, the Indiana Gas Association and the Indiana Electric Light Association will be held in the Hotel Gary, Gary, Ind., on May 1, 2 and 3.

Committees on programs for these conventions have been appointed and special committees for other features of the annual meetings are to be appointed at once. Plans are under way to make this year's convention more valuable to the public utility industry as a whole than every before.

Canadians Plan 25th Anniversary Meeting

Montreal has been selected as the place of the 25th annual meeting of the Canadian Electric Railway Association. It will be held on June 5-7. As in previous years there will be an exhibit in connection with the convention and the officers are looking forward to the largest attendance in the history of the association.

The Canadian Electric Railway Association was formed in Montreal 25 years ago and the executive committee felt that it was fitting that the meeting should be held in that city to commemorate the quarter century anniversary.

Fares Reduced on Oregon Line

A reduction of fares to Vancouver, Wash., on the system operated by the Portland Electric Power Company has been announced by President Griffith. This applies to purchasers of books of ten tickets which will now be sold for $1.50, a reduction of 2 cents a trip. The regular fare will remain at 17 cents. The reduction was justified by the removal of toll on the interstate bridge between Oregon and Washington, which became effective on Jan. 1. Under the old toll conditions on the bridge the company lost a half cent on every passenger, according to Mr. Griffith. One and a half cents of the 3½-cent toll reduction is now retained by the company and the other 2 cents are given to the passengers. A toll of 25 cents for each street car that crosses the bridge is still charged.

Money Prize for Name in Denver

The Denver Tramway, Denver, Col., issued on Jan. 20 a four leaf "newspaper," 4x7 in., easy to read, the front page carrying the caption: "What's in a name?" A statement promised publication now and then by the company. It was added that there was so much in a name that $25 would be paid to any one, not an employee, who suggested a name which would be selected by the judges appointed. Feb. 9 is the last day suggestions will be received.

The little newslet will be placed in boxes on every car, the box carrying the invitation: "Take One." How schedules are arranged, changed, peak of load, slump, important events coming to Denver, and a few jokes will comprise the make-up. The pamphlet will keep patrons posted and will answer that often uttered query: "I wonder why the Tramway does not do so and so?"

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Feb. 7-8*—Midwest Electric Railway Association, Midwinter meeting, Robidoux Hotel, St. Joseph, Mo.**

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***May 1-3*—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***June 21-22*—New York Electric Railway Association, Bluff Point, N. Y.**

***June 27-28*—Central Electric Railway Association, Michigan City, Ind.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Safe Operation by Asheville Men Cited

The Asheville, N. C., railway department, of the Carolina Power & Light Company, won first place in the accident prevention contest conducted by the company in all departments of the two Carolinas during 1928. It set a perfect record of no time lost during the entire year, by reason of accidental injury of employees. Announcement of this record was made to members of the union at their annual banquet meeting by Ed White, superintendent of transportation. A banner has been ordered for the Asheville street railway men.

There were 106 employees included in the Asheville street railway department. Regular accident prevention meetings are held in each department. Every form of safety is discussed and action planned including condition of tracks and equipment, traffic conditions, and efficiency of the men themselves. The Asheville street railwaymen have adopted a motto for another perfect record during 1929.

Ohio Employee as Good-Will Messenger to Canal Zone

In the interests of good-will, Mrs. Mabel Miller, cashier of the freight department of the Indiana, Columbus & Eastern Traction Company, at Lima, Ohio, is en route to Cuba, Jamaica, Haiti, Nassau and the Canal Zone, bearing greetings from the State of Ohio in commemoration of its 125th anniversary.

Her trip is the result of an opportunity presented to the women of Ohio and sponsored by the Ohio Chamber of Commerce during the fall of 1928. Prior to the Ohio Progress Exposition at Columbus Oct. 25-Nov. 3, invitations were delivered to members of the Ohio Chamber of Commerce, members of all Chambers of Commerce in Ohio, industrial plants, business firms and civic organizations asking nominations to be made from among the thousands of young women in Ohio who would be eligible to engage in competition for the honor of being named the best promoters of this enterprise. Mrs. Mabel Miller was entered in the competition with other Ohio women and she proved to be a capable organizer and promoter in the campaign, enlisting the support of state and municipal officials and hundreds of other men and women of Ohio. As a result of her worthy efforts she was presented with a travel-award to the West Indies.

An interesting pamphlet has been printed, addressed to the citizens and residents of the West Indies and containing messages from the Governor of the State of Ohio, secretary Ohio Chamber of Commerce and J. M. Pogue, general manager of the Indiana, Columbus & Eastern Traction Company, with a full spread of statistics of the Buckeye State. These booklets will be presented by Mrs. Miller to persons she meets on her travels.

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Recent Bus Developments

Taxi Privilege in Seattle

An ordinance granting to Sam W. Taggart of the Red Top Cab Company an exclusive 25-year franchise for operation of taxicabs, for-hire cars and sight-seeing cars within the corporate limits of Seattle, Wash., has been introduced in the City Council. In return for this concession, Mr. Taggart is to pay the city annually 2 per cent of the gross earnings of the system; to keep his equipment in good repair; and to set aside a monthly depreciation reserve fund of not less than 1 cent for each mile traveled by his cabs and for-hire cars.

At the expiration of the franchise, the grantee is required to turn over his equipment to the city free, a contingency of special interest since the city is now operating its own railway, but the city may, if it elects, grant an additional fifteen years' franchise, provided the grantee pays the city in cash an amount equal to reproduction cost of the equipment, less accrued depreciation.

Maximum and minimum rates to be charged would be fixed by the Council. For the first five years these rates would be under the ordinance: For one-passenger cabs, maximum 35 cents for the first quarter-mile, and 10 cents for each additional quarter-mile; minimum, 25 cents for the first half-mile and 5 cents for each additional quarter-mile. For each additional passenger, entire trip, maximum 20 cents, minimum 10 cents. For for-hire cars, the rates prescribed are: 4-passenger cars, $2 for the first half-hour; $3.50 for the first hour, and $3 for each additional hour. For six-passenger cars, $2.50 for the first half-hour; $5 for the first hour, and $4 for each additional hour. For sight-seeing cars, a maximum of $3 for one continuous trip is fixed.

Payment of Ton-mile Tax in Iowa Compulsory

Iowa bus operators lost their last chance to protest payment of the state ton-mile tax on motor vehicle common carriers when the Iowa Supreme Court on Jan. 23 refused to grant a rehearing on its recent decision which upheld the validity of the Iowa motor carrier law under which the tax was assessed. As a result, four of the leading bus companies in the state will be required to pay more than $65,000 in delinquent taxes and penalties.

The high court in its refusal to grant a rehearing took the same position it took several weeks ago when it upheld a decision by Judge W. G. Bonner in the Polk County District Court. He ruled that the ton-mile tax on motor common carriers, operating over regular routes between fixed terminals, does not discriminate against this class of traffic as contrasted with oil trucks, moving vans and farm trucks operated over the highways by private interests. The Supreme Court reiterated the opinion that the statute questioned by the Iowa Motor Vehicle Association was not discriminatory and upheld the constitutionality of the law.

Virginia Commission's Authority Upheld

Finality of the decisions of the State Corporation Commission of Virginia in regard to issuing permits for bus lines has been emphasized by the Supreme Court of Appeals in affirming the case of Petersburg, Hopewell & City Point Railway vs. Commonwealth, ex rel., State Corporation Commission.

In this case the railway, connecting Hopewell and City Point with Petersburg, objected to the commission's action in granting a certificate permitting a bus line to parallel its tracks. It insisted that it rendered all transportation service needed in its territory and that the operation of the bus line would decrease its revenues.

The Supreme Court held that such matters were left to the determination of the Corporation Commission, which is vested with the control of transportation within the State.

Substitutions in Nebraska Prohibited

The Nebraska Railway Commission has rejected the application of the Lincoln Traction Company for authority to substitute bus service on the line leading to the suburb of Normal, made after the City Council, in the course of street improvement work, had ordered the company to expend a considerable sum in paving and bridge work. The commission held it was bound to protect the owners of property in the section that abandonment of the car line would leave without any convenient service by the unwritten but tangible agreement made by the former owners of the company with the people who established their homes in the district; that the city, so long as it requires the railway to pay an occupation tax for the use of its streets, should furnish streets and bridges of a type that may be readily used without forcing the company to construct a part of these, but it has no way of enforcing that finding on the city fathers, who insist on pushing through the improvements.

When the company rerouted its College View line some of these people were compelled to accept Normal service instead, and now it was proposed to take this from them. The railway suggested that bus service be substituted, but this would have to be confined to paved streets, which would mean abandonment of part of the Normal served territory.

Park Tax for Baltimore Buses?

Suggestion that all fees paid to the state by passenger buses operating in the city of Baltimore be turned over to the Board of Park Commissioners for use for public park purposes has been made by William I. Norris, retiring president of the Board of Park Commissioners. The parks now receive 9 per cent of the gross receipts taken in on most of the railway lines, but nothing from the bus lines. It was pointed out by Mr. Norris that this change would divert fees from the State Treasury to the Park Board and there would be no additional burden on those operating the buses or the public. It is planned to ask the General Assembly, now in session at Annapolis, to pass a bill providing for the change.

Upshot of Menasha Controversy

As an aftermath to a dispute over license fees at Menasha, Wis., the Wisconsin-Michigan Power Company has announced discontinuance of all buses from Appleton to Neenah and Menasha on March 15. The company removed all extra rush-hour buses and two regular buses in Menasha recently, when the City Council raised the fee from $50 to $300 for each bus and required licenses. The city retaliated by renting trucks for the emergency.

The company's decision will leave Appleton, Neenah, Menasha, Kaukauna, Combined Locks, Kimberly and Little Chute without any public means of transportation other than steam railroads. Wording of the company's notice, which says that "under present conditions it must retire from the field," indicates that there is a possibility that the service might be continued if the municipalities served act promptly to establish a uniform bus license fee. Plans are being made for a conference to be held some time in February in an attempt to settle the differences.

Service to New Portland Hospital

With the completion of the new veterans' hospital in Portland, Ore., the Portland Electric Power Company has extended its bus schedule to conform to night visiting hours. The twenty-minute day schedule is changed to a 30-minute night schedule. When the hospital service was first opened only one day bus was used. Another was soon added and now the night service is a further expansion.

Added Services for Los Angeles

A certificate of public convenience and necessity has been granted by the California Railroad Commission to the Los Angeles Railway to operate motor coach service between Los Angeles and Inglewood.

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Financial *and* Corporate

Sale of Michigan Properties on March 14

Sale of all properties of the Michigan Electric Railway was ordered on Jan. 19 by Judge Charles C. Simons in the Federal Court to satisfy a mortgage on the property securing an issue of bonds, the holders of which are represented by the Bankers Trust Company, New York City, acting as trustee. The date has been fixed as March 14 and the place Jackson.

The mortgage and interest on the properties amounts to $8,699,706. The mortgage was given Jan. 1, 1923, as security for a bond issue of $7,000,000.

Last June the trust company filed suit in the Federal Court, asking foreclosure of the mortgage on the grounds the interest on the mortgage had not been paid. Judge Simons at that time appointed John F. Collins, of Jackson, receiver for the company.

The company operates the street railway systems in Jackson, Battle Creek, Kalamazoo and Lansing and interurban lines between the cities. It also holds the capital stock in the South Michigan Transportation Company, which operates buses connecting these places.

$25,000 Improvement in Denver Net

The Denver Tramway, operating in Denver, Col., in 1928 increased its net income over 1927, through a reduction in operating expenses, in the face of a decrease in total operating revenues. Total operating revenues for 1928 were $4,310,040 compared with $4,390,016 in 1927. Operating expenses and taxes were decreased more sharply than operating revenue with the result that net operating income increased from $926,471 in 1927 to $951,040 in 1928. After inclusion of miscellaneous income and deductions for bond interest and amortization of discount on funded debt, the balance available for dividends on preferred stock and other corporate purposes in 1928 was $460,960.

This is equivalent to $4.41 a share on the preferred stock on which dividends are cumulative up to 5 per cent. On account of a technical accounting change in the form of this year's statement the figure of $4.41 per share is not directly comparable with the per share estimate based on the report issued at the end of 1927. Computed on a similar accounting basis, the balance available for preferred dividends in 1927 was equal to approximately $4.07 a share.

A statement, commenting on the trend of earnings, was issued by the directors. It follows in part:

Passenger revenue decreased $90,751 in comparison with 1927 due to the transportation of 1,189,971 fewer revenue passengers. This was offset by a slight increase in other operating revenues with the result that for the year total operating revenue decreased $79,975.

The tendency is still downward and it will be impossible to meet it with further reduction in operating expense. The company is obliged to meet approximately $225,000 per annum in bond sinking funds. The balance, therefore, of $460,960 this year was not sufficient to meet sinking funds and pay the 5 per cent cumulative dividend on the preferred stock. Dividends on the preferred stock were paid at the rate of 3 per cent per annum and are now in arrears to the extent of $2.50 per share.

Merger Prospects Slim

Unlikely that Congressional approval will be obtained at this session for consolidation in Washington

PROSPECTS of obtaining Congressional approval this session of the resolution authorizing a merger of Washington's transportation systems are believed to be practically negligible as the result of the inability of the Senate District Committee to reach an agreement to bring the resolution up on the floor. The most insurmountable difficulty encountered by the committee in trying to report out the measure has arisen over the method of valuation.

There is entire agreement that the unification compact to be approved by Congress shall be shorn of the proposed $50,000,000 valuation clause or any other fixed amount. There is also full accord among the Senators of the committee that a complete revaluation of the properties shall be left to the Utilities Commission. There is a strong movement of the progressive element in the Senate, however, to make it incumbent upon the commission to employ the prudent investment method in evaluating the new company. By the injection of this issue, it is believed in some quarters that sight will be lost of the immediate merger over an attempt by an element in the Senate to obtain a precedent for its theory.

Except for the matter of obtaining a valuation, the committee has agreed on a tentative merger resolution. Among other restrictions inserted in this resolution is one designed to extend to the authority of the Utility Commission to regulate and pass upon service charges and fees that may be imposed by the holding company. It was decided to allow the commission to determine when the public interest could be served by permitting a competitive transportation system to start operation, rather than to assure the new company of a monopoly of the transportation facilities. It was also agreed to require the rates of fare to remain unchanged for a period of two years after the completion of the merger. The companies are allowed a period of two years to accept the compact after it is passed by Congress.

Balance in Reading $73,589

The accompanying table shows the earning statement of the Reading Transit Company, Reading, Pa., and subsidiary companies for the year 1928 compared with 1927.

STATEMENT OF BALANCE OF NET INCOME OF READING TRANSIT COMPANY FOR YEARS ENDED DEC. 31

	1928	1927
Operating revenue	$2,793,328	$2,872,775
Operating expenses and taxes	$1,576,708	$1,621,327
Maintenance and depreciation	630,337	643,813
Rentals	314,529	317,125
Total operating expenses, maintenance, depreciation, taxes and rentals	$2,521,574	$2,582,266
Operating income	$271,753	$290,508
Other income	16,829	20,140
Total income	$288,583	$310,648
Deductions from income:		
Interest on funded debt	$87,834	$87,955
Other deductions from income	8,014	20,115
Total deductions from income	$95,848	$108,071
Net income	$192,734	$202,577
Provision for dividend on preferred stock	119,145	119,145
Blance of net income	$73,589	$83,432

Valley Division of Illinois Traction Acquired

The Illinois Commerce Commission has entered an order authorizing the Chicago & Illinois Valley Railroad to acquire and receive all property rights and franchises constituting the Illinois Valley division of the Illinois Traction, Inc. Authorization is also given to issue $1,000,000 of its common stock to consist of 10,000 shares without par value.

Six-Mile Line to Be Abandoned

Petition by the Cortland County Traction Company for approval of the abandonment of its line from Hooker's crossing in Homer to Preble, N. Y., a distance of 6¼ miles, was granted by the Public Service Commission on Jan. 21. Actual abandonment is not to become effective until April 1.

Evidence submitted to the commission showed that in 1927 the expenses of operating the Homer-Preble line was $10,000, while the gross revenue was $4,829. The gross operating revenue for the entire system for that year was $63,957, with a net loss of $18,118. It was further shown that if the line was to be continued in operation, improvements estimated to cost more than $40,000 would be necessary, and that the company has met with a steadily decreasing revenue and increasing operating loss.

The Delaware, Lackawanna & Western Railroad gives daily service between Preble and Homer. Commissioner Brewster, who heard the company's application, said the evidence showed that there was very little demand for the line except by school children under a

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contract between the railroad and the school districts by which $800 a year is paid for carrying the children.

September to See End of Muskegon's Cars

Frankly and forcefully D. A. Powell, vice-president and general manager Muskegon Traction & Lighting Company, summed up the transportation situation in Muskegon, Mich., on Jan. 25 before the Mayor and City Commission. He pledged co-operation in the working out of the problem, but declared that cars could not run after September. If the city did not feel that bus transportation would solve the problem and that it would be a bad thing for the city to eliminate the railway, then the company would sell the system or an equity in it at a rock bottom price. Meanwhile he promised continuation of the system until an arrangement could be effected.

The Mayor discussed with Mr. Powell the possibility of the zone system as an ameliorator, but the general manager discounted the efficacy of that plan. As Mr. Powell saw it, it had become a community problem calling for a levy on all the people to provide a transportation system. The fault was not to be ascribed so much to bus competition as to the increasing number of private automobiles. His company was faced with the necessity of spending from $150,000 to $175,000 in new equipment and repairs within the next few years and this, he claimed, was impossible financially. When asked if he thought buses would make money, he replied in the affirmative if they did not have to provide facilities for handling the traffic at the peak hours. A system of this kind, like any other, would serve no good purpose at this time and he and the other officials felt that they did not care to invest any more money in either system.

Mayor Dratz closed the discussion with the promise that the commission would give the question serious study and would from time to time call on Mr. Powell for testimony. He in turn offered to turn over the books of the company for the city's study.

The precarious future of the transportation system in Muskegon recalls an advertising campaign instituted by the company three years ago to answer the question of the hour "Is electric railway transportation a necessity in a community the size of Muskegon with a population of 50,000?" Since that time the population has increased until it is now approximately 58,000. Railway traffic has gradually decreased during the past three years and it is now up to the commission to decide whether transportation is to be supplied entirely by buses or whether a combined bus and street railway operation can be worked out. In the latter case it will be necessary for the city or some other party to effect such a combination.

The Muskegon Traction & Lighting Company also supplies Muskegon and Muskegon Heights with gas.

Transportation Earnings Lower in Tampa

In a letter to the stockholders of the Tampa Electric Company, Tampa, Fla., President Knight states that transportation earnings which constitute 18 per cent of the consolidated revenue were 15 per cent less than in 1927 but 6.4 per cent greater than in 1924, which was the last year prior to the boom period. Combined earnings of all departments show a decrease of $56,682. Operating expenses exclusive of retirement accruals show a net reduction of $72,596. The economies in operation offset not only the loss in revenue, but also a substantial amount of the increase of $42,367 in retirement accruals.

More Juggling in Seattle

City diverts $800,000 from water fund to meet payment on principal of purchase price of Municipal railway

PAYMENT of an installment of $1,062,225, due from the city to the Puget Sound Power & Light Company on the Municipal Street Railway purchase price March 1, has been provided for by passage of an emergency ordinance in the City Council of Seattle, Wash. The ordinance authorizes a loan of $800,000 to the street railway fund from the water fund. Fundamentally, $484,000 of the money is to come from the Seattle municipal improvement bond 1927 construction fund, backed by general obligation bonds. An even $300,000 comes originally from the municipal water extension bond 1927 construction fund, backed by the utility bonds of the water department. The rest will be made up in current revenues from the water department.

Action to this effect was taken in accordance with an agreement reached between the City Council and Mayor Frank Edwards. It kills the campaign instituted before the King County delegation in the State Legislature to pass a bill authorizing a general tax of 2.5 mills in Seattle to help finance operation and maintenance of the Street Railway Department. This bill was presented to the King County Senators by Seattle's Superintendent of Public Utilities, George B. Avery, as an emergency bill which he desired to have enacted before Feb. 1. The measure authorized the City Council, by a three-fourths vote and approval by the Mayor, to levy 2½ mills in 1930 and succeeding years, to make up any deficiency in operating expenses.

In presenting his bill to the King County Senators, Mr. Avery declared that he would be able to save, month by month during the coming year, sufficient money to meet the principal payment due Feb. 1, 1930, and that in his opinion it would never be necessary to levy the 2½ mills. But the bondholders, he added, insisted on the guaranty of the levy as the condition of waiving the principal payment due on Feb. 1, this year. Mr. Avery quoted James B. Howe, attorney for the Puget Sound Power & Light Company, as saying that if the bill is not passed, the Stone & Webster interests would take judgment against the city, and the general fund would be obligated for the entire $9,000,000 still due on the original $15,000,000 purchase price.

Some members of the Council looked upon the bill proposed by Mr. Avery as a way out of the temporary financial difficulty, but others opposed it vigorously as an opening of the general tax fund to all utilities. It was pointed out by certain Councilmen that the measure would immediately bring to the Puget Sound Power & Light Company virtually all the advantages of having its bonds made general obligations upon the city. With the arrangement completed for the loan from the water department, Mr. Avery announces that he will suspend his campaign in the State Legislature.

In the meantime, a project which would completely change the administration of the railway system has been presented in a session behind closed doors, between members of the Seattle Traffic Research Commission and the City Council, together with Mayor Frank Edwards. The plan provides that charge of the railway system be vested in a non-salaried board of seven citizens. A majority of the Council, however, expressed opposition to the creation of the proposed commission by act of the State Legislature, but they were open-minded on the proposal, as an alternative step, that the plan be submitted to a vote of the people as a charter amendment.

The first organized campaign of protest against the proposed rapid transit plan, on which a board of citizens have worked for two years, and which has met with widespread interest and approval throughout the city, has been launched by the Seattle Real Estate Board, a special committee of which appointed to study the plan advises that the cost of the project would be too great for the city to bear at the present time, particularly as it would throw an additional burden on real estate taxation that could not be met. The Real Estate Board urged exhaustive study of the report and investigation of the city real estate conditions before any action is taken toward instituting a project of this kind.

Seven Per Cent Earned on Dallas Property

During the year 1928 the Dallas Railway & Terminal Company, Dallas, Tex., earned enough money to pay a total of $762,665, or 7 per cent, on its property value. In addition, $107,242 was placed in the repair, maintenance and depreciation reserve and $61,383 in surplus reserves. Gross earnings for the year were $3,260,567, a sum $438 less than in 1927. Total operating expenses were $2,329,275. Property value of the company at the end of the year totaled $10,895,221. During the year 47,226,823 passengers were carried.

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Legal Notes

CALIFORNIA—*Street Railway Denied Increased Fare by Railroad Commission May Secure Release From Any Court Having Jurisdiction, Notwithstanding Public Utilities Statute.*

This is the case in which the District Court of California ruled on Sept. 10, 1928, on the plea of the Los Angeles Railway from the order of the Railroad Commission denying the railway an increase over the 5-cent fare. The court held such fare confiscatory where the return on the railway rate base was approximately 4.9 per cent. The property of railroads is under the fundamental guarantees of the constitution, and railroads cannot be deprived of their property without just compensation or due process or be denied equal protection of the law. If the power of regulation of the State Commission over carriers is so unreasonably exercised as to prevent the carrier from obtaining a fair return on the property invested, the commission's exercise of power is violative of the due process clause of the constitution. Where the Railroad Commission made an order denying the street railway the right to increase its fares, the company could resort to any court having jurisdiction to afford relief. The comment of the District Court was to the effect that the Railroad Commission's order denying permission to the railway to increase the existing rate of fare constituted exercise of jurisdiction by the commission, giving the Federal Court power to enjoin enforcement of the order if confiscation of the utilities property resulted, even if the rate provisions contained in the franchises from the city constituted contracts. [Los Angeles Railway vs. Railroad Commission, 29 (2nd), Fed. Rep., 140.]

CIRCUIT COURT OF APPEALS—*License for Interstate Carriers Upheld.*

An ordinance of the city of Philadelphia, regulating all buses on city highways including interstate buses, and enacting an annual license fee of $50 per bus, was held not an unreasonable burden on interstate commerce, as to the amount of license fees, requirements for city license tax, designation of drivers and routes and detailed information required. [American Motor Coach System vs. City of Philadelphia, 28 F, (2d), 736.]

FEDERAL SUPREME COURT — *Company Not Liable Under Federal Employers Liability Act When Employee Is Injured Through Disobeying Orders.*

A railroad conductor had printed orders that his train was to pass another coming in the opposite direction at a certain siding. He did not find the train there, so ordered his own train to proceed to the next siding and was killed in the resulting collision. A telephone message had been sent to him through the station agent not to proceed, but through negligence of fellow employees he did not receive the message. It was held that the company was not responsible under the Federal Employers Liability Act. [Unadilla Valley Ry. vs. Caldine, 49 Sp. Ct. 91.]

FLORIDA—*Terminal Company Granting Special Privilege to Conduct Telegraph Business Need Not Grant Like Facilities to Another Company.*

So long as the service furnished by a common carrier in the discharge of its public duties is adequate to the public needs, the public is not concerned with the selection of the particular agency through which such service is supplied. Hence, a terminal company which granted exclusive privileges to a telegraph company to conduct business upon its premises does not create a monopoly in the odious sense of the word, nor is the terminal company obliged to grant similar privileges to another telegraph company. [State vs. Wells et al. 118S, 731.]

INDIANA — *Legislature May Withhold Power to Regulate from Public Service Commission.*

The Legislature of 1925 withheld from the Public Service Commission the power to regulate buses operating as common carriers within certain cities where the local authorities had previously granted licenses to buses. It was held that this was within the power of the Legislature, regardless of the motive of the legislators, and that Muncie was such a town. [Denny et al. vs. Brady, 163 N.E., 489.]

KANSAS—*Negligence in Driving Team Attached to Grain Binder Over Railroad Crossing in Front of Approaching Train Barred Recovery for Resulting Injury.*

Ordinary care for his own protection was not used where the plaintiff driving a horse team attached to a grain binder approached a railroad crossing with which he was familiar, where his view was obstructed by a station house, so that he could not see a train coming from that direction until the team was entering upon the track. The driver slowed the team down, but stated that he looked and listened for a train, but did not stop his team or go forward to a point where a view of the track could be had and where he could have ascertained that a train was approaching if he had done so. He drove the team and vehicle upon the track when a train traveling at a rate of 20 m.p.h. was only 300 ft. away, and sustained an injury in the collision that followed. It was held that his negligence barred an action for injury. [Clark vs. Atchison Topeka & Santa Fe Railway, 272 Pacific Reporter, 128.]

KENTUCKY — *Franchises of Louisville Railway for operation are valid.*

The Louisville Railway operates in the city of Louisville under two city ordinances, which provided for the adjustment of the former franchises of the company. One was enacted in 1922 and the other in 1926. Recently these ordinances were attacked by a group of tax payers who filed a petition in equity attacking the validity of the ordinances, and asking that an injunction be issued against the railway company to prevent it from operating under them. The various points in this petition were considered by the Court of Appeals of the State, which declared the ordinances valid and dismissed the petition. [Poggel et al. vs. Louisville Ry. 10 S.W., (2d), 305.]

NEW HAMPSHIRE—*Automobile Driver Cannot Recover While Operating Without License.*

The act of an automobile driver in operating a car without a license as required by the law was held causal, so as to preclude recovery for injury received in collision with a train. [Johnson vs. B. & M. R.R. 143 A, 516.]

NEW JERSEY—*Deduction From Franchise Tax of Street Railway's Payment to Township for Removing Snow From Streets Not Permitted.*

A state law permits a railway company which pays taxes to any taxing district for exclusive use, pursuant to agreement or ordinance (except cost of paving and taxes on real and personal property), to deduct such taxes from its franchise tax assessed under the franchise tax act. A railway had an agreement with a township to pay half of the cost of removing snow from certain streets in lieu of the company's obligation under its franchise to remove all of the snow from its tracks. It brought suit to have this payment declared part of its franchise tax under the franchise act. The court declared, however, that where a company receives an equivalent in value for a payment made, no deduction is permitted. Another example, besides the case in court, would be the purchase of water from a municipality. [Public Service Co-ordinated Transport vs. Clark 143A, 722.]

OHIO — *Guest or Passenger in Auto Obligated to Warn Driver of Danger Which Apparently Cannot Be Seen by Driver.*

The charge of contributory negligence in an action for injuries is justified where the evidence showed that the guest in an automobile assumed responsibility of ascertaining whether it was safe to cross street railway tracks in front of an approaching street car in turning from one side of street to the other between intersections to proceed in the opposite direction. [Smith vs. Cleveland Railway, 164 N.W., Rep. 59.]

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Personal Items

A. Taurman Honored Again

A. Taurman, superintendent of equipment, way and structures Birmingham Electric Company, Birmingham, Ala., has been elected president of the Electric Railway Association of Equipment Men, Southern Properties. Mr. Taurman is known to JOURNAL readers for his frequent contributions to its pages and particularly for his article on the application of Alemite lubricating fittings to Brill half-ball brake hangers, which won the equipment essay award for May, 1928, in this paper's Maintenance Contest.

His experience began in the mechanical department of the Southern Railway at the Richmond shop in 1901 where he served as machinist apprentice, shop foreman and mechanical draftsman. Later he was connected with the American Locomotive Company and in 1907 accepted the position of mechanical draftsman with the New York Air Brake Company at Watertown, N. Y. As told previously in these pages, Mr. Taurman served the Virginia Railway & Power Company and in October, 1919, became superintendent of equipment for the Birmingham Railway & Light Company, the predecessor of the Birmingham Electric Company. He has given considerable attention to mechanical improvements in rolling stock and track construction.

Messrs. Wheat and Vaughan Leave California Commission

Resignations of Carl I. Wheat, chief counsel for the last six years of the California Railroad Commission, and Reginald L. Vaughan, for the past five years examiner and assistant attorney, were accepted with regret by the commission on Jan. 21. The resignation of Mr. Wheat is effective Feb. 15 and that of Mr. Vaughan on March 1, 1929.

Mr. Wheat resigns from the commission to re-enter the private practice of law in association with the firm of McCutchen, Olney, Mannon and Greene of San Francisco. During his six years association with the commission he represented that body in more than 90 cases before the California Supreme Court, a number before the United States Supreme Court, and several before other federal courts. He also represented the commission in a number of important proceedings before the Interstate Commerce Commission. In association with Assistant Attorneys Vaughan and Roderick Cassidy, he directed publication of "Public Utility Regulation in California" and the "Digest of Decisions of the California Railroad Commission," two important volumes on public utility regulation. He was graduated from Pomona College in 1915, and from the Harvard Law School in 1919.

Mr. Vaughan resigns from the commission's legal staff to engage in the practice of law on his own account, devoting a considerable portion of his time to the affairs of the Wesix Heater Company, of which he will act as chief counsel. Mr. Vaughan received his A.B. degree from the University of California in 1922, and his J. D. degree from that institution in 1924.

D. C. Green in New York

Official of Salt Lake City Company to join Electric Bond & Share staff. Successful in public relations

D. C. GREEN, vice-president and general manager of the Utah Power & Light Company, Salt Lake City, Utah, is to leave early in March to become an executive with the Electric Bond & Share Company, New York, N. Y.

D. C. Green

Mr. Green is one of those of whom the poet wrote "For they, while their companions slept, were toiling upward in the night." The promotion that now comes to him ends his second term of office at Salt Lake, marked by improved fares, reduction of duplicate trackage and installation of modern trackless trolleys—all innovations affording tangible proofs that Dan Green "has a way with him." It is a significant way, too, for the public soon finds out whether a public utility man is making good.

His first work in Salt Lake City came in 1915 as manager of the Salt Lake Division of the Utah Power & Light Company. A year later he was advanced to the job of general manager of the Fort Smith Light & Traction Company. Mr. Green's remarkable work in Arkansas as operator, public relations man, and organizer of statewide power distribution systems drew the favorable attention of Electric Bond & Share interests, so in 1923 he returned to Salt Lake City as vice-president and general manager of the Utah Power & Light Company.

Born in 1884, Dan Green grew up in the early exciting days of electricity. His predeliction led to his taking the electrical engineering course at Purdue University, from which he was graduated in 1908, following a judicious mixture of factory experience and college theory. After one month as a meter reader at San Diego in 1909, he was made manager of the commercial department. The next five years saw him serving as manager of electric properties at Albany and Marshfield, Ore., followed by a similar position with the Everett Gas Company, Everett, Wash.

In these days, when the problem of big business is to prove that it is really human, there is a great need, as well as a great opportunity, for men like Dan Green. That his promotion to headquarters has been well earned will be apparent enough to those who scan the records. Certainly Salt Lake City will miss Dan's enthusiasm and helpfulness, but the powers higher up have decided his talents should have wider scope.

A successor to Mr. Green will be named at the meeting of the directors of the Utah Power & Light Company scheduled for early in February.

S. E. Emmons in Foreign Field

Samuel E. Emmons, assistant general manager United Railways & Electric Company, Baltimore, has resigned, effective Feb. 1, to become associated with the American & Foreign Power Company, Inc., controlled by the Electric Bond & Share Company. Mr. Emmons will sail from New York on Feb. 9 to take up the management of railway properties owned and controlled by the American & Foreign Power Company, Inc., in the United States of Brazil, with headquarters in Rio de Janeiro.

Mr. Emmons is a son of Charles D. Emmons, president of the United Railways & Electric Company. He was born in Pittsburgh and was graduated from the University of Michigan with the degree of Bachelor of Civil Engineering in 1916 and then took up work with the Atchison, Topeka & Santa Fe Railroad. Later he became connected with the Pennsylvania Railroad at Pittsburgh. He joined the Fifteenth Regiment of Railway Engineers at the outbreak of the war and served as a second lieutenant. The regiment sailed for France on July 9, 1917, and was among the first contingent of troops.

Mr. Emmons was mustered out of the service in May, 1919, with the rank of captain and then re-entered the service of the Pennsylvania Railroad. He resigned his position with that company to become associated with Professors Cooley, Riggs and Anderson on valuation work. He became connected with the Ann Arbor Railroad as assistant chief engineer in April, 1920, and from that position he went to Baltimore in September, 1922, as assistant to H. B. Flowers, general manager of the company at that time. Mr. Emmons was promoted to the position of assistant general manager in April, 1924.

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E. S. Haymond Promoted With West Penn

At a recent meeting of the board of directors, Edward S. Haymond was elected an assistant treasurer of the West Penn Power Company and the West Penn Railways. Mr. Haymond is a native of Indiana. He was graduated from Purdue University in 1914 and went to Pittsburgh shortly thereafter to take a position with the Westinghouse Electric & Manufacturing Company. In June, 1915, he became affiliated with the West Penn, his first work being in the statistical department which at that time was under the supervision of E. D. Dreyfus. During the World War, Mr. Haymond saw service with the air forces stationed at San Antonio, Tex. In February, 1919, Mr. Haymond returned to the statistical department and two years later was made statistician which position he held until February, 1928, when he was assigned to the treasury department as assistant to D. P. Guest.

E. J. Mehren Succeeds Wheeler Sammons with Shaw Company

Wheeler Sammons, who requested several months ago that, as soon as the reorganization of the A. W. Shaw Company was completed, he be relieved as senior vice-president and general manager, and his responsibilities changed to those of an advisory character, assumed this advisory position in the A. W. Shaw Company on Jan. 15. He will remain a member of the board of directors of the McGraw-Hill Publishing Company, Inc. E. J. Mehren will become vice-president and executive head of the A. W. Shaw Company and will continue as editor of the *Magazine of Business* and resident vice-president of the McGraw-Hill Publishing Company in Chicago. Mr. Sammons desires to give closer attention than it has been possible for him to do in the past to the development of his personal interests and publishing properties, which include the A. N. Marquis Company, publisher of "Who's Who."

A. P. Titus Goes to Illinois Terminal

A. P. Titus, chief operating officer of the Chicago & Alton Railroad, has resigned to accept the position of vice-president of the Illinois Terminal Railroad in St. Louis, affiliated with the Illinois Power & Light Corporation. He has been placed in charge of operations, entering upon his new duties on Jan. 16.

The Chicago & Alton has promoted S. P. Henderson, general superintendent, to succeed Mr. Titus, while Clarence W. Bearden, superintendent of transportation, was promoted to Mr. Henderson's old post.

The Illinois Terminal Railroad plans the construction of a $5,000,000 terminal in St. Louis, including a subway, surface and elevated lines. This work will be started soon and will fall in the sphere of Mr. Titus' duties.

J. H. Cain in Atlantic City

Former New York and New England operator appointed assistant superintendent of Atlantic City & Shore Railroad

JOHN H. CAIN, Boston, has been appointed assistant superintendent of the Atlantic City & Shore Railroad, Atlantic City, N. J., to succeed E. A. MacMillan, bound for São Paulo, Brazil, where he will have charge of transportation in a growing metropolitan section of the South American country.

The new assistant superintendent started in railway work as a conductor on the New York State Railways, Rochester Lines. Working his way up from the ranks, Mr. Cain became successively, motorman, inspector, chief inspector, superintendent of employment and instruction and assistant superintendent of transportation.

Following this foundation, he became train dispatcher of the Rochester & Eastern Rapid Railway; division superintendent and assistant to the general manager of the Hudson Valley Railway; superintendent and general superintendent of the Buffalo, Lockport & Rochester Railway; and general superintendent and manager of the Shore Line Electric Railway, Norwich, Conn.

When an appraisal of the Edmonton Radial Railway of Edmonton, Alberta, Canada, was undertaken, Mr. Cain was one of the railway men from the United States called across the border to assist in the preparation of the valuation report. He likewise did considerable field work, including a survey and appraisal, for the Toronto Railway, Toronto, Canada.

N. T. Brown Has Headquarters in Philadelphia

Nelson T. Brown, who since April 15, 1927, has been vice-president of the International Railway, Buffalo, N. Y., in charge of transportation, has moved his office to Philadelphia where he will be in closer touch with Dr. Arthur A. Mitten, of Mitten Management, Inc., and the Philadelphia Rapid Transit Company. Mr. Brown will continue to administer his duties in Buffalo, traveling between Philadelphia and Buffalo at frequent intervals.

Ohio Commission Appointees

Roscoe C. McCulloch has been appointed a member of the Ohio Public Utilities Commission by Governor Myers Y. Cooper. Mr. McCulloch served six years as Congressman and in 1920 was an unsuccessful candidate for the Republican nomination for Governor. He was special assistant attorney general of the United States, serving under three attorney generals, and was a member of the federal board created to review war contracts. He is a practicing attorney.

Frank B. Maullar, Mr. McCulloch's predecessor, was appointed in 1921 by Governor Davis. His term expired in 1927, but the Senate two years ago refused to confirm any one of three men named by Governor Donahey to succeed him. Mr. Maullar consequently has held office two years beyond the end of his term.

OBITUARY

Daniel Boal

Daniel Boal, superintendent of schedules and timetables of the Chicago Surface Lines, died in Evanston recently. He had been in the department for the past four years.

Mr. Boal entered the service of the Chicago City Railway, the south side lines, in 1902 as a window washer. Later he became transfer clerk, working nights, and during these years he attended the University of Illinois Medical School, and was graduated in 1906. In 1909 he went to Seattle, Wash., where he entered the mechanical department of the Seattle Electric Company, which operated a street railway and lighting system in that city. He was later transferred to the railway department in charge of traffic studies and schedules. He returned to Chicago in 1910 and entered the schedule department of the Chicago Surface Lines, resigning in 1919 to accept a position in the schedule department of the Philadelphia Rapid Transit Company. He was recalled to Seattle in 1920 but in 1923 again entered the services of the Chicago Surface Lines.

Although he held a doctor's degree and practiced for two years, his interest in street railway work was so great that he devoted his entire time to it.

THOMAS DUNCAN, founder and president of the Duncan Electric Manufacturing Company, died on Jan. 21, at Los Angeles, Cal. Mr. Duncan was one of the few men who saw almost the entire development of the electric meter and had been in intimate touch with all its phases. He was an inventor as well as an administrator and held about 200 patents. Born and educated in Scotland, Mr. Duncan came to America in 1883. Among the firms with which he was associated were the Sun Electric Company, the Fort Wayne-Jenney Electric Light Company, the Thomson-Houston Electric Company, the Fort Wayne Electric Light Company and the Siemens & Halske Company of America. In 1901, with several others, he organized the company which now bears his name. He was 63 years old.

FRANK E. JOHNSON, Chicago district sales manager of the Ohio Brass Company, died at his home in that city on Jan. 16. Mr. Johnson had been with the Ohio Brass Company for 21 years, all of that time in the Chicago territory.

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Additional Improvements Announced

Public Service to spend $7,500,000 for transportation improvements. Fifty cars may be purchased by Brooklyn-Manhattan Transit Corporation. Track improvements to be made in Hartford

OUTSTANDING among improvement programs recently announced is the approval by the Public Service Corporation, Newark, N. J., of the budgets for 1929 of its subsidiary operating companies. The total budgets approved represent more than $34,000,000 of which more than $22,000,000 will be used by the electric department of the Public Service Electric & Gas Company for interconnection, transmission and distribution purposes. The gas department will spend more than $4,000,000 in the manufacturing and distribution branches of its organization.

More than $7,500,000 has been apportioned to the Public Service Co-ordinated Transport for equipment, track renewals, buildings and general items having to do with the improvement of the operations of electric street cars and buses. The major portion of the transportation appropriation will be used during the year for the purchase of buses.

Fifty Cars for Brooklyn

The Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., is preparing specifications for 50 new surface type cars. The details of these cars have not been completed but it is understood that they are to be for one-man operation. It seems that centre entrance cars are most desirable and that some difficulty is encountered in arriving at a decision as to which type of car is most suitable.

In a partial report to the Board of Public Service, St. Louis, Mo., the Condemnation Commission has recommended the North Twelfth Street boulevard improvement project to facilitate the construction of the Illinois Terminal Railway subway and elevated line, connecting a new terminal to be constructed at Twelfth Boulevard and Locust Avenue with the McKinley Bridge. It is recommended that 40 ft. of property be taken east of High Street from Morgan Street to a half block north of O'Fallon Street. It is beneath the additional 40 ft. that the railway will build its subway.

The commissioners for the entire project will not finish their report for another two or three years, but if a partial report is filed on the 40-ft. strip, the city would be able to take possession not later than at the end of six months. If the city should widen this street during the coming summer, the construction of the Illinois Terminal Railway subway would be advanced about two years.

The Board of Finance, of Hartford, Conn., plans a paving program for 1929 in which the Connecticut Company, New Haven, Conn., is involved to the extent of $244,000. This sum is the allotted percentage on eight of 25 streets to be paved, where the railway has tracks. In addition to this amount, the Connecticut Company will be asked to spend $26,000 for track work in connection with the widening of North Main Street. The Connecticut Company has been in conference with city officials and has suggested that the railway may find it hard to fill its part of so large a program, due to problems the company faces throughout the state. The city has been assured, however, that the Connecticut Company would do its best to take care of its share of the work.

Two major projects for the current year are now being undertaken by the Memphis Street Railway, Memphis, Tenn. One of these, on which work has already been started, is the rebuilding of the line on Poplar Avenue from Third to Dunlap Streets. This construction will require about six months and will cost approximately $90,000. The old rail is being removed and new 9-in., 134-lb. rail is replacing it. Plans for 1930 will probably continue this construction from Dunlap to Watkins Street.

The other major project which this company will begin work on in the near future is the reconstruction of the line on Hernando Street from Beale to Calhoun Streets. The 7-in., 70-lb. rail is being replaced by 7-in., 122-lb. rail. This project represents 2,400 feet of double-track reconstruction. The street is now paved with brick but the railway will pave between the tracks and for 24 in. along either side of the outside rails with asphalt. The project will require three or four months for completion and will cost approximately $40,000. Though these are the only projects definitely planned, they will probably be increased by work that will depend upon the city's program of improvements.

Milwaukee Track Relocation

Several grade crossings will be eliminated in the new $500,000 track relocation project on the Milwaukee-Racine-Kenosha rapid transit line of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. Six miles of track will be relocated within the next six months. The present tracks are adjacent to the pavement of highway No. 15, following its many curves. The new tracks will be placed about ¼ mile to the east on a recently acquired private right-of-way, parallel to and just east of the Northwestern Railroad passenger line. Grade separation is planned for four important crossings.

The new line will join the present route at South Junction, pass under highway No. 15 north at Ryan Road and pass over Ryan Road and the Northwestern line. This will eliminate present grade crossings over Ryan Road at the highway intersection and will avoid two diagonal grade crossings with highway No. 15. Another improvement will be effected at Ives subway where the line will cross overhead, permitting widening and realignment of the highway which now takes a sharp dip and reverse curve. Ultimately the entire line, except where it passes through Racine and Kenosha, will be on a new right-of-way remote from all highway traffic. Two miles of grading has been completed at the south end of the new road.

Cars Rebuilt in Oakland

The Key System Transit Company, Oakland, Cal., has rebuilt three street cars and three transbay cars for operation as experimental cars giving greater comfort and less noise. Aside from shimming the trucks and bodies of the cars and air compressor equipment with a noise and shock absorbing material, the cars have been completely refinished. Among the types of new fittings installed are deep cushioned individual seats, new window sash arrangements that afford more spacious windows and greater vision for the passengers, industrial carpet on the floors, a new stop buzzer system and modern illumination.

The Denver Tramway Corporation, Denver, Col., has recently ordered 500 trolley ears, 12 in. long for No. 00 round trolley wire and 500 trolley ears, 12 in. long for No. 0 round trolley wire, 50 22-in. splice ears with ⅝ in. boss for No. 00 round wire, 100 renewable bronze 6-in. cam tips for No. 00 wire and 400 renewable bronze 2½-in. cam tips for No. 00 wire. This company has also ordered two Mack AB 25-passenger city type buses.

The Knoxville Power & Light Company, Knoxville, Tenn., plans an automatic power substation to cost approximately $75,000.

Although the City Council of Seattle, Wash., has voted an appropriation of $28,000 for the construction of the extension to the Beacon Hills street car line, the actual start of the construction is delayed, due to a vote by the City Council to amend the original ordinance providing for the extension. Upon a petition of residents living between Columbian Way and Graham Street for extension of the line to Graham Street, the Council has voted to grant this request. The amendment will set forth a new schedule of payment on the warrants for financing the line.

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Steel Cars Barred on Old N. Y. Elevated

The New York Transit Commission's steel car committee has reported that all-steel cars are impractical for use on the old elevated lines of the city. The report, which has just been filed with the state board after months of intensive study, was prepared by a special group of engineers named by the commission to design a coach built entirely of steel, after the manner of subway cars, which would be light enough to be operated on the elevated structures and thus give those lines the same fire protection as that obtained in the subways. The group reports that it was found impossible to construct a car of sufficient rigidity and strength and of proper dimensions within the weight limitation required to make operation of a full ten-car train on the overhead structures safe. The committee consists of W. G. Gove of the Brooklyn-Manhattan Transit Corporation, J. S. Doyle of the Interborough Rapid Transit Company, William C. Lancaster, chief engineer of the Transit Commission, and H. N. Latey, equipment engineer of the Board of Transportation. They worked in conjunction with the representatives of several equipment companies including the Pressed Steel Car Company, the Standard Steel Car Corporation, the Pullman Company, American Car & Foundry Company and the General Electric Company.

The committee held out the hope that it might be possible to construct an all-metal car—provided some of the new light metals such as aluminum or duralumin were used in place of steel—but this would be of an experimental nature without engineering certainty as to its success. It reported that such an experimental car would cost in the neighborhood of $120,000—and no public board feels like spending that sum unless without assurances of success.

The report practically spells the doom of the drive to secure a light steel car for elevated work, although some of the transit commissioners still believe that a satisfactory car can be built.

With respect to Brooklyn the engineers were more hopeful. It is held that the Brooklyn lines can be more cheaply strengthened to hold steel cars. It is urged, however, that for this borough an effort should be made to bolster up the present structures sufficiently to carry the regular B.-M. T. subway car rather than seek to design a new lighter type.

It is pointed out that Broadway, Brooklyn, is already strengthened; that part of the Fulton Street line has been rebuilt, and that the only two other heavy passenger carrying lines that would have to be strengthened are Myrtle and Lexington Avenues. Referring to the construction of the Fulton Street subway to take the place of that elevated and the building of the Smith-Ninth Street tube, the report says:

"It is possible that the Fulton Street line will be taken down and that traffic on Fifth Avenue will be so reduced that this line may also be eliminated."

Exhibitograph No. 3

GAIN
Patronage and Profits
and
SAVE
by Exhibiting
at the
A.E.R.A.
Atlantic City
Convention
Sept. 28 to Oct. 4

NO OTHER MEANS IS SO EFFECTIVE IN TELLING YOUR STORY.

The city plans to hook the Smith-Ninth Street subway into the Culver line, and when these trains are carried to Manhattan through the Smith-Ninth Street tubes, rather than over the Fifth Avenue L, it is asserted that the carrying capacity of that elevated will no longer be necessary. The four-track Fourth Avenue subway already parallels it within one block and the new line, it is declared, will care for the remainder of its traffic.

Since the through traffic over the Brooklyn Bridge is falling off, it is reasonable to expect that within a short time it will be so small that it can be handled by means of shuttle trains. The Brooklyn elevated will end at Sands Street, where the shuttle would terminate on this side of the river. To provide for passengers seeking Manhattan points other than the end of the Brooklyn Bridge, an extensive transfer station would be erected where the combined Lexington and Myrtle Avenue lines cross Flatbush extension, and another where they intersect the new Smith-Ninth Street line at Jay Street, which will lead through the Cranberry and Jay Street tubes on the city's new subway system. The B.-M. T., in line with this, has already urged the construction of a transfer station at Flatbush extension.

Proposed Standard for Milling Cutters Issued

The American Society of Mechanical Engineers is distributing copies of the proposed American standards for milling cutters, which has recently been approved by the sub-committee of the sectional committee, on the standardization of small tools and machine tool elements. This proposed standard is being distributed for criticism and comment, and the committee will appreciate any discussion on the matter. Comments on this tentative form should be addressed to C. B. LePage, assistant secretary of the American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y.

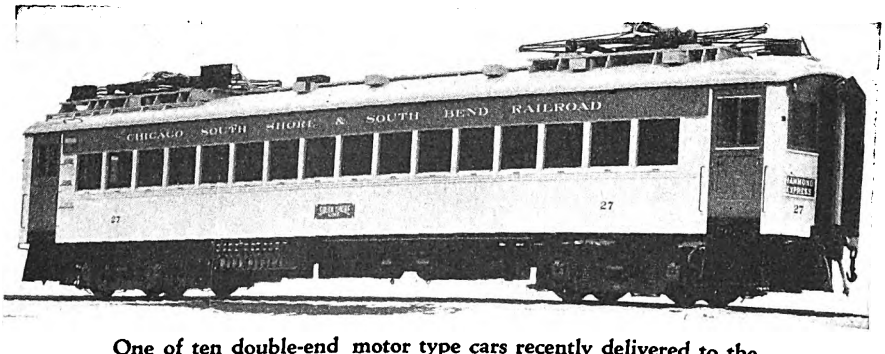
The proposed American standard on milling cutters was developed by the sub-committees on the standardization of milling cutters through its sub-group on nomenclature, limits, keys and keyways, profile and formed cutters, after frequent meetings throughout the country, and after preparation of numerous drafts. The sectional committee consists of twenty members representing the Society of Automotive Engineers, the National Machine Tool Builders' Association, and the American Society of Mechanical Engineers, who are joint sponsors for the project under the procedure of the American Standards Association.

The proposed standards effect plain, side, angular, stagger-tooth, end mills, metal slitting, T-slot, and half side cutters, involute gear, stocking and fluting reamers and taps.

South Shore Receives Ten Cars

Delivery of ten cars ordered last May by the Chicago, South Shore & South Bend Railroad, Michigan City, Ind., has been made by the Standard Steel Car Company. These cars are of the two-man, motor-driven, interurban type, each seating 48 passengers. Each car weighs 133,600 lb., is 61 ft. long and 10 ft. 1¼ in. wide. These cars are similar to the ones recently ordered.

Individual easy seats of the bucket type, Pullman smoking compartments, wide aisles, large windows and low descending steps are important features. The bodies are of all steel construction with arch roofs and swinging end doors. The exterior finish is in orange and



One of ten double-end motor type cars recently delivered to the Chicago, South Shore & South Bend Railroad

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maroon lacquer and the interior trim is finished in mahogany.

The trucks are each equipped with two inside hung motors and 36-in. rolled steel wheels. Plain type armature and journal bearings are used. Complete plans and specifications of these cars were published in the July 14 issue of ELECTRIC RAILWAY JOURNAL.

Timken Steel & Tube Expands

The Timken Steel & Tube Company, Canton, Ohio, has put into effect an expansion program for the coming year that will necessitate expenditures in the neighborhood of $1,000,000. A tract of land 200 acres in extent has been purchased, which extends 2 miles west of the company's present holdings. This will provide room for future expansion of the plant facilities on the present basis of straight line production.

Work has already been started on the first unit, a tube mill, which will be housed in a building 320 ft. wide x 420 ft. long. It is being erected at a cost of more than $500,000 for building and equipment. This mill will be completed and put into operation by April 1. Other extensions to the production facilities of the company will be made later.

Uniform Through Export Bill of Lading

Many questions have been raised concerning the use and practicability of the uniform through export bill of lading. Chambers of Commerce, individual shippers, and associations of various types frequently suggested to the Department of Commerce that there was a great deal of misconception and misunderstanding regarding this bill of lading. They requested that the department, after conferences with the exporters, railroads, steamship lines, freight forwarders, bankers, and others, who might be affected by the use of this document, publish a bulletin bringing out all of the basic facts regarding the uniform through export bill of lading, its practicability and the favorable and unfavorable factors experienced in its use in foreign trade. In this connection some 30 conferences with shippers, bankers, transportation interests, and others have recently been held at the offices of the Bureau of Foreign and Domestic Commerce.

The Bureau of Foreign and Domestic Commerce has now issued Bulletin No. 593, which is a revision of one on the same subject published in April, 1925. It not only discusses the general features of the uniform through export bill of lading, but also summarizes the experiences of shippers and others interested in foreign trade in 29 cities in the country, relative to the practicability of and the principal factors to be considered in its use. A new section, dealing with the acceptability and use of this bill of lading in foreign countries, is also of considerable interest.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	Jan. 29, 1929
Metals—New York	
Copper electrolytic, cents per lb	16.775
Copper wire, cents per lb	18.875
Lead, cents per lb	6.65
Zinc, cents per lb	6.7
Tin, Straits, cents per lb	48.625
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.45
Central, Ill., screenings, Chicago, net tons	0.975
Kansas screenings, Kansas City, net tons	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$5.75
Weatherproof wire base, N.Y., cents per lb.	19.5
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.5
White lead in oil (100-lb. keg), N. Y., cents per lb	13.2
Turpentine (bbl. lots), N. Y., per gal	.6375

Weekly Business Conditions

Check payments during the week ended Jan. 26 were smaller than in the preceding week but showed a considerable gain over the similar period of 1928, according to the weekly statement of the Department of Commerce. Steel plants were more active during the week than in either the preceding week or the corresponding week of the previous year. The output of crude petroleum, lumber and bituminous coal, covering the latest reported week, was greater than during either the previous week or the similar period of last year.

The general index of wholesale prices showed a further gain as compared with both the previous week and the same period a year earlier. Prices for copper, iron and steel averaged higher than in either prior period. Loans and discounts of federal reserve member banks showed a further contraction from the preceding week but were larger than a year ago.

Weekly Business Indicators

(Weeks ended Saturday. Average 1923-25 = 100)

	1929				1928			
	Jan. 26	Jan. 19	Jan. 12	Jan. 5	Jan. 28	Jan. 21	Jan. 14	Jan. 7
Steel operations	110.5	109.2	110.5	110.5	101.0	97.0	93.0	88.0
Bituminous coal production	.....	120.4	*119.7	101.1	103.9	99.8	111.5	101.1
Lumber production	.....	102.3	96.4	74.5	103.2	101.4	97.3	72.7
Petroleum production (daily average)	.....	126.9	124.5	124.4	113.1	114.3	113.9	114.2
Bldg. contracts 37 states (daily average)	110.6	109.6	93.4	64.4	137.3	104.3	109.2	56.2
Price iron and steel, composite	87.6	87.5	87.5	87.6	85.6	85.3	85.1	84.7
Copper, electrolytic, price	.....	120.3	119.6	119.6	100.7	100.0	100.0	100.7
Interest rates, call money	145.5	169.7	154.5	200.0	90.9	97.0	100.0	115.1
Business failures	128.0	143.2	156.0	116.2	158.7	148.9	154.3	125.1
Interest rates, time money	177.1	177.1	174.3	182.9	100.0	102.9	97.1	97.1
Federal reserve ratio	89.4	86.5	85.5	79.9	96.8	93.8	91.2	86.7

* Revised.

Petroleum Industry to Hold Trade Practice Conference

A trade practice conference will be held in St. Louis, Feb. 11, under the auspices of the Federal Trade Commission, to discuss trade practices and formulate standards of business conduct for the petroleum and petroleum products industry. A general committee of the American Petroleum Institute, together with six regional committees covering the United States, is reported to have been working on a proposed code of practices and have held regional meetings. The American Petroleum Institute made application for the conference as sponsor for all branches of the petroleum industry, its board of directors and members representing collectively a preponderance of the total volume of petroleum products produced, refined and marketed in the United States. All members of the industry are welcome to attend, it is stated, whether or not they have received a formal invitation.

Among practices proposed for discussion are: Interference with existing contracts; substitution of one grade of product for another; lottery schemes; sales from trucks; regulation of loaning or leasing gasoline pumps, tanks, and equipment; and discontinuance of such practices as the building of driveways and other extraordinary free services, leasing filling stations at abnormally low rents, or subleasing of such stations for the purpose of price-cutting or rebating.

International Railway Tests Fuel Oil for Buses

If experiments now under way are successful, the International Railway, Buffalo, N. Y., will use fuel oil instead of gasoline in a number of its buses, according to Walter McCausland, director of public relations of the company. Mr. McCausland says that early tests have proved satisfactory, and that the oil would be entirely practicable for the 59 gas-electric buses of the fleet of 90 being operated.

Arrow Electric and Hart & Hegeman Merge

Effective at the close of business Dec. 31, 1928, by an agreement of consolidation, the Arrow Electric Company and the Hart & Hegeman Manufacturing Company, both of Hartford, Conn., have merged and become one corporation under the name of The Arrow-Hart & Hegeman Electric Company. This company will have two divisions: The Arrow Electric Division and the Hart & Hegeman Division.

Commercially these two divisions will operate independently through their own distributing channels. It is believed that this merger will result in new lines, more efficient manufacturing, better service to their customers and a better product.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGraw-Hill Publishing Company, Inc.
James H. McGraw, *Chairman of the Board*
Malcolm Muir, *President*
H. C. Parmelee, *Editorial Director*

CHARLES GORDON, *Editor*

Louis F. Stoll,
Publishing Director

Volume 73 New York, Saturday, February 9, 1929 *Number 6*

Faster Movement of All Traffic Wanted

FROM the welter of ideas concerning proper regulation of traffic a few major points are beginning to stand out prominently. Chief among them is the fundamental principle that all such regulation must be based on the needs of the community as a whole rather than on the wishes of a few individuals or groups. Progressive electric railways are taking an active part in the campaign for better regulation; not with the selfish idea of advancing their own interests, but rather with the hope of securing faster movement of all traffic.

In the past, too many people have been thinking of traffic regulation entirely from the standpoint of their own convenience. Many of those who ride habitually in their own automobiles, giving no thought to the needs of the majority, have contended that the public transportation vehicles, particularly the trolleys, should be taken off the streets. On the other hand, public transportation men sometimes have favored overly severe restriction of the use of the streets by private automobiles. Neither of these extreme views is practical. As long as some 16,000,000,000 passengers are being carried every years by the trolleys and buses of the local transportation systems in this country, it is evident that these vehicles cannot be taken off the streets. At the same time, there are more than 20,000,000 private automobiles in the United States, and they, too, must be allowed to make reasonable use of the streets.

Stringent regulations are justified when and where they contribute to the better movement of traffic, but when they are merely inconvenient without also being beneficial they have no justification. In other words, traffic regulations must be fitted to the needs of the situation, and they must be based on the greatest good for the greatest number. Both public and private transportation vehicles must continue to use the streets, and the problem is to devise regulations such that they both can move with reasonable comfort, safety and speed.

No Niggardly Policy Should Satisfy Detroit

RAPID transit for Detroit has been revived as a live issue. Re-agitation of the subject just at this time has nothing to do with the controversy over the jitneys, but the subject has reappeared at a time when Detroit is stirred to the depths transit-wise. Nearly everybody has a remedy for the transit ills that have come in the wake of the growth of the city to a metropolis of more than 1,000,000 inhabitants, but nobody seems to do anything about it. Plan after plan goes into the discard or is permitted to languish in desuetude. The so-called Waldon plan of the Rapid Transit Commission has now been revamped and there is talk of it being put before the voters in the spring. However much one may be inclined to differ with the report as to its details, the plan as advanced is comprehensive, but its advocates appear to be in for a period of opposition.

Detroit can hardly afford to subscribe to any plan of expedients. It has waited a long time now, but it would be better to wait still longer than for the city to accept any compromise on this issue. Whatever work of this kind is done should be carried out on the broadest possible lines, lines that take into account the remote rather than the immediate future. It is going to cost Detroit a lot of money to secure a system fitted to the city's real needs, but it will cost the city still more if it should perchance blunder into a program not sufficiently generous in its conception to take fully into account future requirements. Detroit's real need is not the need of a day. There should be no attempt to deal with the matter in any way that does not carry reasonable assurance that any start made at this time can be expanded to meet the needs of a future Detroit of 2,000,000 people.

New York Has Much to Learn from Other Cities

NOW that the attention of New York City's new Police Commissioner seems to be momentarily diverted from the suppression of crime and the smashing of speakeasies to the regulation of street traffic and the relief of traffic congestion, and a citizens' committee representative of the entire city has been organized to deal with this same baffling question, it would appear timely to call attention of the interested parties to the fact that New York City can learn much by condescending to look beyond the limits of its own borders. A number of local traffic problems to which the average New Yorker is inclined to refer as unique and unusual are neither the one nor the other. There is scarcely a situation in the city involving traffic congestion that is not experienced to a greater or less degree in other cities in the land. And in many of them the difficulty is in a fair way of finding a solution. In a recent address before the Metropolitan Section of the A.E.R.A., Col. A. B. Barber, manager Transportation and Communication Section, Chamber of Commerce of the United States, brought this point out quite clearly.

New York, for example, has a much lower proportion of automobiles to population, less than one-third the ratio, in fact, of Los Angeles, and yet in the California city the adoption of modern traffic control methods, which New York has been reluctant to consider, was followed almost at once by an increase in the vehicular movement of more than 30 per cent. In Chicago's Loop District, where conditions a few years ago were possibly worse than on Manhattan Island, a series of measures has been adopted which has speeded up traffic in this district by from 25 to 50 per cent, in addition to which there has been, since the regulations went into effect, an increase of 18 per cent in the use

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of private automobiles. A modern system of motor vehicle administration, in which respect New York has been strangely lacking, has resulted in a considerably lower accident record in communities where it is enforced. There is a crying need for standardization in the ordinary rules of the road, and in this respect, too, New York State and more particularly its greatest city, are far behind the times. "I sometimes hear it said," remarked Colonel Barber in his recent address, "that New York's traffic situation is so different and peculiar that experience elsewhere is of little value. Personally, however, I doubt the correctness of this assumption." At another point he said, "Certain cities have shown a curious tenacity or individualism in clinging to certain peculiar traffic rules or regulations in spite of the availability of well worked out and recognized standards which are being successfully applied elsewhere."

And so when New York sets out seriously to devise ways and means of relieving its traffic tangles—if that is what the bally-hoo on the subject really portends—its efforts will not be entirely of a pioneering nature. There is already a considerable accumulation of experience and precedent for guidance, as well as qualified authorities to whom to turn.

Putting the House in Order

IN ALL of the discussion that has taken place relative to modernization and rehabilitation as steps in the process of restoring the electric railway industry to its proper place, much has been said about the necessity for the establishment of credit as an all-important preliminary. Ability to borrow money for needed improvements is based primarily upon anticipated earning power, and it is quite in order to prepare statements setting forth the economies that can be effected and the increased earnings that can be expected as the result of the proposed schedule of betterments. The character, integrity and managerial and engineering skill of the organization back of the property are also determining elements, but of even greater importance is the necessity for presenting a properly balanced capital structure.

Too many properties with promising prospects and crying needs for improvement and modernization are handicapped at the very start by a load of interest-bearing obligations out of all proportion to any possible ability to pay. If to meet interest payments the credit of the company is so curtailed that funds to make necessary improvements cannot be obtained, the integrity of the property is threatened. Often it can be shown that the ultimate value of the security actually can be enhanced by making a temporary sacrifice. If every possible economy has been introduced and there still remains a staggering burden of interest to pay, the management has not performed its whole duty until an effort has been made to reduce this charge as well. Of course, this is unpleasant medicine to take and the security holder is likely to balk at the suggestion. But, after all, is it any more unreasonable to ask a security holder to accept a junior position for his investment in the hope that its value will thereby be made more secure than it is to urge a patron to pay a higher fare to the end that better service may be given?

It is only fair to admit that the process of voluntary readjustment of a capital account is a very intricate and difficult undertaking. But the task should not be avoided because it is difficult. The best legal talent obtainable has been enlisted to secure the modification of onerous franchise requirements and permit of the raising of fares. Financial direction of equal ability is available for the task of making the securities a sounder investment.

Higher Schedule Speeds Are Essential

SPEED, always a primary factor in the art of transportation, never has been of such importance as it is today. The private automobile bases its appeal not alone on comfort and luxury but on its ability to take its passengers from place to place in minimum time. That point is emphasized by G. M. Woods in his article on another page. In comparison with automobiles, street cars in many cities are too slow—a criticism that is not confined to any one route but to whole systems. That this situation should exist today is the more remarkable when it is considered that the electric vehicle has no inherent limitations in power or possible braking rate.

It will not do to dismiss the subject with the excuse that street cars go as fast as the traffic, or to suggest that if the city will relieve traffic congestion the cars can go faster. Mr. Woods points out six factors that influence city schedules. These are the number of stops per mile, the standing time, the average voltage, the rates of acceleration and braking, the gear ratio and the weight of the vehicle. Every one of these is within the control of the operating company. Some of them, of course, cannot be changed except at considerable expense, but the others can be modified with little cost.

Stopping places can be relocated to advantage in many cities. Where stops can be reduced in number without losing patronage the change should be made in the interest of better service. But it is in the operation of the cars themselves that the greatest opportunity exists for an increase in speed. Nearly all cars have sufficient motor power to permit of accelerating rates much higher than those in common use. As Mr. Woods points out, many cars are overpowered if the rates of acceleration are to remain in the vicinity of 1.25 m.p.h.p.s. Proper instruction should result in a marked increase of acceleration. The same is true of braking. If a braking system is designed to work up to the limit of sliding the wheels, for emergencies, there is no reason why it cannot be worked reasonably close to this rate right along. All that is essential is that the inspection should be rigid and the brakes kept in first-class order. By using these higher rates of acceleration and braking the car speed can be increased between 10 and 20 per cent. With proper attention to power saving, the total energy consumption with this method of operation is actually less than when the car is allowed to drag along.

The simplest and the most direct way to increase the speed is to reduce the standing time at stops. It costs nothing save alertness on the part of the operator. Granted that cars are equipped with adequate power and efficient brakes, riders, pedestrians and traffic officers are influenced by the attitude of the platform men. When trainmen are alert, passengers get on and off quickly, pedestrians keep out of the way, and automobile drivers respect the street car that is ready to move. With all of these factors given proper attention, schedules may be raised from say 9.5 m.p.h. to 13.5 m.p.h., or more than 40 per cent, as Mr. Woods points out. Thus a great deal can be done not only toward improving car service, but also toward removing the present complaint that the street car is slow in comparison to the other vehicles on the street.

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Taxation—Excessive and Unreasonable

SO OBVIOUSLY unreasonable and unfair are some of the taxes which have been heaped upon the electric railways that the temptation is strong to place chief emphasis on this phase of the matter when endeavoring to secure relief. But, after all, it is the excessive total burden imposed rather than the peculiar character of any individual item that hurts the railways. Taxes to pay for pavements which the railways do not use, taxes for the upkeep of public parks which are of no benefit to the local transportation company, and the like, though wrong in principle would be less objectionable if they were moderate in amount and if they were the only taxes imposed. The fact is, however, that they are only part of the burden. Franchise taxes, gross receipts taxes, licenses of one sort and another, real estate taxes and various others must be paid, too.

Unfortunately the peculiar character of the taxes which are imposed upon the railways works to their disadvantage in securing relief. Business men are extremely sensitive concerning forms of taxation to which they themselves are subject. The business man, however, does not have to pay a franchise tax nor a paving tax, nor a gross receipts tax. While he may admit the injustice of imposing such burdens upon the railway, he sees no danger of their being imposed upon himself and it is difficult to arouse his interest in measures for relief. On the other hand, if the tax burden of the railway was of the same nature as that of ordinary business, the business man would quickly see the unfairness of taxation ranging as high as 12 to 15 per cent of the gross revenue.

To secure the co-operation of the public in measures for relief, therefore, it is necessary that the extent of the total taxes on the industry be driven home in the public mind. The important fact is that electric railways carry a tax burden that is out of all proportion to those of other industries, and are seriously handicapped in their efforts to give satisfactory transportation service by this unjust and unreasonable situation.

Defilers of a Noble Profession

MANY proposals have been made to overcome the evils of the ambulance-chasing lawyer, but the most propitious appears to be the one intended to admit to the bar only the men best qualified to practice before it. This was among the suggestions made by William D. Guthrie, president of the New York Bar Association, following the recent hearings on ambulance chasing in New York, and referred to by Frank E. Carstarphen in his paper before the American Electric Railway Claims Association in Cleveland last fall. More recently this need has been reiterated by Prof. I. Morris Wormser in an address presented at the annual meeting of the New York Bar Association on. Jan. 19.

Men dishonor a profession who resort to practices lower than those of the level of the guttersnipe, and it is difficult to believe that practitioners before the bar who resort to such activities as have recently been disclosed in New York and not infrequently elsewhere would ever have survived an adequate scrutiny of character or education in professional ethics as a prerequisite of admission to the bar. Nor does this mean that corporation attorneys disposed to fight fire with fire deserve exculpation. But this is not the only branch in which practitioners offend. The devices of the ambulance chaser are employed in other fields of the law, notably the solicitation of criminal cases and of condemnation proceedings.

What seems to be needed most is a standard of admission to the bar that in addition to increased scholastic attainment shall contemplate a strict examination into the character, background and environment of applicants for admission to the law schools. In no other way can a guard be placed against the evils of an overcrowded and an uneducated bar, since a bar so constituted tends to be a weak bar, a cowardly bar, and too often a crooked bar. These are strong words, but the occasion demands them. Knowledge of legal ethics is not inborn. Laws schools should place more emphasis on the teaching of legal ethics than they now do. If this were not true, it would not have been said that the 74 men recommended for disciplinary proceedings in connection with the ambulance-chasing investigation in New York came to the bar lacking in the environment, the background and the education to make them fit members of this profession.

Of course, no profession deserves to be condemned because a few shysters practice it who have met the accepted qualifications of the day—and a shyster at heart may be successful in taking all the hurdles of the most rigid requirements—but it does seem that, after all, the best way of raising the standards of the profession is the way of Mr. Guthrie and of Professor Wormser, namely, "Fewer Lawyers and Better Ones."

Community-Mindedness Is Needed

NEED for thinking in terms of an entire community rather than of a limited district is seen in a recent report of the Regional Plan of New York and Its Environs. This body feels it is too obvious to need any argument that a growing community, which is constantly having to make physical provisions for its growth, can do better if it keeps its total needs constantly in view than if it shuffles along blindly without much regard for them. Yet so obstinate is the habit of building in terms of the municipal subdivisions, which are the political fractions which make up the whole, that too little heed is paid to those things which transgress and transcend municipal boundary lines. In nothing is this narrowness of viewpoint more damaging than with respect to transportation.

In obtaining co-operation between the various governmental units for regional planning, which is believed to be particularly necessary in such things as the planning of highways, transit facilities and public utilities, some form of control should be established. A good example of such control is the Port of New York Authority, which, in the face of great difficulties, has done much to unify the port and to increase its value to the entire country as well as to the states in which the port lies. There is every reason why such planning in any community should be done by a similar independent body which has the vision and the courage to investigate regional problems and to administer them wisely. As the Regional Plan sees it, while such boundaries of influence may result in a certain measure of overlapping of political jurisdiction, the history of commissions to which have been delegated similar special powers does not reveal that this overlapping has been seriously detrimental. In fact, it has been far less harmful than the confusion and lack of co-ordination which previously existed with many local political units.

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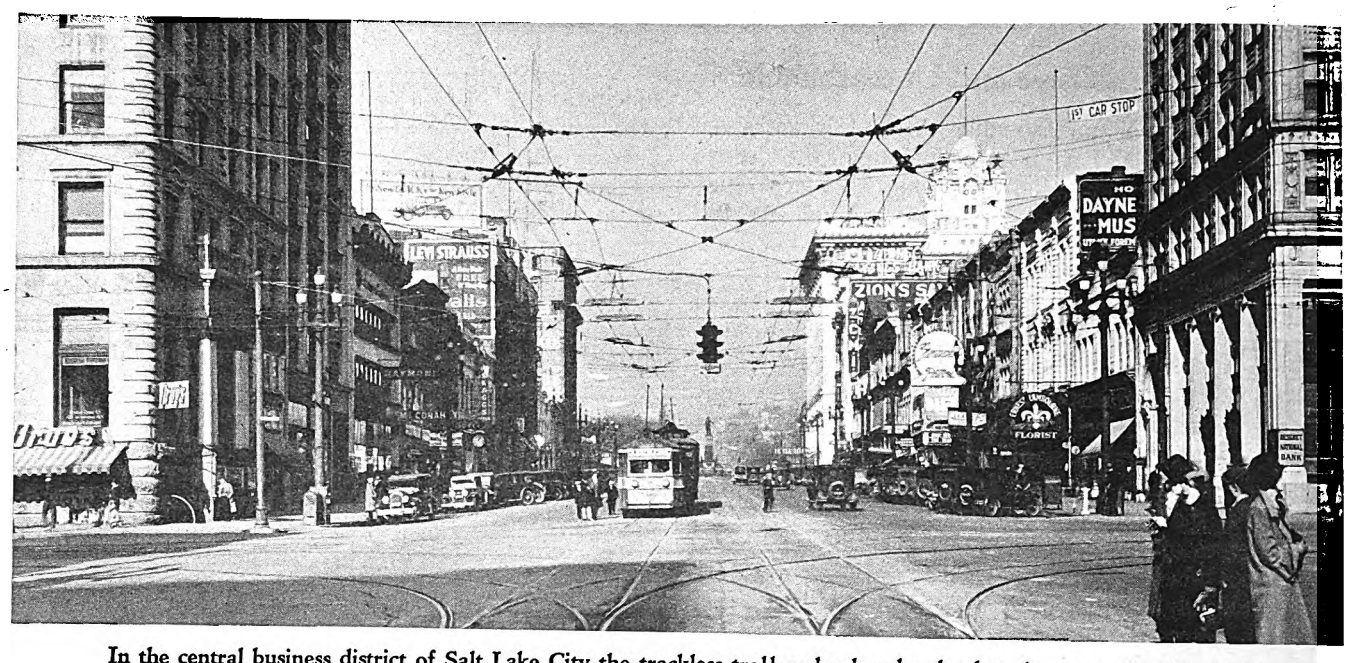

In the central business district of Salt Lake City the trackless trolleys load and unload at the street car safety zones

Trackless Trolleys Approved in Salt Lake City

By F. D. Heiges
Office Engineer Utah Light & Traction Company
Salt Lake City, Utah

Riding has increased 30 per cent on line where this equipment is used. The route is 4.43 miles long. Cars and trackless trolleys operate on same street downtown using special overhead construction

WHEN the Utah Light & Traction Company introduced ten new trackless trolleys in Salt Lake City on Sept. 9, 1928, many eyes were turned toward the "City of the Saints," for transportation men considered the installation to a certain extent as an experiment. True, trackless trolleys were not new; but the vehicles developed for this installation were radical departures from any previously placed in service in this country. However, the particular route for which they were intended seemed well adapted for this type of equipment.

The underlying reasons for the adoption of this type of vehicle for service in Salt Lake City were discussed by Edward A. West, general manager of the Utah Light & Traction Company, in an article appearing in the Sept. 8, 1928, issue of ELECTRIC RAILWAY JOURNAL. Although no extensive data are yet available, the general outlook is promising from an operating standpoint, and the public of Salt Lake City appears to be receiving the new service favorably. This is shown not only by comments received but also by the fact that riding on this line has increased approximately 30 per cent since the service was instituted. Its popularity can be illustrated also by the fact that the ten 43-passenger coaches, which have a greater total capacity than the street cars used on the line prior to the change, now are taxed to accommodate the people who want to ride. Loads of 70 and 80 people are being carried during rush hours. Moreover, the coaches have been in operation a sufficient length of time to make it practically certain that the increased patronage on this route is not due to the novelty of the vehicle, nor is it made up of people deserting adjacent lines.

These electric coaches have entirely replaced the street cars on one route. All of the rails along the route, with the exception of those in the central business district, have been removed and the pavement relaid. The route, as shown on the accompanying map, is north on Fourth East from 21st South to Seventh South, through a residential district; west on Seventh South to Main Street, through a semi-residential and business district; north on Main Street to Second North, including the heart of the

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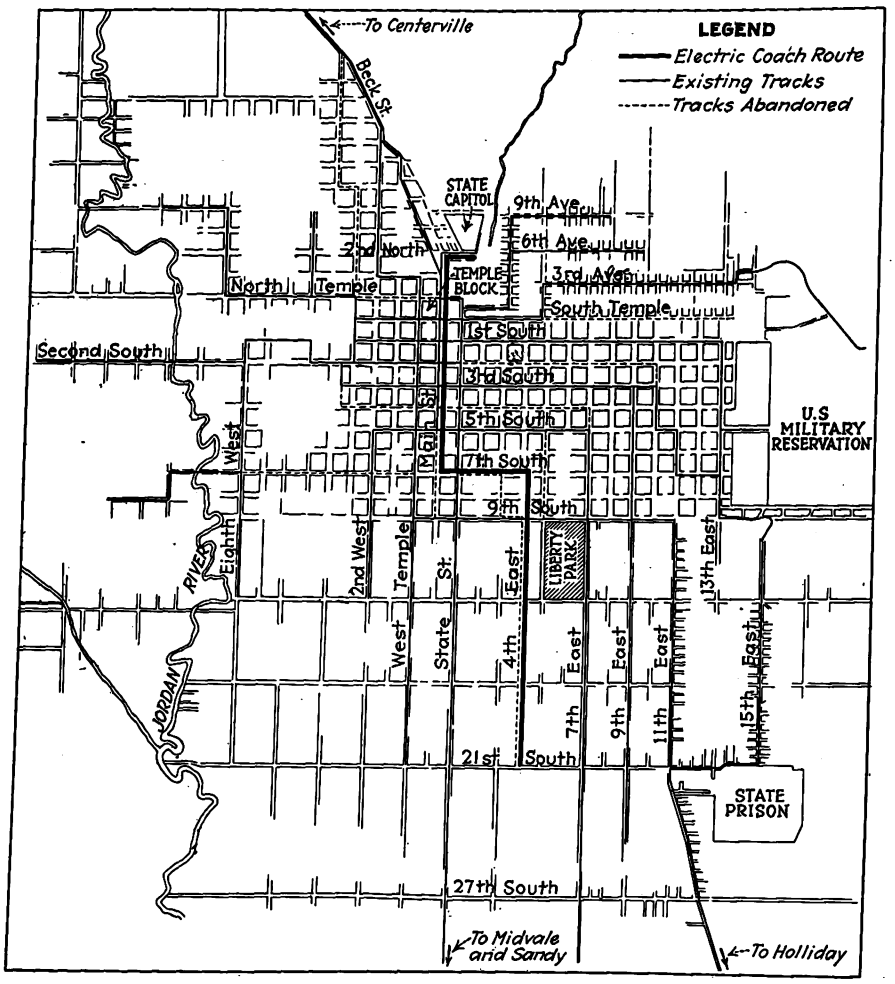
business district where there is both street car and coach operation; and east on Second North, through a residential section to the State Capitol, a total distance of 4.43 miles. The route is over paved and dirt streets, varying in width from 44 to 90 ft., and with grades as steep as 10 per cent. On that portion of the route which is not served by street cars coaches load and unload at the curb, while on that section of the line which has both kinds of service the coaches take on and discharge passengers at the street car safety zones.

As the coaches are a part of the city's transportation system the same operating rules, fares, transfer privileges, etc., that apply to street cars apply also to the coaches. The headway is ten minutes, except between 6:10 and 7:08 a.m., when it is fifteen minutes; between 7:08 and 8:40 a.m. and 4:30 and 6:40 p.m. when it is six minutes, and between 3:30 and 4:30 p.m., when it is eight minutes.



Map of Salt Lake City, showing the new electric coach route, the existing street railway lines and the railway lines abandoned since Jan. 1, 1925

Construction Features of the Vehicles

The type of coach used weighs approximately 16,000 lb. and was built by the Versare Corporation. It is of duralumin construction and is equipped for one-man operation. The length over all is only 31 ft. 7¼ in., so that coaches for special service can be parked at street curbs subject to dispatcher's orders. The height on inflated tires from the ground to the roof is 9 ft. and the over-all width is 8 ft.

The coach seats 43 passengers on nine cross-seats and five longitudinal seats, accommodating four to six passengers. This large seating capacity is made possible by utilizing the space required by the engine in gasoline buses. The horizontal seat cushions are 33 in. wide and 6½ in. deep. The cushioned seat backs are 30 in. high and are recessed in the back to provide adequate knee space for the passengers in the next seat to the rear. All cushions are upholstered in Spanish grain leather. Standees are provided with sanitary handstraps, eight straps being hung in the rear of the bus and six straps in the front.

There are ten windows on the right side, twelve on the left and two in the rear. All sash is metal and of the demountable type, with nickel finish. Curtains were eliminated by using amber glass in all of the upper stationary sash of the side windows, excepting the first sash on the right side which has a destination sign. The front windows are of $\frac{3}{16}$-in. plate glass. Extending over the front window is a route number and destination sign. The coaches carry rain and sun visors and bumpers on both front and rear. Ten ventilators, five on each side spaced equidistantly, insure a continuous supply of fresh air.

The front door is pneumatically operated while the center door is equipped with an automatic treadle plate. The front and center door openings are 36¼ in. and 28½ in. wide, respectively, and the doors are the four-leaf jack-knife type, folding outward. The step height for both doors from the ground to the first step and from the latter to the car floor is 13½ in. The step of the front door is provided with a safety light. Canvas-inserted pliable 1½-in. rubber makes a cushion and gives a compact fit where the door edges come together.

Composition flooring ⅜ in. thick is reinforced in the middle with 2-in. chicken wire mesh. To prevent bolt heads protruding it was laid after all flooring material was installed.

Fares are collected in a locked fare box conveniently located at the right of the operator's position. A mirror 11x15 in. gives the operator a full view of the coach interior, and a circular 6-in. diameter mirror is installed on the exterior at the left corner vestibule post to provide rear vision. The operator's curtain is of 10-oz. tight woven canvas and extends around the operator sufficiently to eliminate light reflection and glare.

Headlining is of aluminum with ivory finish. The roof is arched and is covered with 8-oz. canvas. The windshield wiper is of the pneumatic type. All light wiring terminates at snap and cutout switches located in switch boxes within easy reach of the operator. The coach is equipped with an air-operated horn. Interior lighting is provided by twelve 30-volt lamps mounted in short-circuiting sockets and arranged in two rows along the side of the roof of the car. The coach has two headlights and a rear stop light, which lights when the electric and foot air brakes are applied. Safety lights just below the roof at the rear corner posts also are provided.

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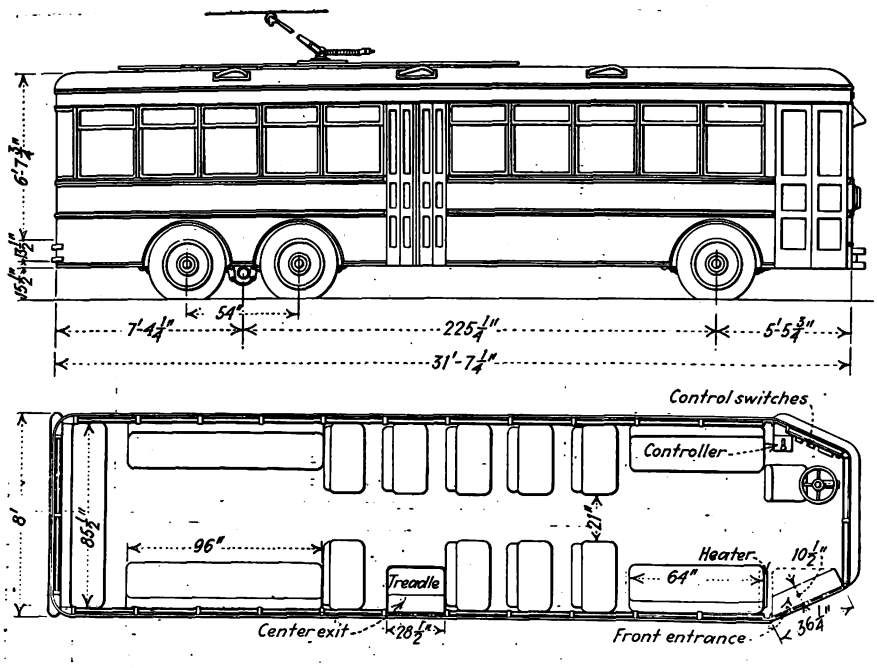

Side elevation and floor plan, showing the seating arrangement and the principal dimensions

Prior to assembly each coach frame was mounted on its axles and wheels and subjected to a total uniformly distributed floor load of 17,500 lb. The greatest temporary deflection was only ⅛ in. and there was no permanent set.

Distinctive Color Scheme Selected

The color combination for the exterior of the coaches was selected only after several schemes had been prepared and exhibited to groups of men and women, and a preference stated by the majority. While the buses could have been finished in the standard orange used on the street cars, it was thought that the electric coach was a transportation vehicle different from the street car and that this could best be brought out by painting it a distinctive and different color. In doing this, however, a combination had to be provided that would give maximum visibility and a harmonious, rich and pleasing effect, as well as satisfactory service from the standpoint of durability. The final choice was a combination of amber brown and canary yellow for the body and a terra cotta red for the roof.

The drive is through a double reduction gear from two Westinghouse 50-hp., 600-volt, direct-current motors weighing approximately 800 lb. each. They give an acceleration of 3 to 3½ m.p.h.p.s. and an average running speed of 30 m.p.h. Each motor is mounted in front of one of the two rear axles. The motors hang by swivel bearings from longitudinal members which are a part of the cross-frame. Braking is electrodynamic and accomplished by using the motors as series generators. Resistance is of the spiral rather than of the grid type, with one set installed under the car and another set placed inside the car to serve as a heater. Transfer from one set to the other is made by a double-throw switch of the spring knife-blade type.

Operation is controlled by two pedals, one of which regulates the electrical energy and the other the brake. After the speed has been reduced to 3 m.p.h. by the control pedal and the dynamic brakes, the stop is completed by exerting pressure on the other pedal, which applies the pneumatic brakes. There are three steps in the electric braking that permit speed control on down grades of approximately 14 or 6 m.p.h. and the final 1½ to 2 m.p.h. The controller pedal operates by steady foot pressure through six notches to full series position, at which point there is a positive stop latch. By slightly raising the foot and then pressing down the operation is carried through the remaining five notches into full parallel position. The foot electric and air brakes, together with the pneumatic hand brake, provide three separate and distinct methods of stopping, insuring positive control of the coach at all times.

All the electro-pneumatic switches, electro-magnetic contactors, motor cutout and sequence switches, sequence and overhead relays, control resistor, terminal board and change-over switch, are mounted in an outside dustproof cabinet under the rear seat. They are so arranged that any piece of apparatus can be inspected, repaired or renewed without disturbing the other apparatus. Wiring is standard cable, the light wiring being No. 14 seven-strand cable with all circuits continuous and not spliced. Ground connections are made on ground wire only, and care was taken to insure complete insulation from every part of the body or frame.

The body of the vehicle is mounted on six wheels, each of the four rear wheels having dual 36x6-in. pneumatic tires. The dual wheels are mounted on two separate axles, each being driven by one of the motors. Rear axles are 54 in. apart from center to center, and the wheelbase of the coach, measured from midway between the rear axles to the center of the front axle, is 225¼ in. The front wheels are equipped with 36x8-in. pneumatic tires. The road clearance is 9 in.

Overhead Construction Specially Designed

Brackets supporting the trolley retrievers are spaced 24 in. apart on the rear of the coach. The trolley poles are 19 ft. long, or 6 ft. 6 in. longer than poles now used on the Salt Lake City street cars giving the coach a possible operating radius of approximately 16 ft. on either side of the center line of the two trolley wires. Coaches operate normally not more than 9 ft. from the center line of the trolley span. The trolley wires are No. 00 round, spaced 24 in., strung at a height of 18 ft. 6 in. above the street and placed with the center line 13 ft. from the curb. Two pairs of wires are so installed throughout the route except on Main Street between Fifth South and Second North, over which section the positive street car trolley wire was left in place and a negative wire installed adjacent thereto to permit joint operation in the business district.

The overhead special work required was designed by Ohio Brass Company engineers, who, mounted on a gasoline-propelled truck, conducted tests with a trolley base, pole, wheel and retriever at proper height and clearance. Experiments were made with several types of frogs, owing to a condition at intersections on Main Street that required a special selective frog permitting right and left-hand and straight ahead street car operation but only straight ahead electric coach operation. A spring tongue frog with a flat spring proved satisfactory,

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SUMMARIZED SPECIFICATIONS OF UTAH LIGHT & TRACTION COMPANY TRACKLESS TROLLEYS

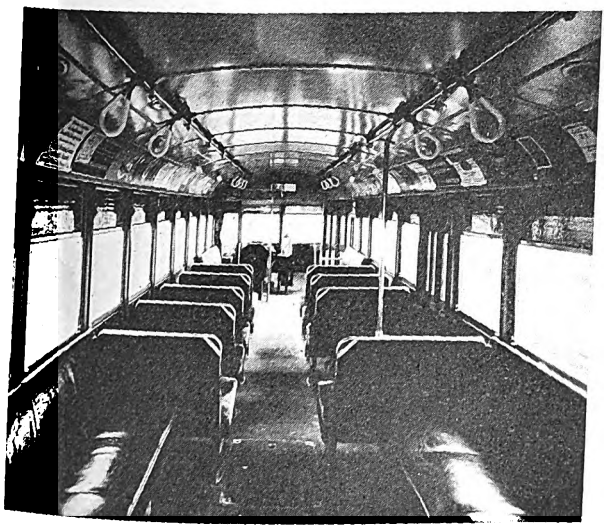
Weight and Principal Dimensions

Total weight, approximately	16,000 lb.
Length over all	31 ft. 7¼ in.
Width over all	8 ft. 0 in.
Height, trolley base to pavement	9 ft. 0 in.
Wheelbase	225½ in.
Headroom	77⅞ in.
Clearance	9 in.
Door opening, front	36½ in.
Door opening, center	28½ in.
Seat spacing	30 in.
Window post spacing	30 in
Seating capacity	43

Equipment Details

Air compressors	General Electric Type PC
Air governor	Westinghouse Traction Brake Co.
Axles	Eaton Spring & Axle Co.
Body	Duralumin, built by Versare Corp.
Brakes:	
Air	Westinghouse Traction Brake Co.
Dynamic	Westinghouse
Hand	Versare Corp.
Bumpers	C. G. Spring & Bumper Co
Car signal system	Faraday
Control	Westinghouse FL, with dynamic brakes
Destination signs	Hunter
Door mechanism	National Pneumatic Co.
Fare box	Cleveland
Floor covering	Flexolith
Gears	Eaton Spring & Axle Co.
Glass:	
Upper window sash	Amber, McMurty Manufacturing Co.
Other glass	Double strength, grade A
Hand straps	Electric Service Supplies Co., Steelkar
Headlights	Ohio Brass Co. Golden Ray
Heaters	Westinghouse type M
Motors	Westinghouse 1426 A6, 50 hp.
Odometer	Veeder hub type
Rear stop light	Oskel Equipment Co.
Resistance	Spiral
Roof	Agasote
Sash fixtures	Adams-Westlake
Seats	J. G. Brill bus type
Seating material	Spanish grain leather
Steering gear	Ross Gear & Tool Co.
Steps	National Pneumatic treadle
Step treads	Kass
Tires	Firestone pneumatic
Front	36 x 8 in.
Rear	36 x 6 in.
Trolley base, harp, pole and retriever	Ohio Brass Co.
Trolley wheel	Star Brass
Ventilators	Electric Service Supplies Co.
Warning signal	Westinghouse Traction Brake, pneuphonic
Wheels	Van
Windshield wiper	Trico

but owing to the short headway at such intersections the item of spring failures and renewals had to be considered. Another frog with solid runners extending from the frog points to the center and reduced to different thicknesses was tried. The principle of this frog is that the deeper groove of a street car trolley wheel taking a curve prevents the trolley wheel from being affected by the thin runner but causes it to follow the thick runner and take the curve while the electric coach trolley wheel, having a groove of lesser depth, follows the thin runner through.



With nine cross-seats, four longitudinal seats and a wide rear seat the coach can accommodate 43 seated passengers. Automatic doors at the front and center provide for easy entrance and exit

In the residential sections where the trackless trolleys have their own overhead wires they load at the curb

At the wye on this route, however, where the service is less frequent, the overhead employs the spring frog because it more satisfactorily takes care of wyeing cars. Spring frogs may be installed later at Fifth South and Main Street to provide an overhead crossover on the main line, so that coaches will have facilities for getting to the barns at night without the operator shifting the trolley poles by hand from the main-line overhead to that leading to the barn.

The intersection of Fifth South and Main Street affords the greatest variety of switching and crossing devices. At the 15-deg. crossings, for example, initial operation disclosed that the trolley wheel had a tendency to turn in the pan due to the wheel being set in a swivel harp. The first effort to eliminate this difficulty was the use of a small wheel affixed to the harp about 6 in. behind the trolley wheel, to follow and keep it in line. This proved unsatisfactory, however, because when dewirements occurred the overhead was damaged. The arrangement now in use seems to have corrected the trouble. It consists of a mechanical crossing equipped with a pivoting tongue. When the trolley wheel strikes it, this tongue is automatically swung into position. Three of these devices are being used at this intersection, in addition to a set of Cheatham overhead electric switches as well as other crossings and frogs of various angles.

Where street car positives are crossed by electric coach negatives at various angles, especially in the downtown district, it has proved advisable to insulate the positive rather than the negative to give the heavier north and south traffic every advantage to make speed, thereby eliminating the delays that would result from throwing off power for insulators. Coach operation originally began with the negative insulated, but it was found that the "throw-off" necessary at insulators slowed up the coaches. Since this change the coaches can accelerate up to full speed and the necessity for street car operators throwing off power while passing under insulators has been eliminated. On all acute angle crossings, therefore, fiber bridge insulators were used for insulating the street car positive which is passed through a Micarta tube 4 in. long, 1 in. in diameter and of ½ in. bore. This tube is suspended about 1 in. above and across the pan and fiber bridge insulators. The positive, after passing through

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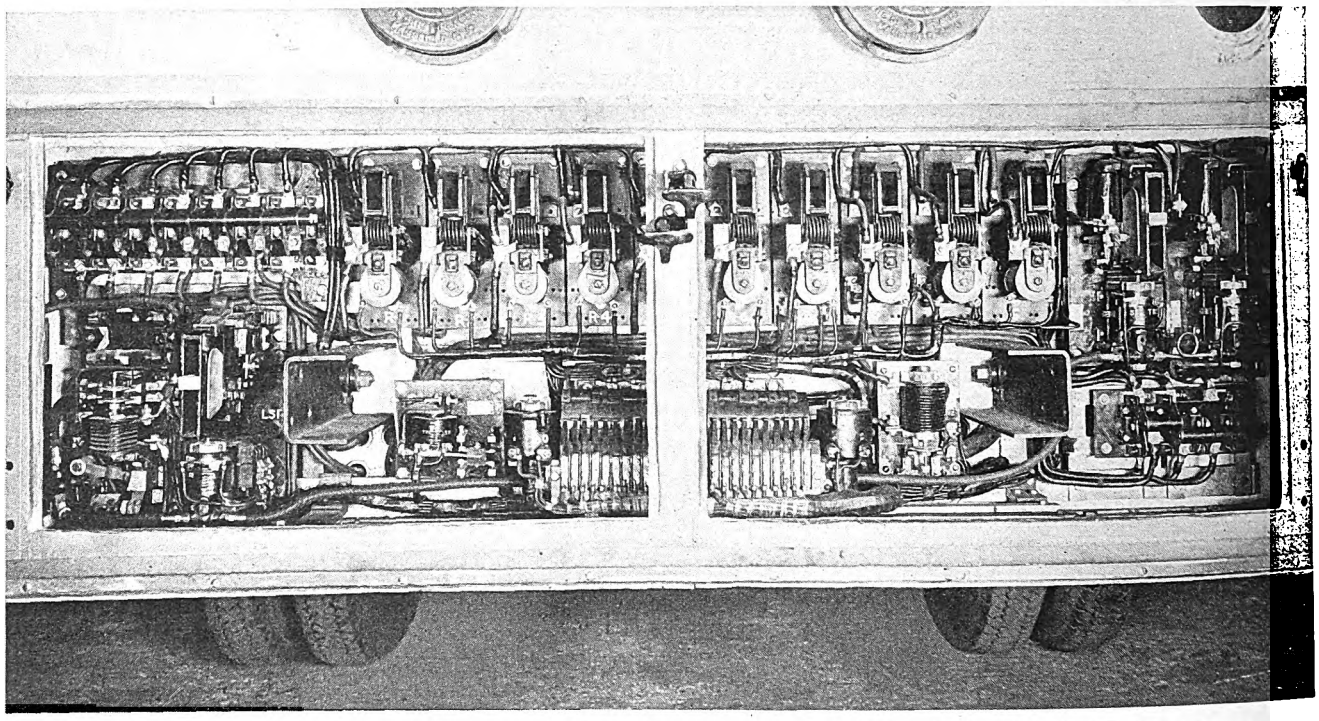
the Micarta tube, is held by set screws in the copper castings at the ends of the fiber bridges where the trolley cam tips fit into them. The use of the Micarta insulator eliminates, without sacrificing insulating qualities, a considerable weight that would be present if a hard wood block were used for bypassing the positive.

At right-angle crossings the standard 90-deg. insulated crossover, two live over one dead, as used in Rochester, was installed. This crossover has considerable weight, as it is approximately 5 ft. 8 in. long, and, with the other additional overhead material required, necessitated replacing the $\frac{5}{16}$-in. Siemens-Martin strand span wire with $\frac{7}{16}$-in. wire. Regular $10\frac{1}{2}$x$1\frac{1}{4}$-in. wood strain insulators were used. Prior to the inauguration of electric coach service all trolley and span wires were installed with as much of the special work as possible, so that on the night preceding the changeover to coach operation there would not be more work to do than was absolutely necessary.



This cabinet in the rear of the coach contains switches, contactors, relays and other electrical equipment. It is protected by a massive channel iron bumper

In withdrawing car service on this route the company was required to replace pavement in the abandoned right-of-way. The total right-of-way abandoned amounted to 12,157 ft. of which 3,077 ft. was 20.8 ft. wide; 5,822 ft. was 19.8 ft. wide, and 3,258 ft. was 9 ft. wide. Of the wide right-of-way 1,552 ft. was in pavement which was replaced by pouring concrete over ties that were left in place and crowning with asphalt. The remainder of this section, 1,525 ft., was in dirt and after all track materials were removed a bank run mixture of red gravel was filled in and rolled. All the 19.8-ft. section was in pavement, but on 2,996 ft. thereof the company was required to lay a base before applying the asphalt topping, because of the physical characteristics of the subsoil on Fourth East Street. This was done by laying the stone toothing blocks taken from alongside abandoned rails and pouring concrete about them. On the balance of this stretch, 2,826 ft., the ties in the concrete base were in good condition and were left in. The 9-ft. section of 3,258 ft. in dirt was resurfaced with gravel in the same manner as the dirt section described above.

Seven Major Improvements in Louisville in 1928

THE Louisville Railway, Louisville, Ky., made the following improvements in its service during 1928:

1. Inauguration of the Broadway express service, with co-ordinated street car and bus operation.
2. Continuation of the safety work which won the Brady award in February, 1928, and gave Louisville the distinction of having "the safest street car service in the United States."
3. Extension of feeder bus lines into sections not served by street cars.
4. A new crosstown bus line serving the extreme eastern, western and southern sections of the city.
5. New treadle-type cars put into operation on Sixth and Seventh Streets.
6. Purchase of fourteen modern buses for city use and two luxurious buses for special chartered service.
7. The speeding up of street car service into the heart of town, despite the increase of automotive traffic.

These facts were contained in a good-will advertisement run recently by the railway in the Louisville papers.

Employees Mutual Aid Association at Salt Lake City Does Well

WILLIAM M. SCOTT, superintendent of lines and service of the Salt Lake division of the Utah Power & Light Company, Salt Lake City, Utah, was elected president of the Traction and Power Mutual Aid Association of the Utah Power & Light Company, Utah Light & Traction Company and subsidiary companies' employees, at a recent meeting. Other officers are Lester Seare, vice-president; J. R. Mathews, secretary and treasurer; F. E. Hansen, Paul Ashworth, R. M. Parr, J. M. Lindsay, J. H. Sundstrom, J. W. Twelves, directors, and W. E. Zwick, auditor.

A surplus of $9,915 was divided among members in the form of a Christmas dividend. The organization has members in practically all parts of the territory served by the Utah Power & Light Company.

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Six Ways to Obtain

High Schedule Speeds

By G. M. Woods
General Engineer
Westinghouse Electric & Manufacturing Company

By reducing number of stops, length of standing time and car weight, by increasing average line voltage, acceleration and braking rates and by changing gear ratio, schedule speeds can be increased nearly 50 per cent. This article is based on an address recently made at a meeting of the Electric Railway Association of Equipment Men, Southern Properties

COMPETITION of the private automobile with its speed and comfort has forced the subject of higher street car speeds to first place among present-day operating problems. While there may be little difference in the total time required to travel between home and place of business by automobile and by street car, the latter, with its more frequent stops, seems slower. In spite of marked improvements in outside and inside appearance, better lighting and ventilation, more comfortable seats and other attractive features the patrons say, "The street car is too slow." Formerly in street car equipment design the major objective was the lowest energy consumption consistent with practical operating requirements. Today the major objectives are higher schedule speeds, quieter running and all-around performance that will enable the street car to meet competition successfully and attract more patronage.

Some operators recognize the need for more speed but dismiss it with the excuse that the street car is slow because of traffic congestion. They say that if the city will improve traffic conditions, street car speed will be satisfactory. Equipment departments of such properties say that the cars are well maintained, the motor capacity is sufficient, and the cars are geared normally for city service, and as a result there isn't much that they can do about it. They argue that the transportation department should reduce the number of stops. Fortunately, progressive equipment men recognize that the line between "can" and "can't" is flexible and by using every effort to improve conditions they can make a material contribution to higher schedule speeds.

Accompanying charts show the effect of changing each of the various factors affecting the schedule speed of the car. Let us consider a car weighing 40,000 lb. complete with passenger load under the following conditions:

Stops per mile	3-10
Average duration of stop, seconds (4-7)	10
Average voltage	500
Rate of acceleration, m.p.h.p.s	1.25
Rate of braking, m.p.h.p.s	1.25
Wheel diameter, in.	24
Gear ratio	9:1
Number of motors	4
Horsepower per motor	50
Train resistance, lb. per ton	20

For these conditions of operation this car is much over-motored with four 50-hp. motors. Actually, four 35-hp. motors would be ample for this service. However, it is intended that these 50-hp. motors will be

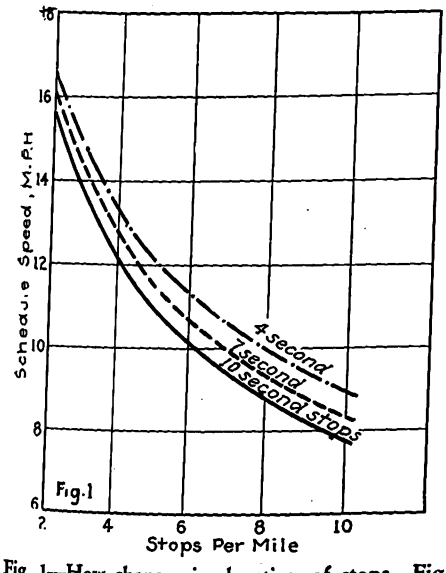

Fig. 1—How changes in duration of stops affect schedule speed

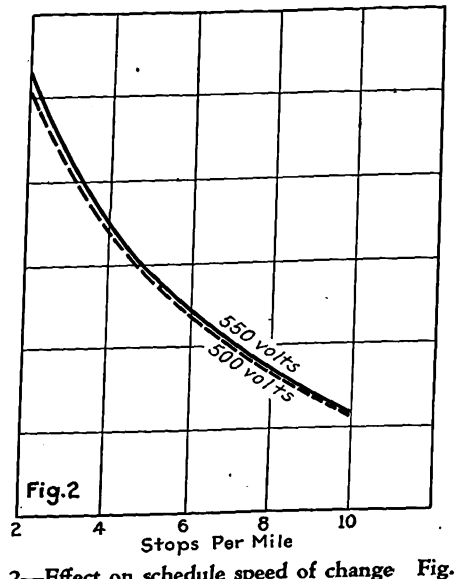

Fig. 2—Effect on schedule speed of change in average voltage from 500 to 550

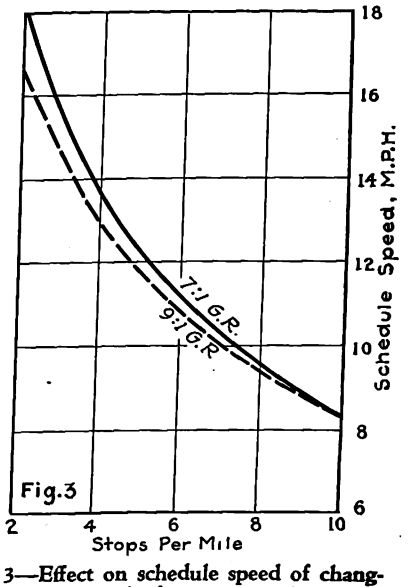

Fig. 3—Effect on schedule speed of changing gear ratio from 9 : 1 to 7 : 1

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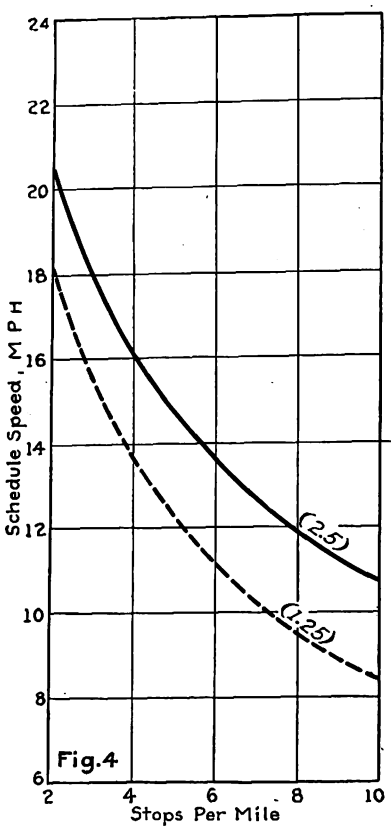

Fig. 4—How schedule speeds are affected by changes in acceleration and braking

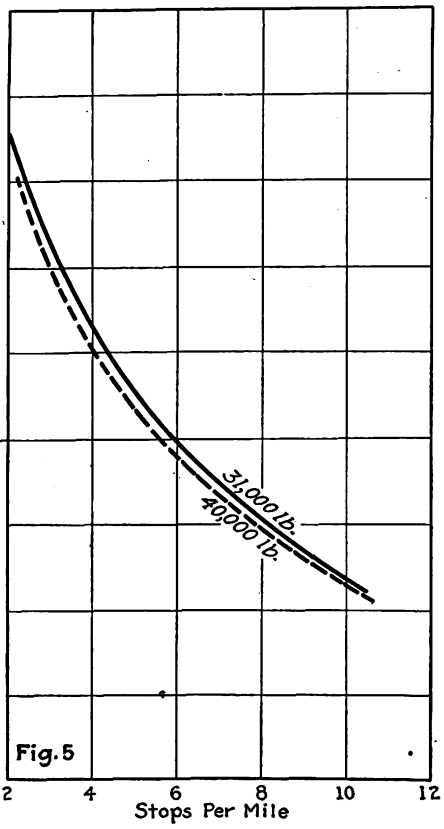

Fig. 5—Effect which weight of car has on schedule speed

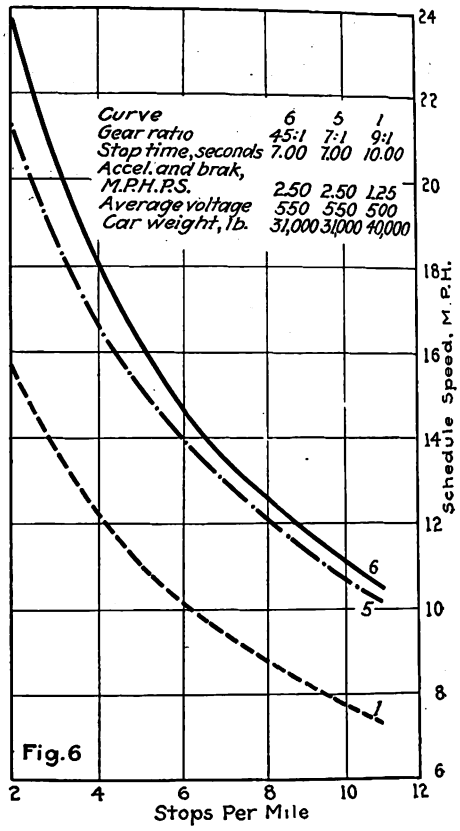

Fig. 6—Effect that change in gear ratio from 7 : 1 to 4.5 : 1 has on schedule speed

worked much harder before this process of increasing schedule speeds is completed and it seems undesirable to introduce into our discussion various sizes of motors with their varied characteristics.

If the number of stops can be reduced, the effect on schedule speeds is quite marked, as will be seen in Fig. 1. For instance, if the stops per mile are now eight and they can be reduced to six the schedule speed can be increased from 8.8 to 10.1 m.p.h. A reduction in the number of stops is one of the most effective means of increasing schedule speeds in frequent stop service and from the equipment man's standpoint one of the the most desirable. In the first place some one else has to take the action. Then the duty to be performed by the electrical equipment is lessened and the energy consumption is reduced. The only trouble is that if the passengers have to walk too far they may not ride at all. This is particularly true in smaller cities.

The next obvious place to increase schedule speeds is in the standstill time. The co-operation of the public and the transportation department is needed here also, but the equipment man has made valuable contributions to shortening stops and doubtless will make others in the future. One need only mention low-floor cars, wide unobstructed doors, door operating mechanism and seating arrangements to facilitate loading and unloading to indicate the large number of improvements made by the equipment department in this respect. Fig. 1 also indicates the changes in schedule speed which can be effected by decreased stopping time. If the round trip length of a line is 10 miles and there are eight stops per mile, the shortening of the average duration of stop from ten seconds to seven seconds saves four minutes on each round trip. Even if the service is not sufficiently frequent so that this reduction may result in saving one car, the effect on the passengers is well worth the effort.

The next place where the equipment man can be of service, although here also he must obtain the co-operation of another department, is in the matter of average voltage. Our original operating characteristic curve was on the basis of 500 volts, which was considered a rather good voltage not long ago. In fact many of the motors were old and any attempt to increase voltage was followed by an epidemic of motor flashing. Now there are few city systems which, except in the congested districts where other considerations may govern, cannot maintain an average voltage of 550. Fig. 2 shows the schedule speeds which can be maintained under the same conditions as Fig. 1, except that the voltage is 550 instead of 500. At seven stops per mile the schedule speed with seven-second stops is increased from 10 to 10.1 m.p.h.

The car on which this study is based has a free running speed on level track of 25.5 m.p.h. at 500 volts. If the gear ratio be changed from 9:1 to 7:1, the balancing speed becomes 32.8 m.p.h. at the new voltage of 550. Fig. 3 shows the performance of the car with the gear ratio of 7:1. The change in schedule speed at ten stops per mile is negligible. At seven stops per mile the change of gear ratio alone accounts for an increase in schedule speed from 10.1 m.p.h. to 10.3 m.p.h.

The next items which are subject to change are accelerating and braking rates. There is no reason why a car cannot be accelerated quickly and retarded slowly, or accelerated slowly and retarded quickly but it doesn't usually work out that way in service. A person becomes accustomed to a certain rate of speed change and in the case of the motorman tends to maintain that rate both accelerating and braking. Years of doing things in the same way have resulted in both rates being too low for present day traffic conditions. The electrical equipments have been improved to a point where much higher rates of acceleration than are generally used are permissible. Air brakes have been improved by shortening the time

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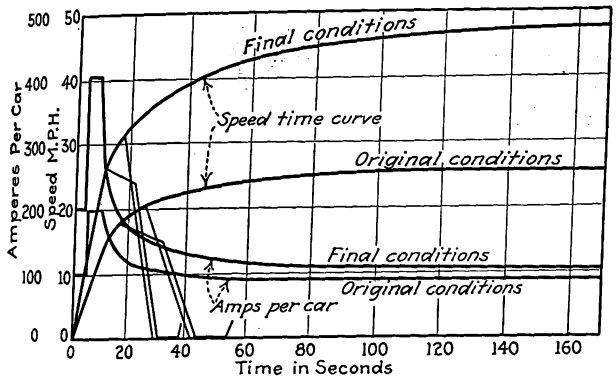

Fig. 7—Speed, current, time graphs for comparing operation under original and changed conditions

elapsing between the application of the air and the building up of pressure in the brake cylinder, and by the variable load feature. There has been a tendency to make tests of accelerating rates and then refer to the higher values observed as those maintained in service. Actually, the averages are much lower. With older equipments, especially two-motor equipments, and in a more leisurely day, 1.25 to 1.5 m.p.h.p.s. were acceptable accelerating rates. Equipment men are now using motors and control equipment capable of accelerating the car smoothly at rates of 3 and even 5 m.p.h.p.s.

There is no reason from the equipment standpoint why average rates of accelerating and braking of 2.5 m.p.h.p.s. cannot be maintained. Some may hold that these rates are a little too high while a few may think they are too low. However, several large railway systems are basing equipment purchases on the maintenance of these rates. The motormen will have to be trained more thoroughly in correct car operation and the public will have to learn that the street car is not going to hold back and let all other traffic crowd ahead of it. More difficult things have been accomplished. Fig. 4 shows the performance of the car with seven-second stops, 550 volts and accelerating and braking rates of 2.5 m.p.h.p.s. At seven stops per mile the schedule speed is now 12.7 m.p.h.

The change of voltage, gear ratio and accelerating rates with increased schedule speed have tended to increase motor heating (hence motor size) and energy consumption. The next change to be considered, weight reduction, compensates for this. Light-weight cars have been the aim of the industry for many years and here also the equipment man has produced good results. The history of weight reduction is so well known that it need not be repeated. Taking recent developments in light-weight cars, the loaded weight of 40,000 lb. can be reduced to 31,000. When the "New Birney" seating 39 and weighing 18,000 lb., is considered the weight chosen seems most conservative. These weight reductions have been brought about while the cars have been made quieter, more pleasing in appearance and more comfortable. Fig. 5 shows the schedule speeds for the 31,000-lb. car. At seven stops per mile the schedule speed is 13 m.p.h.

There is only one more step in this process of increasing schedule speeds and it is contemplated only for certain special conditions. The original car of this study was equipped with 50-hp. motors so that our equipment man could get the most out of it and not be handicapped by inadequate capacity. When he reduced the weight of the car to 31,000 lb. he again found himself with excess motor capacity. To use a part of it the gear ratio is changed to 4.5:1. Fig. 6 shows the schedule speeds on this basis.

EFFECT ON SPEED OF CHANGES IN OPERATING CONDITIONS

	Original conditions	9.5 m.p.h.
Shorter stops	10 to 7-second	10 m.p.h.
Increased voltage	500 to 550	10.1 m.p.h.
Changed gear ratio	9:1 to 7:1	10.3 m.p.h.
More rapid Acceleration and braking	1.25 to 2.5 m.p.h.p.s.	12.7 m.p.h.
Lighter weight	40,000 to 31,000 lb	13.0 m.p.h.
Changed gear ratio	7:1 to 4.5:1 gear ratio	13.5 m.p.h.

With this gear ratio the car has a balancing speed of 47.4 m.p.h. on level track at 550 volts. That is probably a little faster than most operators care to run a car on city streets. But where there are long grades with few stops the speed of this car is very useful. For example, in Pittsburgh there is a street railway tunnel almost 4,000 ft. long with a 5.8 per cent grade. The original car would run through this tunnel at a speed of 15 m.p.h. at 550 volts. The 31,000-lb. car with motors geared 4.5:1 would operate at a speed of 26.5 m.p.h. at 550 volts, which is a whole lot better. The speed time curves shown in Fig. 7 illustrate the difference between the first condition and the last.

Subways Are Costly, Engineer Advises St. Louis

R. F. KELKER, Jr., Chicago, traffic engineer for the Rapid Transportation Survey Commission at St. Louis, Mo., in an address before the Industrial Club of St. Louis on Jan. 24, advised against too extensive subway construction in whatever rapid transit scheme St. Louis may adopt.

He said that the cost of constructing subways, $9,000,000 a mile, based on New York City's experience, is so prohibitive as almost to restrict subways to streets where no other plan of rapid transit may be utilized. Extensive use of subways is impracticable in cities that do not have a dense population. He said:

> However, if the subway is adopted and proves to be what St. Louis needs, you will have no better sheet anchor for property values than they. But I want to warn you that they are very expensive luxuries. There is not a subway anywhere that pays its own way. New York pays the interest on its subway investments from its tax receipts. The fixed charges on a subway system for St. Louis would exceed the gross annual receipts of the surface street railway system.
>
> St. Louis needs a comprehensive rapid transit program that will give reasonable assurance of being adequate for a long period and yet be flexible enough to permit adjustments as conditions change without changing its basic principles.

Mr. Kelker said that the business of the electric railways is falling off, due to the competition of buses and private automobiles, while costs are mounting. The industry is unusual among public utilities because it is not permitted to assess a service charge on potential users, yet remains the backbone of mass transportation in urban centers, hauling 75 per cent of the population but using only 10 per cent of street space.

Mr. Kelker advocated the co-ordination of the street railway and bus lines to prevent duplication and the "milking" of the revenues of the railways. He added that "the bus has a definite place in the transportation scheme, but so long as you permit one service to take the cream you cripple your major transportation agency."

Stanley Clarke, executive vice-president of the St. Louis Public Service Company, told the meeting that the company would never seek more than a just return on a just investment.

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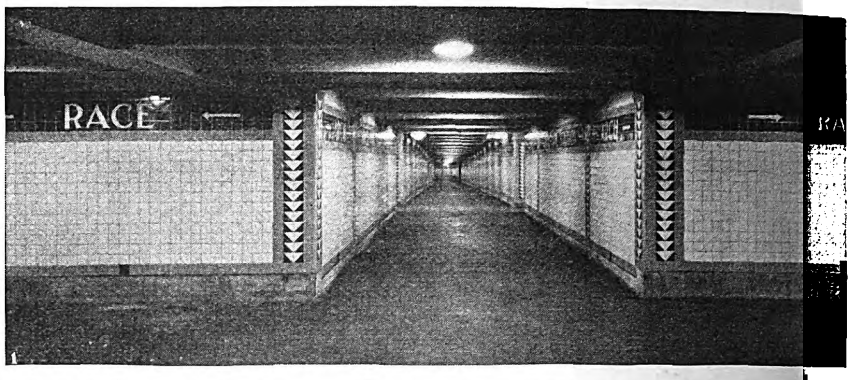
Typical Views in the Stations and Along the Route of the New Broad Street Subway, Philadelphia



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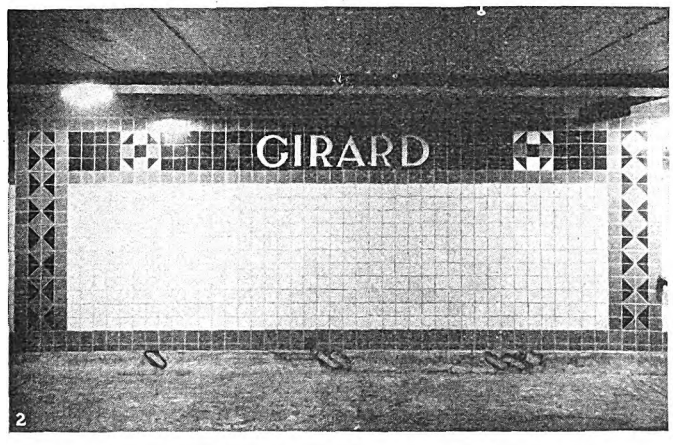

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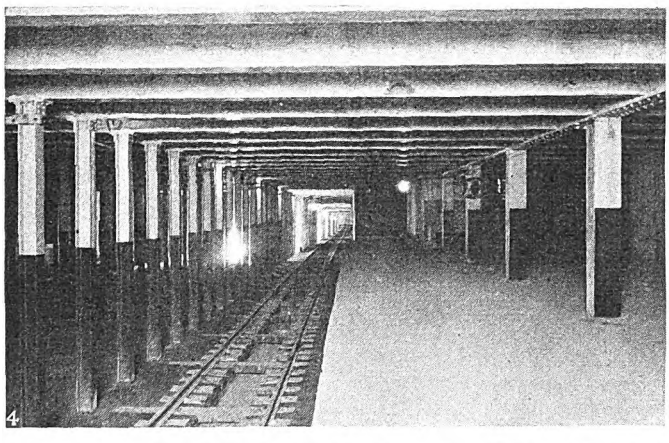

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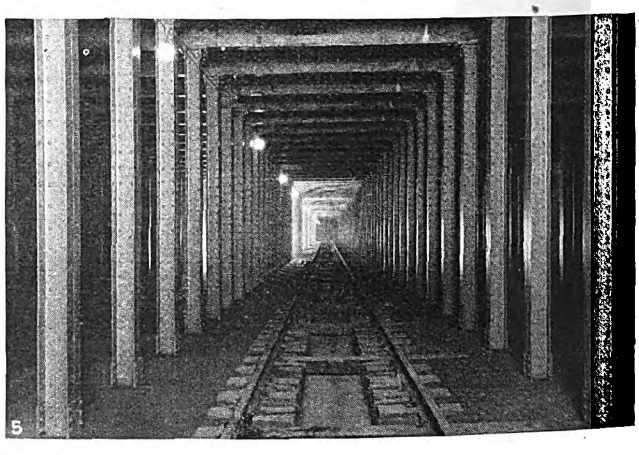

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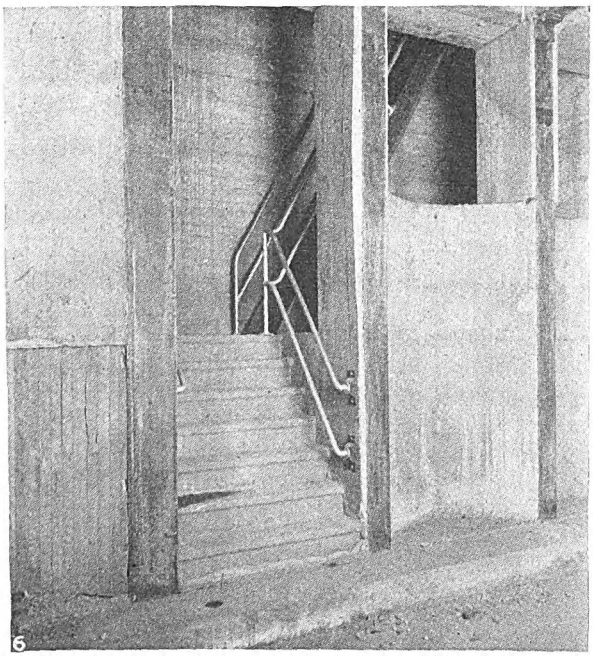

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1, 2 and 3. A feature of all the stations is the tile work, which is distinctive for each station. Four different color schemes were used, no two successive stations having the same color scheme or design. No. 1 shows the tile work in the pedestrian concourse between City Hall and the Race-Vine station. Nos. 2 and 3 show two other designs used.

4. Dauphin-Susquehanna station platform before it was tiled and equipped with station signs, lights, etc.

5. A portion of completed tangent track using wood blocks embedded in concrete. This type of construction has long life and a pleasing appearance.

6. Ventilation wells, equipped as emergency exits and marked by lighted exit signs, are located midway between the stations on each side of the track.

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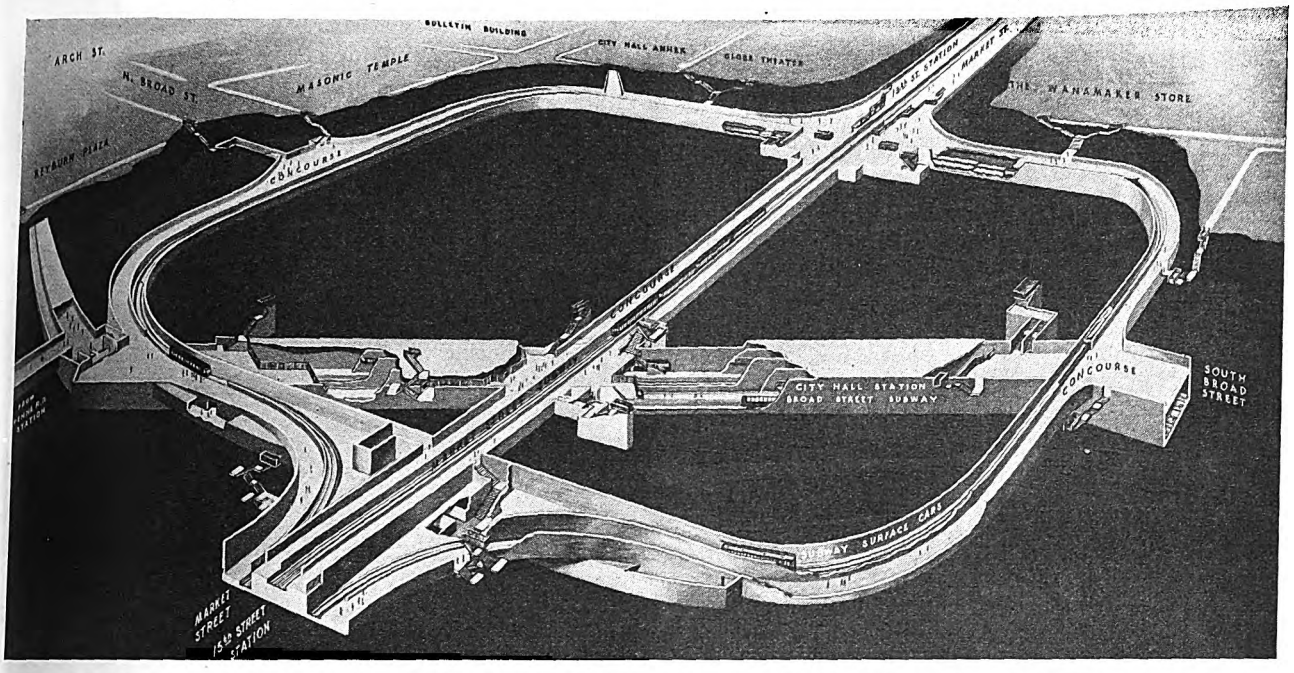

This phantom view shows how the city of Philadelphia plans eventually to take care of the great number of people who will in a few years be forced to make their way about the City Hall district. Passengers arriving at City Hall either by the Broad Street subway, the Market-Frankford subway-elevated, the subway street cars, Pennsylvania Railroad or Reading Railroad can walk underground to other systems or to buildings adjoining the City Hall Square, as well as to points several blocks in any direction from City Hall, when the project is completed. Some of these pedestrian concourses, including one from the Broad Street subway City Hall station to the Race-Vine station, have been completed. Although the Market-Frankford subway-elevated line now passes around City Hall, provision was made in constructing the new subway to have the Market line pass over it in a straight line. The entire City Hall improvement program, as shown by this illustration, is extremely comprehensive and is designed to serve the city for many years to come.

New Philadelphia Subway

a Vital Unit in City's Transportation System

This article, the first of a series, shows the relation of the Broad Street subway to the existing and future transit facilities of the city, gives operating details of this initial unit and describes the general construction of the subway proper. In future articles details will be given of the cars, the Fern Rock shops and terminal, the distribution equipment and the signal system.—EDITOR.

Designed as the backbone of a comprehensive rapid transit system which will meet the needs of the future as well as those of the present, it is an outstanding example of modern subway construction. Its operation is co-ordinated with that of other transit facilities in the territory served

PHILADELPHIA'S newest transportation facility, the Broad Street subway, built by the city at a cost of approximately $90,000,000, represents another forward step in meeting the demand for high-speed transit service in the Pennsylvania metropolis. The need for more rapid transit lines was recognized many years ago, and in 1913 legislation was passed to permit the city to construct transit facilities and to own, lease or operate such facilities, and adding to the city government a department of city transit. A comprehensive system of rapid transit lines was adopted shortly after, funds authorized and construction work started on the section of the Broad Street subway under City Hall, on sections of a delivery loop in Arch and Locust Streets, and on the Frankford elevated line. Federal restrictions arising from war conditions made necessary the cancellation of certain contracts and a limitation of the work under construction, but the work under City Hall was completed and the Frankford elevated and surface feeder line to Bustleton were finished in 1922. Changing conditions and viewpoints during this period led to a demand for revison of the routes then authorized, and after consideration by a Councilmanic transit commission, a material revision in the general scheme and program was authorized by the voters in the fall of 1923.

The main features of the program adopted in 1923 included the immediate building of a four-track subway in Broad Street from Spruce Street on the south to Olney Avenue, a two-track branch under Ridge Avenue

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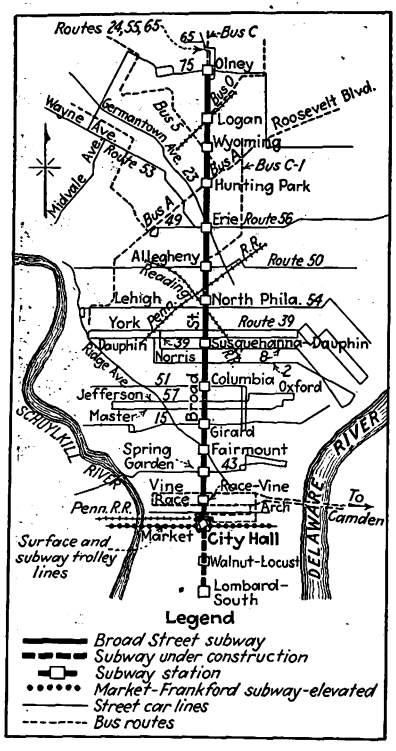


The new Broad Street subway system is co-ordinated with other transit lines of the Philadelphia Rapid Transit Company. The large number of street car lines and buses which connect with the system are shown on this map. The car and bus lines that are numbered or lettered have transfer arrangements with the subway.

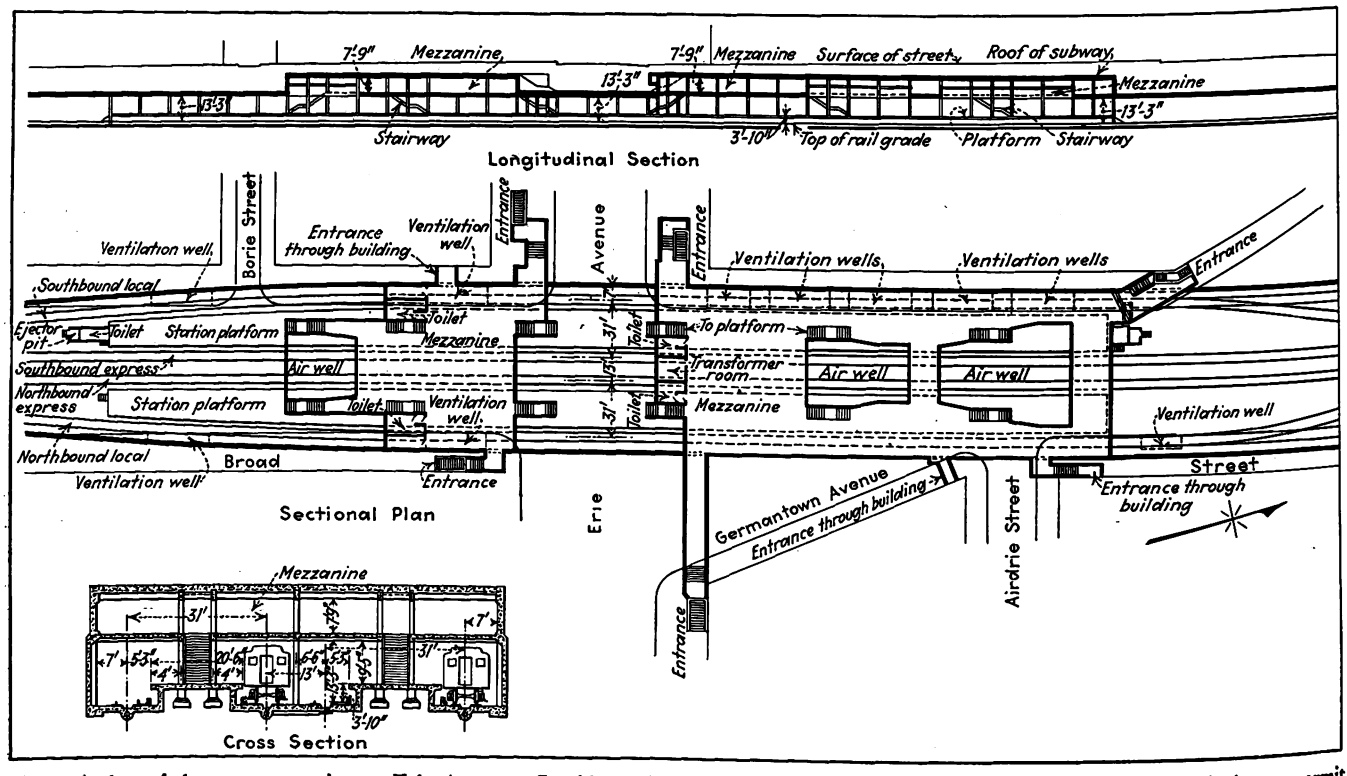
from the Broad Street line to Eighth Street and extending via Walnut Street to Darby through West Philadelphia, the construction of a street car subway on Chestnut Street, later changed to Locust Street, the eventual extension of the Broad Street line to League Island on the south and a subway-elevated to extend into the northwest section of Philadelphia and also over the Delaware River to Camden.

The rapid transit lines are not intended to supplant the street car, nor any other transportation agency now operating. On the contrary, they are planned to fit in as a part of one city-wide transportation system, with the one purpose of serving the entire population in the most satisfactory manner. The policy of the city to have the lines privately operated was formulated primarily to enable complete co-ordination of all the other facilities.

Work was started on the preparation of contract plans for subway construction in January, 1924, it having been determined to concentrate efforts on the portion of the subway in Broad Street. This work involved not only the design and construction of the four-track tube itself, but also the much more complex problem of designing, specifying and providing all of the equipment required to make the subway complete.

On Aug. 25, 1924, ground was broken in Broad Street under the first contract. In March, 1927, the 6½ miles of four-track subway structure from City Hall to the yard, and the yard grading and shop foundations, had been completed, surface restoration work was far advanced and track laying operations were well under way. The next few months saw the completion of the power system, the finishing and equipping of the subway stations, the completion and testing of cars, the provision of shop tools and equipment and the trying out and tuning up of the system as a whole. On April 20, 1928, the first test train was operated in the subway, and on Sept. 1, 1928, the subway was opened to the public between City Hall and Olney Avenue. This made four years from breaking ground to public operation. The cost of this section was approximately $90,000,000, the funds being obtained by the sale of city bonds. The added expense for completing the extension to South Street will bring the total cost to more than $100,000,000.

As the first section of the subway neared completion, plans were made for operating it. Two utilities experts were consulted, J. Rowland Bibbins and Charles C. McChord. Both the McChord and the Bibbins plans contemplated operation by the P.R.T. and the payment to the city of all surplus earnings after the operating expenses were met. Mr. Bibbins proposed that the accounts of the Broad Street subway be kept separate from those of the rest of the transit system, that the P.R.T. be paid an operating fee based on a percentage of the subway's net earnings, and that all surplus revenue over the expense of



General plan of the express station at Erie Avenue. In this station, as in most of the others, mezzanines extend lengthwise to permit underground passage from any point of the subway platform to any of the exits. Another feature is the large number of air wells and smaller ventilating ducts

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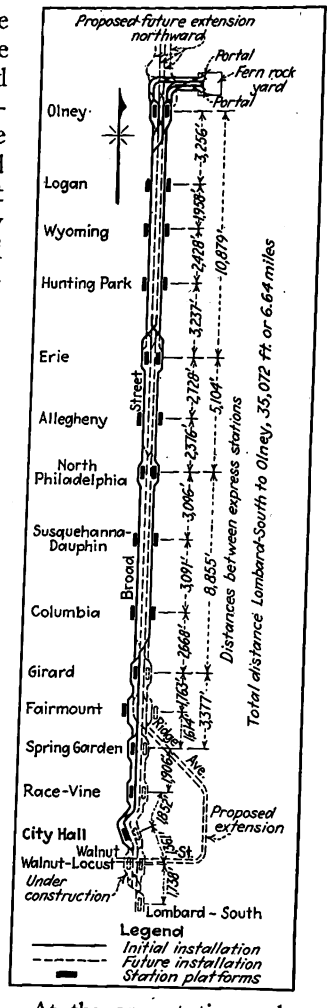
operation and the fee be paid to the city toward meeting the carrying charges on the construction bonds. The McChord report suggested a merging of the accounts of the rapid transit company and the city system, the creation of a joint "buffer" fund and the maintenance of the present dividend rate to P.R.T. shareholders. Both plans called for a board of control over the expenditures and financial operations of the company.

Neither of these plans was thought satisfactory, so the Public Service Commission of Pennsylvania was asked to make a study to enable it to declare the conditions upon which it would approve a lease agreement between the city and the company. Since the study was not completed prior to the time when the subway was ready for operation, a temporary agreement was entered into by the two parties whereby the P.R.T. was to operate the subway for a temporary period of three months, at a rental of $200,000 per month, an amount representing about half of the carrying charges. The agreement provided for the P.R.T.'s receipt of all gross income and required that the company maintain the property in first-class condition. The terms were such that either party could cancel the agreement with a 24-hour notice after the trial period. However, if not cancelled, it was to continue day by day until a permanent lease was formed. At the end of the period on Nov. 30 the P.R.T. notified the city of its desire to cancel the temporary agreement, claiming the operation had caused a loss of $10,000 per day. Negotiations are now under way between the city and the company to formulate an operating lease satisfactory to both parties and retroactive to Nov. 30.

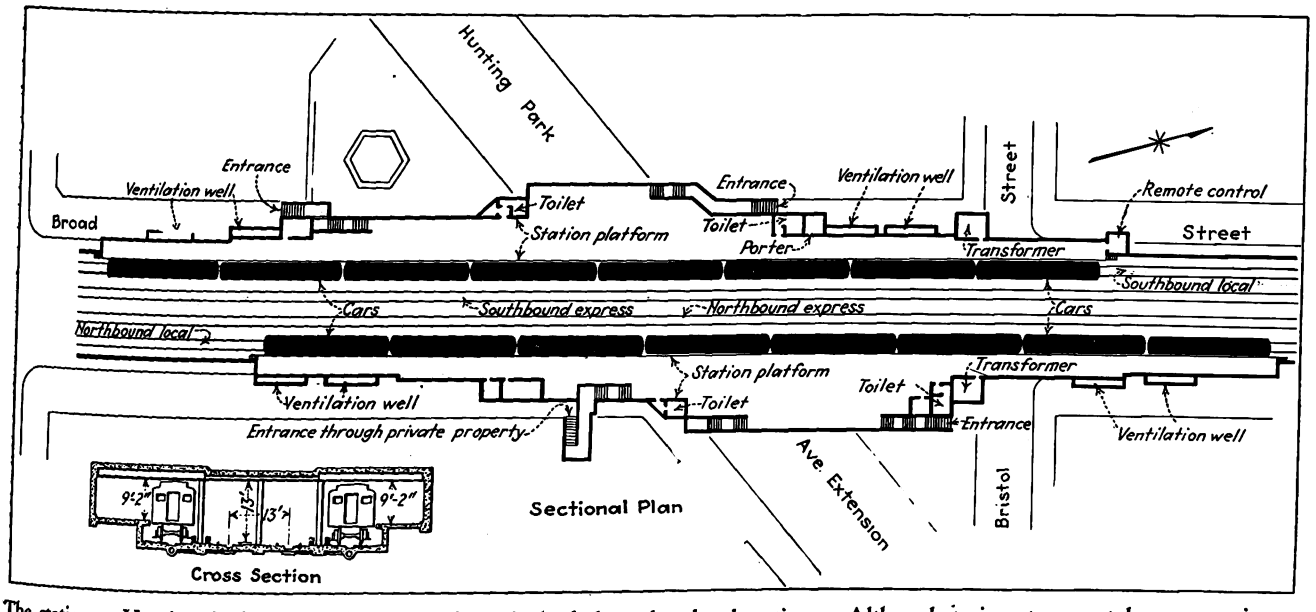
Free Transfers for Several Street Car Lines

The fare being charged on the subway is 7½ cents or two tokens for 15 cents. This is the same rate in effect on the surface lines and the Market-Frankford subway-elevated. This fare, however, permits the passenger to obtain a free transfer to any one of a number of intersecting street car lines or a transfer to any of four bus lines for a payment of 3 cents. There are sixteen car lines on which the transfers can be used, all above Spring Garden Street. Passengers boarding these car lines in the morning obtain transfers to the subway upon payment of the regular fare. There is no transfer or exchange privilege between the Broad Street subway and the Market Street subway because the resultant congestion and confusion, with the Market Street line already heavily loaded at rush hours, would create an unsatisfactory condition.

The normal weekday service provides a headway of five minutes during the middle of the day and three and one half minutes during peak hours, morning and evening. During the middle of the day three-car trains are operated, and during peak hours, six-car trains. For the present operation, when City Hall station is used to a somewhat greater extent than it will be after the subway has been extended to South Street, one track has been planked over to supply additional platform space, and operation into the station is now by single track. The running time at present between Olney Avenue and City Hall is 21 minutes, the time of run between the stations varying between one and two minutes. When express service is started, the running time between City Hall and Olney Avenue will be reduced to seventeen minutes. During the early morning hours between 1:30



At the present time only two tracks are being operated the full length of the system, as indicated on the diagram. However, seven of the fourteen stations of the sections being operated are express stations and as soon as traffic warrants the other tracks will be laid permitting express service



The station at Hunting Park Avenue Extension is typical of the other local stations. Although trains at present have a maximum length of six cars it is planned to lengthen them as the traffic increases to eight cars, the number which the platforms were designed to accommodate

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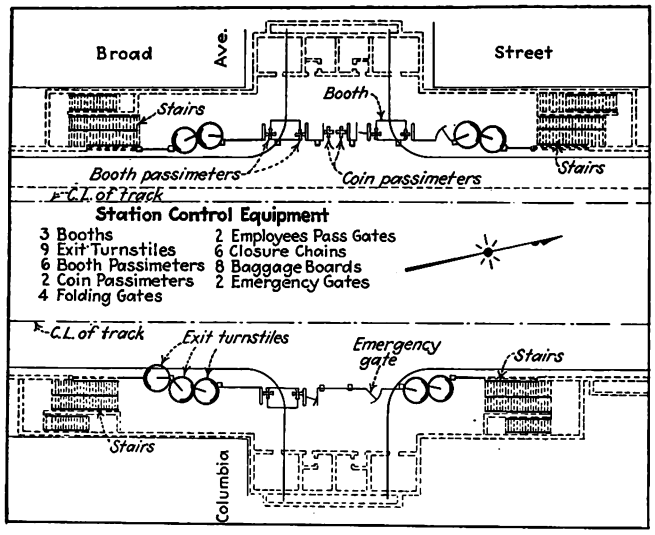


Plan of the Columbia Avenue local station, showing the arrangement of the passenger control equipment. Both coin and booth passimeters are used and numerous exit turnstiles and gates are provided

and 5, trains run every eighteen minutes. The scheduled running times between the stations, including stops, are given in an accompanying table.

On Sept. 1, 1928, when the subway was opened to the public, approximately 20,000 people were carried as guests of the city and the P.R.T. On the next day, a Sunday, 62,507 passengers were carried and on the following Saturday 101,110 passengers used the subway. The number reported for the entire first week totaled 564,460. During the first month the system carried 2,519,359 passengers. To carry this number it operated 361,510 car-miles and 27,569 car-hours.

Fourteen Stations on Present System

On the portion of the system now being operated, totalling 6.1 miles in length, there are fourteen stations, seven of which are to be express stops. Only two tracks have been laid for initial operation, but provision has been made for laying two additional tracks when the traffic warrants express service. The tubes with the present track layout contain a total of 20.86 miles of single track, composed of 15.01 miles of revenue track and 5.85 miles of non-revenue track located in the terminal yard and shop. The extension south of City Hall will have two stations and will make the total length of the line approximately 6.64 miles.

The system as now being operated is shown in an accompanying map. As can readily be seen, the two-track arrangement does not allow the use of the northbound platforms of the five stations at the south end of the line. However, with the exception of the Fairmount station, passengers can use the southbound platforms for boarding northbound trains. This was not possible at Fairmount because it is not an express station.

Platforms Accommodate Eight-Car Trains

The average spacing of the stations outside of the delivery district is about ½ mile. The exact distances between the stops, as well as the distances between the future express stops, are shown on one of the accompanying maps. The Walnut, City Hall, Race-Vine, and Spring Garden stations in the delivery district and the Girard, North Philadelphia, Erie and Olney stations to the north, are island-platform or express stations, serving all four tracks. The intervening stations are side-platform or local stations, serving the two outer tracks. Every platform is 550 ft. long and will accommodate an eight-car train. The island platforms, except at City Hall station, have clear widths in the middle section of about 20½ ft., tapering off to between 13½ and 18 ft. near the ends of the platforms. Numerous stairways, averaging about 5 ft. in width, have been provided to facilitate movements between the station platforms and the mezzanines and particularly to reduce movements along the

Interesting Facts and Figures of the Broad Street Subway

Cost, approximately	$90,000,000
Length of line	6.1 miles
Single track, now constructed	20.86 miles
Number of stations	14
Scheduled running time, Olney Avenue to City Hall	21 minutes
Free transfers to street car lines	16
Three-cent exchanges to bus routes	4
Number of cars	150
Area of yards and shops	34 acres
Construction started	Aug. 25, 1924
Opened to the public	Sept. 1, 1928
Subway excavation	3,131,000 cu.yds.
Concrete poured	373,000 cu.yds.
Structural steel used	47,400 tons

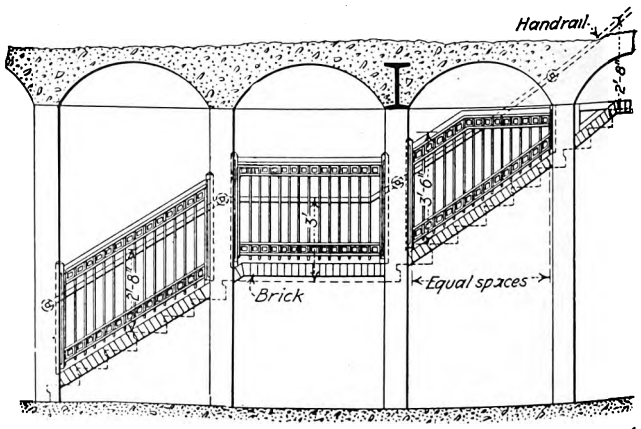
Data of the Subway When Completed to South Street

Cost, approximately	$100,000,000
Length of line	6.64 miles
Number of stations	16

Schedule of Running Times and Other Station Data

Station	Entrances at	Color	Distance Between Stations in Feet	Running Time Between Stations in Min.
*Olney	Olney Ave.	Blue, two tones	3,256	2½
Logan	Lindley Ave., Ruscomb St.	Red and tan	1,958	1½
Wyoming	Wyoming Ave.	Blue, two tones	2,428	1½
Hunting Park	Roosevelt Blvd., Bristol St.	Brown and tan	3,237	2
*Erie	Erie Ave.	Green, two tones	2,728	1½
Allegheny	Allegheny Ave.	Red and tan	2,376	1½
*North Philadelphia	Lehigh Ave., Somerset St.	Blue, two tones	3,096	1½
Dauphin-Susquehanna	Dauphin St., Susquehanna Ave.	Brown and tan	3,091	1½
Columbia	Columbia Ave.	Green, two tones	2,668	1½
*Girard	Girard Ave.	Red and tan	1,763	2
Fairmount	Fairmount Ave., Ridge Ave.	Blue, two tones	1,614	
*Spring Garden	Spring Garden St.	Brown and tan	1,906	1½
*Race-Vine	Race St., Vine St.	Green, two tones	1,852	2
*City Hall	City Hall Square	Red and tan		

* Express stops.



This is not a stairway in a bank building; but the stairway leading from a Broad Street subway platform to a mezzanine level. It illustrates the attractive type of grille work designed for all of the stations

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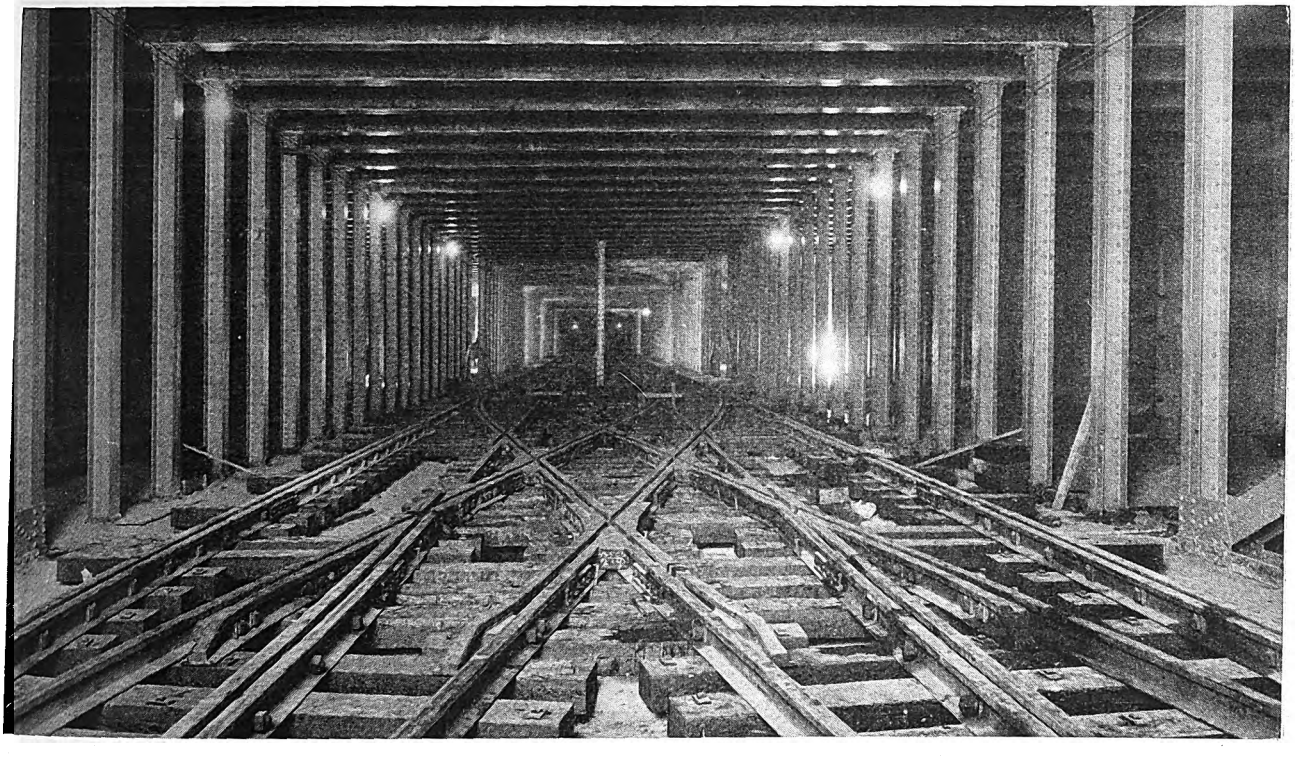
length of the platforms. Liberal mezzanine areas have been provided to allow flexibility of control and freedom in the movement of traffic. At important crosstown streets where the profile is high, bringing the roof of the mezzanine rather close to the surface, the mezzanines are separated into two parts, to allow room for future crossings of utility structures in the intersecting streets. It is possible in most of the express stations to travel from any point on either platform to any exit without going above the surface of the street, because of the arrangement of the mezzanines.

The width of the side platforms varies from a minimum of 10 ft. for short sections near the ends of the platform, to from 30 ft. to 40 ft. in the middle sections. The clear height from the floor to the bottom of roof beams is in general about 8 ft. for mezzanines, passageways and stair entrances, and 9 ft. over the platform designs are shown, and in a table the color scheme for each station is given. The appearance of the stations is enhanced also by the extensive grille work along the stairways and mezzanines, the bricks laid at the edges of the stairways, and the change booths and other station fittings, all designed to give a refined atmosphere to the station interiors.

The stations are well lighted by high intensity lamps mounted in steel enameled reflectors of the standard type or special design as required. The system differs from the usual plan of using five lights in series across the railway voltage of 500 or 600 volts because, except for the emergency lights, a 125-volt alternating current supply is used for this purpose. Particular attention was given to lighting around stairways. Each station has one or two transformer rooms into which the lighting cables and d.c. emergency cable enter. The equipment is in duplicate so



One of the more complicated arrangements of track within the system. Under all special work the channel type of track construction is used

areas. Street entrance stairs vary in width and number per station, but in general are not less than 6 ft. wide, are located in the sidewalk against the house line, and are uncovered. In a number of instances, through co-operation of building owners, entrances have been secured through private property, thereby reducing encroachment on sidewalk areas and any resulting congestion of traffic.

Vari-Colored Tile Used in the Stations

To give a bright and cheerful appearance to the subway stations, the side walls of entrance stair wells, passageways, mezzanines and side-platform stations were finished in white tile, with colored tile borders and station name panels. Four different color schemes were used in the stations, no two successive stations having the same color scheme or design. This feature, intended to help the passenger locate his station, gives a very striking appearance to all of the stations of the system. The four color schemes are red and tan, brown and tan, two tones of blue, and two tones of green. On page 240, three tile

that in case of trouble on a transformer or cable feeding the lighting load on the station, it will be automatically transferred to the other transformer. The tunnel lighting halfway to the next station also is supplied from the station transformer. The d.c. emergency lights are arranged five in series across the 630-volt line. The direct current is supplied through a special cable which loops into each substation, so that in case of failure of any one substation current for the emergency lights can be supplied from either one of the other stations. The emergency lights form part of the general lighting system and are burning at all times. They are placed at all stairways and stations along the platforms and mezzanine floors in sufficient number to permit passengers to find their way through the station in case of failure of the general lighting system.

An important part of the station equipment is that provided for the entrance and exit of passengers. Perey passimeters of the coin and booth control type are used throughout the system. In some stations only the booth type are used, but in the larger ones several coin passi-

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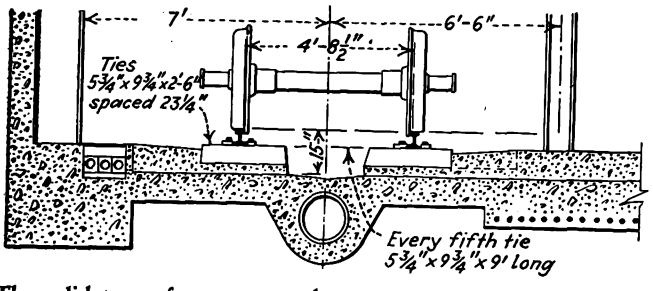
meters have been installed. In the stations on the upper part of the route more passimeters are installed in the southbound side, and more exits are provided on the northbound side to accommodate the great number of passengers who enter the station in the morning and leave it at night during the rush periods. The change booths are of both the single-end and double-end type, and in certain stations several are provided. In addition to the



The solid type of concrete track structure rather than the more usual ballasted type was selected because of its many advantages. On tangent track the ties are partially embedded in concrete as shown above

numerous exit turnstiles, the stations have emergency gates and separate gates for the employees. The station control equipment of a typical station is shown in one of the illustrations.

Connections Made with Railroad Stations

A passageway 12 ft. 6 in. wide, built on the subway roof, connects the north mezzanine of the North Philadelphia station with a passageway built by the Pennsylvania Railroad, leading directly to its North Philadelphia station. A like passageway has been built to connect the south mezzanine of this same subway station with the Huntingdon Street station of the Reading Company. The Reading Company has planned the construction of a new four-track railroad station at this point.

A similarly constructed 14-ft. passageway connects the Race Street mezzanine and intermediate subway entrances with mezzanine areas at Filbert Street, which in turn give a new and direct access to the City Hall station of the Broad Street subway, the proposed Pennsylvania Railroad underground electrical suburban station, the authorized Filbert Street subway station, etc.

City Hall Station and Pedestrian Concourse a Big Project

Early in 1924 a proposal for an extensive system of underground concourses in the center of the city was made. The plan provided for a concourse completely encircling City Hall and extending in Broad Street beyond Chestnut Street on the south and Arch Street on the north, forming a direct underground connection between all of the existing and proposed subway and railway stations in the general vicinity of City Hall, with entrances and exits to or convenient to large office buildings, department stores, etc. Such a concourse would aid materially in spreading and distributing underground traffic to and from the various existing and proposed stations in this section, thereby relieving the surface of a large portion of this traffic, and also would improve materially the accessibility of the City Hall station of the Broad Street subway.

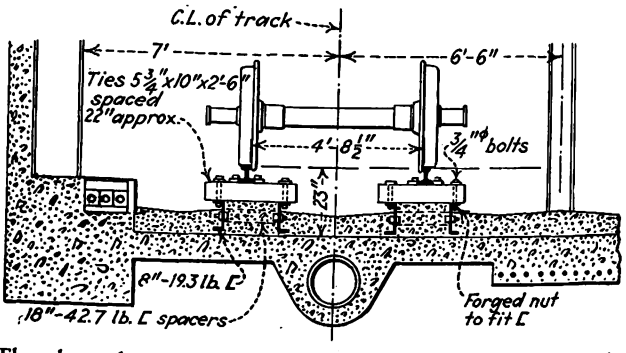
In designing the subway provisions were made to extend the system as needed or to give better service on the system as the traffic increased. Alignment, profile, stations, track arrangement, and terminal facilities all were designed with this in mind. For example, the main line was made to accommodate four tracks, even though express service will not be warranted for some time. Also, at the northern terminus of the line extra track spaces were provided to a little beyond Grange Avenue for the extension of either or both pairs of tracks northward at any time without disturbance of the existing structure or of the operation of trains therein, and, of course, without any grade crossing movement. This involved extensive construction and cost, but will result in a big saving should the extension to the north be made.

Just north of the Erie Avenue station, where the subway drops to pass under the Reading Company's tracks, advantage was taken of the situation to provide a two-level structure, whereby local trains can be turned back without grade crossing movements. This provision will enable a balancing of service and traffic and added flexibility of operation. If the Ridge Avenue extension is constructed, no doubt this will be used for turning back the trains. As designed, the ramp will accommodate a total of 32 cars. Trains northbound can leave the outer main line track, run up on the ramp and return on the outer southbound track without crossing the express tracks at grade.

The two-track branch to Ridge Avenue has been provided for by a special six-track, two-level construction, enabling either express or local trains to be diverted into Ridge Avenue, and with a complete separation of grades.

Profile and Sectional Details of the Structure

The distance from City Hall to Olney Avenue is a little more than 6 miles, and in this distance there is a total rise in elevation of top of rail of 167½ ft. The



The channel type of track construction, with the ties bolted to channels, which in turn are embedded in a concrete track floor, was used under switches, frogs and other special work

maximum main line grade is 3 per cent and the minimum center line radius on the main track is 200 ft. The maximum grade of the track in station areas is three-tenths of 1 per cent. The profile was kept as near the surface as conditions would permit to save cost and to add to public convenience.

Broad Street is 69 ft. between curbs and 113 ft. between house lines. The over-all width of the four-track structure is 57 ft. at standard sections, widening out to 113 ft. at and near stations. The structure has a concrete invert, steel columns and roof beams spaced 5 ft. 6 in., with concrete jack arches forming the side walls and roof. The standard vertical clearance over the top of rail is 13 ft. and normal spacing of track centers 13 ft. Subway

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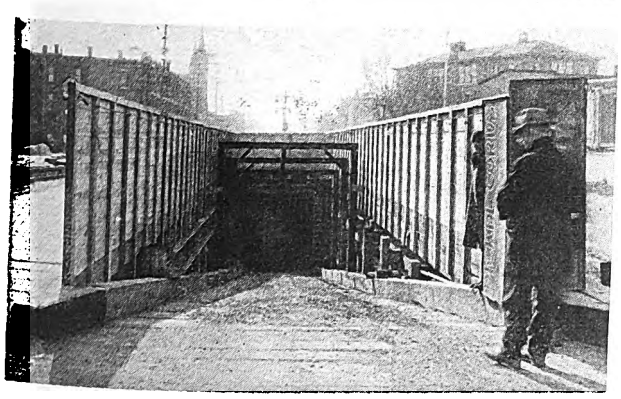
Excavating in one of the rock cuts. Note the heavy bracing to hold the side walls and to support the decking for the street

clearances have been provided on the basis of cars 67½ ft. long, 10 ft. wide and 12 ft. 3 in. high. Waterproofing, in general, has been restricted to the roof, where two ½-in. layers of asphalt mastic form a membrane protected by a 3-in. coating of lean concrete. Lateral drains are provided at frequent intervals to reduce accumulation of water along the subway walls, and longitudinal drains under the track carry all water to float-controlled electrically operated pumps installed at the five low points on the line. A duct bench along the outer wall forms a walk and, together with the extra clearance afforded by the side wall arches, offers a safety zone for trackmen and others working in the tube during operation.

In designing the ventilation system it was determined to rely upon natural ventilation, aided by the piston action of the trains, through sidewalk gradings of ample capacity, and in the deeper sections of the subway near City Hall to provide fan chambers so that, if in later years it becomes necessary, the natural ventilation can be supplemented by mechanical ventilation.

Ventilation wells are provided of reinforced concrete construction, connecting openings in the side wall of the subway with sidewalk grating located at the curb. The grating units are 4 ft. wide and 5 ft. long, arranged in banks of from three to six units, distributed as uniformly as underground and surface conditions would permit, and to the extent practicable with openings at all summits and valleys. The grating area provided is in proportion to the air content of the subway structure, which varies from about 740 cu.ft. per foot of length between stations. to about 1,030 cu.ft. at local stations and to about 1,250 cu.ft. at express stations. At and near



In part of the excavation work trucks drove down ramps into the subway where they were loaded by air shovels

station areas, one square foot of net ventilation area was provided for every 750 cu.ft. of subway content. This is in addition to the entrance stair openings. Between stations, the design was based on a ratio of 1 sq.ft. net area per 1,000 cu.ft. of subway content. Between City Hall and Grange Avenue at the north, there is an average of sixteen units in each side per square.

Ventilation openings at station platforms are screened and fitted with louvers to prevent snow, dirt, etc., from blowing through. On either side of the subway and about half way between all stations, a modified ventilation well is equipped with stairs and a counter-balanced grating at the sidewalk to serve as an exit from the track level for passengers or as an exit for rescue forces in case of emergency. The exits are indicated in the subway by lighted signs connected with the subway lighting system, which is fed from duplicate circuits with automatic throwover devices to guard against failure of one circuit. A fire alarm and telephone also are located at each emergency exit, the telephones being indicated by purple lamps.

Solid Concrete Track Construction Adopted

In selecting the type of track structure for the subway, the major characteristics sought were safety of operation, permanence of alignment and surface, long life of the

One of the contractors raised the excavated material through shafts and loaded the trucks on the street surface

structure to keep to a minimum the frequency of and average cost of maintenance and renewals, and a construction that would facilitate keeping the subway floor in a clean and sanitary condition. It was determined that a solid concrete track, rather than the more usual ballasted type, best met these requirements. The type selected for tangent track, and this covers the major portion of the subway track, consists of ties partially embedded in concrete, as shown in one of the accompanying illustrations. This type would not be advantageous for use under special work because of the greater wear and strain imposed on the track in such location, with the resulting necessity for comparatively frequent adjustment and renewals of portions of the structure. It was considered desirable, therefore, to obtain a more positive anchorage of the track to its foundation and to so arrange the track elements that they could be adjusted or replaced at lesser cost and with less interference with the operation of the trains. In the type selected for this purpose, the ties are bolted to channels, which in turn are embedded in a concrete track floor, as illustrated.

The ties, of Southern yellow pine, were creosoted with

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5 lb. of oil per cubic foot by the empty cell process, after being dressed and bored for screw spikes and tie bolts. They were cut from 6x10-in. timber and surfaced to a uniform thickness of 5¾ in. In the straight track type of construction, the ends of the ties were beveled to form an anchorage to the floor. Short ties, 30 in. long, are used under each rail and spaced 23¼ in. between centers with every fifth tie 9 ft. long to engage both running rails and to provide for the conductor rail. In the channel type short ties are used throughout except where switches, frogs, etc., require the use of greater lengths.

The rails used in the subway are 100 lb. A.S.C.E. section, 62 ft. in length. This particular section was selected largely because of its wide base as compared with the weight of the rail. This wide base, in conjunction with ties having a 10-in. face, gives sufficient tie bearing to justify the omission of tie plates. Screw spikes with cast iron clips to engage the base of the rail are used throughout the subway and splice bars of a type recently developed and embodying the so-called "head-free" feature are used.

The special track work, involving switches, frogs, crossings and curved rail, is of rugged construction. Cast manganese steel is used at practically all points of maximum wear and most of the switches in the subway are of a specially designed type. All curves of short radius are protected with guard rails, and guard rails also have been installed at all other locations where a tendency toward derailment might exist. The running rail in all special work is the same as that used on straight track.

A pipe line for compressed air extends the full length of the subway with taps at frequent intervals for connecting to electro-pneumatic interlocking and train stops.

The work of subway construction, including grading and foundation work in the terminal yard, was divided into four large sections. These sections varied in length from 7,184 ft. to 10,131 ft., and involved costs varying from $12,300,000 to $17,700,000. Three of the sections included three stations each while the fourth included four stations.

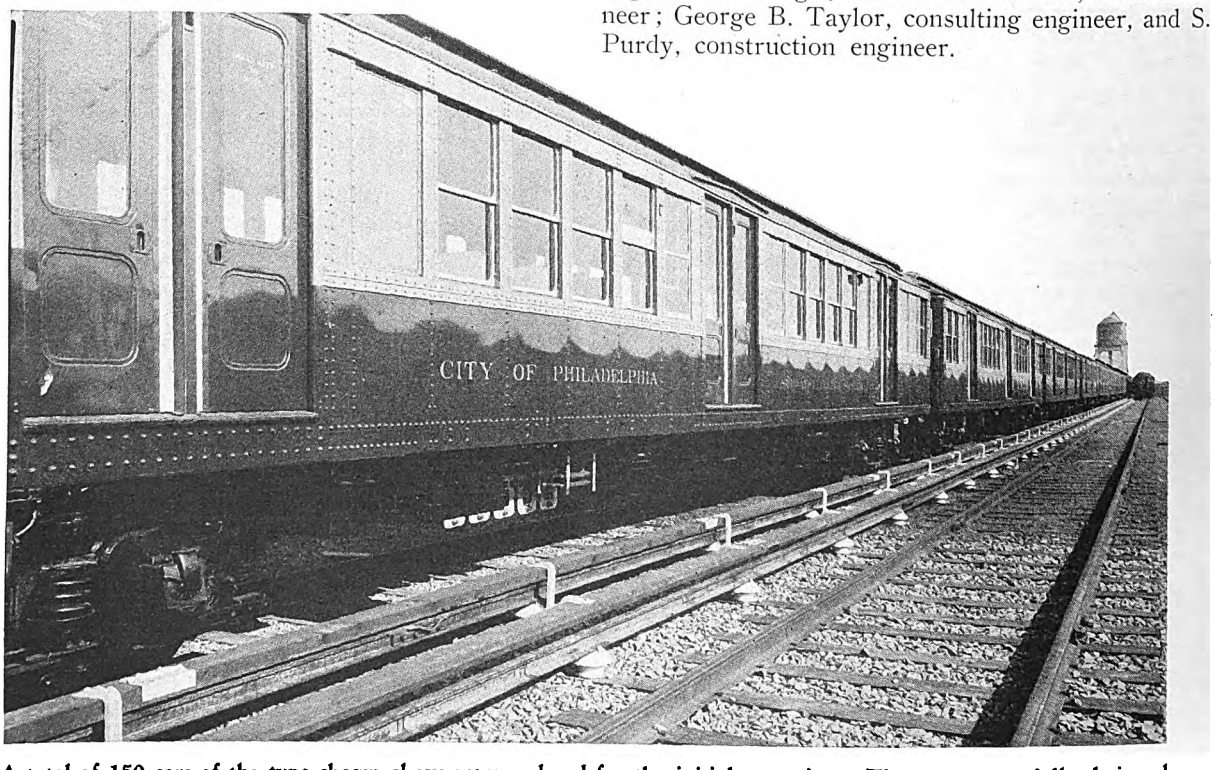
The construction requirements specified varied from complete decking of the trench and maintenance of the full street for traffic to open-cut construction, depending upon the local conditions. The temporary and permanent relocation of gas mains to keep gas out of the trench was provided for under separate contracts. Extensive relocation of large water mains to safeguard service as well as construction operations, and reconstruction of four large sewers crossing Broad Street, as well as the support, maintenance and protection of public utility structures, buildings, etc., along the line of the work, were included in the general contracts, as were the temporary paving and the restoration of sidewalks.

The following figures will give an indication of the magnitude of the work between City Hall and the terminal yard:

Subway excavation	3,131,000 cu.yd.
Concrete	373,000 cu.yd.
Structural steel	47,400 tons

One of the two contractors who constructed the subway used the cross-bracing and posting method of timbering, decking the entire width of the cut. The excavation work was carried on by hand tools and the spoil carried by an industrial railway to fifteen shafts, located about 600 ft. apart, and there hoisted to the surface and loaded into trucks. The other contractor first opened and covered one-half the street, supporting the decking on large I beams spanning the trench, and bracing the sides of the excavation from the I beams.

The preparation of plans and specifications, the receipt of bids, the awarding of contracts and the supervision of construction for the Broad Street Subway and the other transit projects now under way by the city are taken care of by the Department of City Transit. The present personnel of this department, most of whom assisted in the design and construction of the subway, include C. E. Myers, director; George T. Atkinson, assistant director; Frank R. Fisher, chief engineer; Charles H. Stevens, engineer of design; H. M. Van Gelder, electrical engineer; George B. Taylor, consulting engineer, and S. M. Purdy, construction engineer.



A total of 150 cars of the type shown above were ordered for the initial operation. They were especially designed for underground rapid transit service

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Tide Water Safety Record Wins Another Brady Medal

FOR the second time in two years the Tide Water Power Company of Wilmington, N. C., has won the Brady Safety Award for companies operating less than 1,000,000 vehicle-miles. In its last Brady brief, the company points out that greater interest has been taken in good service and safety by both the company's employees and the public in Wilmington since the company's receipt of the Brady medal for its 1926 operations. There have been numerous evidences that the public continues to appreciate the company's efforts along the lines of safety and sanitation. One proof of this is that in practically all cases in the city requiring resuscitation, calls are put in for the employees of the company to take charge. City and county school authorities have also shown an increased interest in allowing the company to present safety messages to all of the school children in the territory in which the company operates.

A map has been prepared and hung in the trainmen's room, showing where accidents have occurred. In monthly talks given to the men in this room, the map is used and the circumstances surrounding various accidents are recalled, with a view of avoiding recurrence of similar types.

With the co-operation of the city authorities, improved parking conditions have been obtained along the routes of the car line in congested districts. A faster movement of cars and a reduction of accidents at these points have followed.

An employees' school, started in 1926 and meeting twice each month was continued and expanded during 1927. Instructors were paid 50 per cent by the federal government, 25 per cent by the State, and 25 per cent by the company. The meetings were held on the employees' time, an hour being devoted to actual classroom work with instruction in elementary and technical subjects. A later hour or more was devoted to safety talks and moving pictures.

In addition, monthly safety meetings are held throughout the year. Recently they have taken largely the form of experience meetings, in which employees are requested to report once a month any unsafe conditions they have discovered and remedied through the usual channels since the previous meeting.

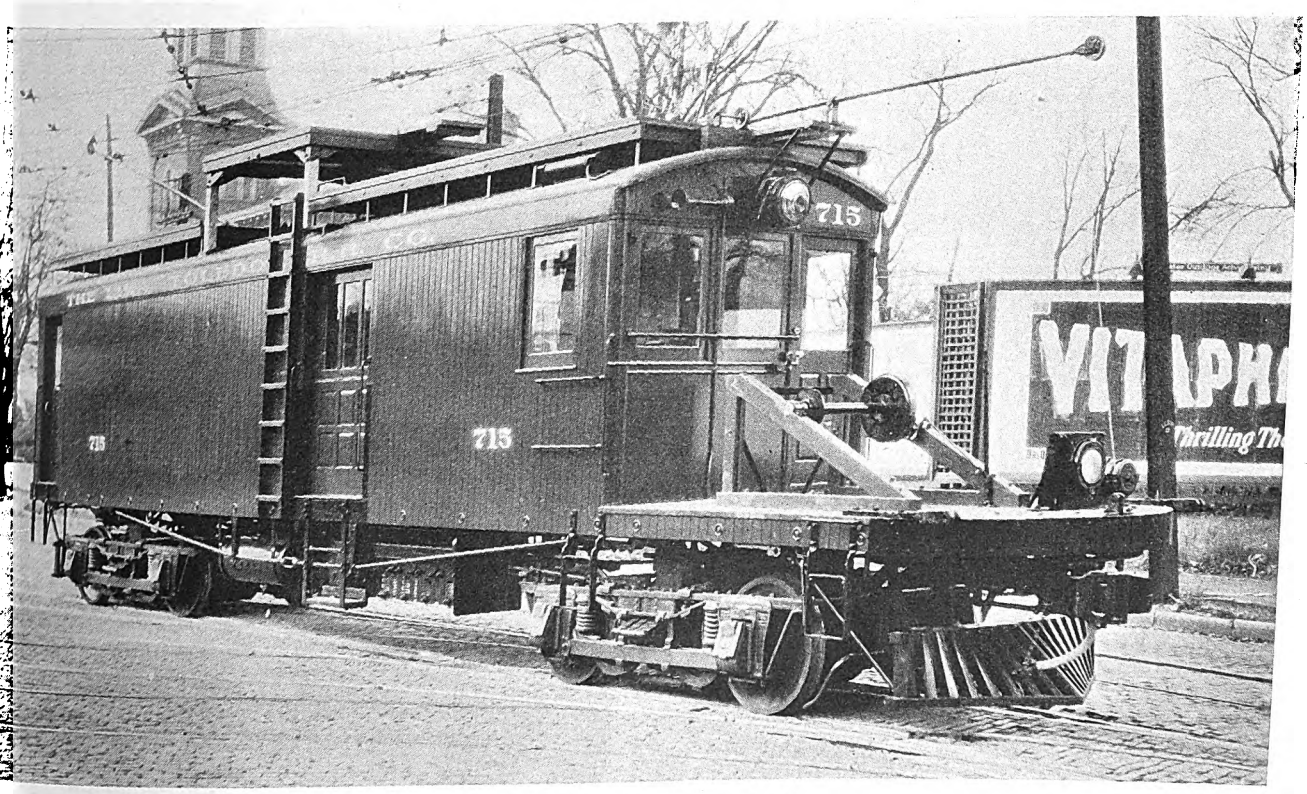
The bonus plan in operation for trainmen and bus drivers is being continued, and last year one-half of the 48 operators had perfect safety records. Under the plan an operator can win an annual bonus of $21 by a non-accident record.

The company gives transportation on its city lines to district nurses in consideration of free service to company employees and their families in case of sickness.

The success of the safety program is shown by the results. For a period of more than three years there has not been a single fatality on the property, and the number of persons injured has shown a gradual decline from 32 in 1924 to 12 in 1927. The total cost of accidents, claim department operation and miscellaneous claim expense during 1927 was only 1.1 per cent of gross earnings. The average cost per accident was $58.16, or $0.0029 per vehicle-mile. The number of accidents per 100,000 vehicle-mileage was 4.94, or 20,250 vehicle-miles per accident.

Line Car for Lima Toledo Railroad

SEVERAL features not regularly found in line cars are incorporated in a new one built for the Lima Toledo Railroad. It has an open platform at one end with provisions for a reel of wire, and an inclosed section 37 ft. long. The underframe has four 6-in. I-beams and two wood sills. The two center sills and the two outside sills are of steel I-beams and the two intermediate ones are long-leaf yellow pine. The length of the flat end is



New line car of Lima-Toledo Railroad

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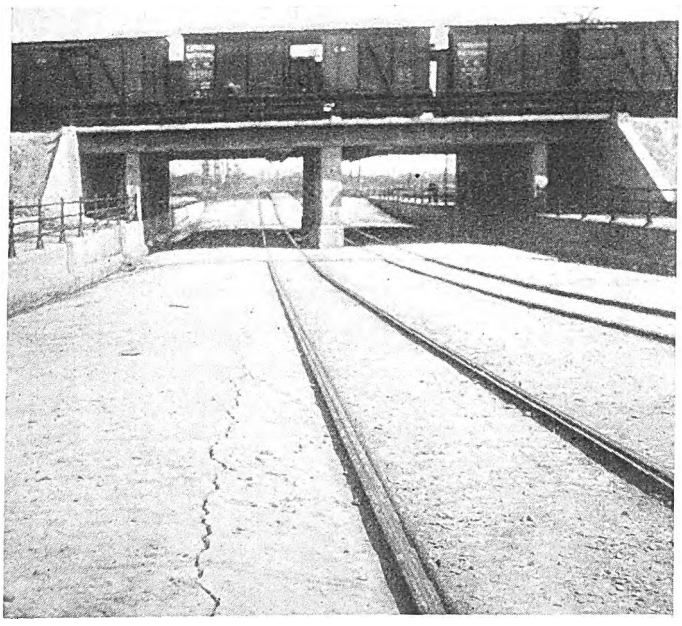
8 ft. 4½ in. Inside the inclosed body at each end is the motorman's inclosed cab, 45x48 in. In this is the various controller and air brake operating equipment. The inside of the car is provided with bins of different sizes to take care of material carried, and there is also a work bench with a vise attached. The car has three large lockers for raincoats and hats. It is also equipped with stove for heating and cooking, and in addition to this there is an electric heater in each motorman's cab.

The tower is 7 ft. 1 in. x 7 ft. 6½ in., and has a raise of 4 ft. It is operated by an air cylinder which consists of a brass pipe of 8 in. inside diameter and 4 ft. 6 in. long. The top of the car at each end of the tower is equipped with a flat deck, so that when the tower is down there is a working platform 7 ft. 6½ in. wide by 35 ft. long.

At each end there is a Crouse-Hinds Z.P. dash headlight mounted so that the motorman can raise and lower it vertically and swing it to either side of the track from his seat in the cab. This makes it possible to focus the light on the pole line for trouble shooting at night.

Constructing Tracks on Clay Subsoil



Stone and stone dust were used for the base of this track, laid on clay subsoil. Note the buckled pavement which was laid directly on the clay

HEAVING of tracks constructed on clay subsoil was prevented by the Montreal Tramways, Montreal, Que., Canada, by using alternate layers of stone and stonedust for the base. The clay was excavated to a depth of 18 in. below the ties and a 6-in. layer of stonedust laid on the subgrade. On this was placed about 4 in. of 1-in. stone, another layer of stonedust, 2 in. thick, 5 in. of 1-in. stone, and 1 in. of stone screenings for tamping to surface.

The concrete paving base for the roadway and the railway track were laid late in the fall of 1927, too late for the city to lay the asphalt surface. During the winter the concrete base on the roadway, which was laid directly in the clay, heaved approximately 7 in., as may be seen in the illustration. The electric railway tracks, with their stone base, were not affected.

Extension of Freight Pick-up and Delivery Service Recommended

CONCLUDING a careful investigation which extended over a period of two years, the committee on the pick-up and delivery of freight of the Central Electric Railway Association has presented a report recommending that all member companies concurrently seek to develop this kind of business, both locally and interline.

Although the population and the business of the country have increased, the steam railway and electric railway freight earnings have remained stationary since 1925. In 1918 steam railway freight earnings in the United States were about $3,522,000,000. By 1925 this had increased to $4,648,000,000. Electric railway freight earnings in 1918 were $13,637,000 and had increased in 1925 to $24,085,000. Since that time neither steam nor electric freight earnings have shown any appreciable increase. In 1917 there were but 326,000 trucks registered, while in 1926 the number registered had increased to 2,766,222, an increase of 750 per cent. With business conditions thriving in this country the total freight business of all carriers must be increasing, but the electric railways and the steam railroads are not enjoying the benefits of this increase. The committee believes that most of the increase which might normally have been expected is being taken care of by motor trucks.

While in most instances the gross freight receipts have not actually decreased, the electric lines have lost much of their profitable short-haul business to the trucks. This situation is unsatisfactory because through rates are not so high in proportion to the length of haul, consequently the business is less profitable. The electric roads now carry iron pipe, large castings, machinery and other bulky and cumbersome merchandise, which is expensive to handle and on which rates are low, while the trucks are transporting the high class and easily handled freight. The principal reason why the trucks are getting this business is because they give store-door pick-up and delivery service at the same or lower rates than the railway lines offer.

The present-day merchant does business with small inventories. He demands speed and insists that the carrier perform the entire service of pick-up, handling, transportation and delivery with as little effort as possible on the part of the consigner or consignee. The electric roads must prepare to meet these requirements and complete the transaction from start to finish. If they do not do it, the report states, the steam roads or the motor trucks will. The electric railways are further handicapped by a lack of commercial tracks into industrial and wholesale establishments, the advantage in this respect going to the steam railroads. Further competition from steam roads is anticipated when these roads provide a system of freight containers.

The report of the committee does not make any specific recommendation as to how the requisite pick-up and delivery service should be performed, beyond indicating that it may be done with trap or ferry cars, trucks, trailers, or otherwise. A tentative tariff, similar to those now in effect on some of the steam roads serving the territory, is submitted with the suggestion that it be amended where necessary to fit local conditions.

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Southern Equipment Men Discuss Maintenance Problems

Methods of increasing schedule speed, economy of gas-electric drive, and bus rebuilding evoke interest at Houston meeting

NEW cars, improved car equipment and maintenance and construction of buses were the chief topics of discussion at the joint meeting of the Electric Railway Association of Equipment Men, Southern Properties, and the Mechanical Division of the Southwestern Public Service Association held at Houston, Tex., Jan. 23-25. A review of outstanding equipment seen at the American Electric Railway Association's convention held in Cleveland last September was given by W. H. McAloney, superintendent of equipment Georgia Power Company. He referred particularly to the two types of four-wheel car that were shown there. Regarding trends in design, he said that there was an increase in motor capacity, a general tendency to use roller bearings where possible, to use metal sash, some type of floor covering and improved seat upholstering.

A paper describing means of securing an increase in scheduled speed was presented by G. M. Woods of the Westinghouse Electric & Manufacturing Company. An abstract appears elsewhere in this issue. The experimental type of foot control equipment now being tried by the Pittsburgh Railways was described by E. H. Bell, equipment engineer for that company. The idea behind the development of this type of control equipment is to relieve operators of one-man cars of some of the duties which it is now necessary to perform by hand. Cars having this equipment were described in the June 2, 1928, issue of ELECTRIC RAILWAY JOURNAL. Outstanding features of the new Birney car were outlined by F. J. Bennett, master mechanic, Houston Electric Company. This car was described in the issues of ELECTRIC RAILWAY JOURNAL for Oct. 20, 1928, and Jan. 19, 1929.

Maintenance of cars from a transportation viewpoint was discussed by P. S. Duenweg, general superintendent Houston Electric Company. He referred somewhat regretfully to the fact that ideas for the new designs now being considered by operating properties had come from outside the electric railway industry. To be successful, a car must combine two features: First, it must have such strong riding appeal that the patrons will not ride it out of curiosity and then leave it and go back to their former method of transportation, and, second, it must be so designed that sufficient saving in maintenance and operating costs can be effected as to make it possible to pay for these cars in a short period of years.

BUS MAINTENANCE NOW AN IMPORTANT PROBLEM

The economy of the electric drive for buses was emphasized in a paper given by Guy W. Wilson, General Electric Company. Under comparable conditions he estimated that the gasoline-electric drive bus would cost 1.03 cents less per vehicle-mile than a mechanical drive of the same type, assuming the proper application of the former. As a demonstration of reliability he pointed to the record made by 580 gasoline-electric buses that had run 16,800,000 miles with an average of 86,000 miles per transmission failure.

Costs for complete rebuilding of buses were presented by George Hoskins, master mechanic Northern Texas Traction Company, Fort Worth. On a group of eight buses, all of the four-cylinder type, the total cost for rebuilding averaged $2,130 per vehicle. Of this sum $1,300 went for body overhaul, $140 for painting, and the remaining $690 for engine and chassis work. All these buses were several years old and in bad condition. Mr. Hoskins explained the large item for body work by saying that, while the panels and trimmings were salvaged, the ash posts and frames had rotted out so completely that all of them had to be replaced. White oak was used because it had worked well on electric cars, although the weight was thereby increased some 550 lb. per vehicle. In the effort to prevent further dry rot, all inclosed woodwork was painted with a lead and oil primer. Roofs which had been damaged because of the baggage rack were strengthened by the use of bent oak carlins instead of the sawed type previously installed, and by replacing the slats with a solid roof of $\frac{1}{4}$-in. poplar.

On the basis of this experience Mr. Hoskins held that complete rebuilding was good economy when the body was of standard type and the engine and chassis were not obsolete. His statements about the short life of ash framing were concurred in by other members, all connected with properties in the Southern states where unusual conditions of humidity exist. A few favored the metal body when properly primed to prevent rust, although the wisdom of assuming a ten-year life for such construction was questioned on the ground that new equipment would be needed to keep the riders.

Other details of construction which received attention in the rebuilding were the brakes, windshields and exhaust system. Two members reported the installation of brake-drum lathes, and one told of finding it necessary to true up the drums on new buses. Answering the question as to the best windshield wiper for buses, the meeting agreed that none now on the market was entirely satisfactory. J. H. Stakes, Twin Coach Corporation, responding to an invitation, described methods of keeping gas fumes out of bus bodies. His main recommendation was that engines should be washed once a week. In addition the carburetion should be watched, manifolds and pipes kept tight and mufflers and tail pipes free from obstruction. Mr. Stakes warned against heating of springs or front axles for re-arching or straightening purposes.

Cleaning of miscellaneous parts and the reclaiming of oil were taken up in connection with the second day's program, when a list of 55 questions submitted by members before the meeting were discussed at length. Several members told of their success with various types of commercial oil reclaiming devices. H. E. Gohlman, Texas Company, offered to provide blueprints of a simple device for filtering used oil. This makes use of a washing powder and can be built at small expense. He warned against attempts to reclaim mixtures of different grades of lubricating oils. Gas-steam systems of cleaning cars were discussed, the verdict being that they were still in the experimental stage and that their value depended to a great extent on the type of washing compound used.

Officers of the association for the current year were elected as follows: President, A. Taurman, Birmingham; vice-president, W. H. McAloney, Atlanta; secretary, L. O. Eiffert, Birmingham. Members of executive committee, John Brown, Dallas; Frank Wampler, Covington; W. H. Curtis, Little Rock; R. S. Bull, Pittsburgh, and J. M. Kington, Knoxville. It was decided to hold the next meeting of the association at Lexington, Ky., July 24-26.

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Better Maintenance Through Improved

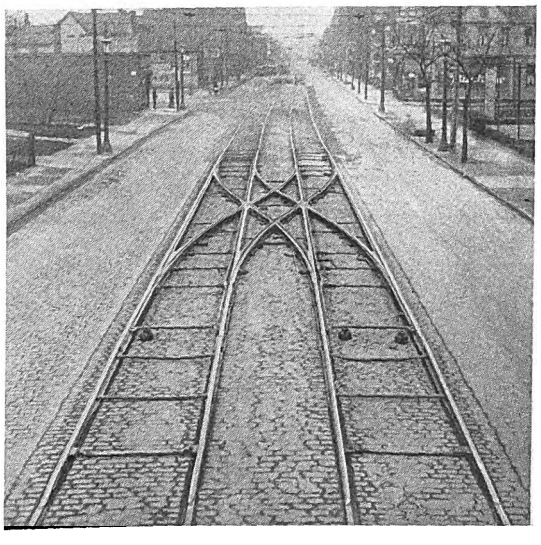
Temporary Double Portable Crossover*

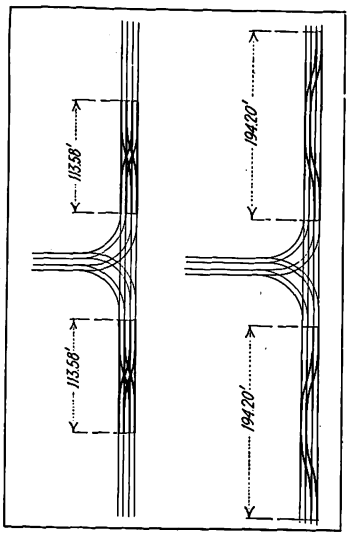
By F. E. Davidson
Assistant to the Superintendent of Way Cleveland Railway, Cleveland, Ohio

ON ALL large special work installations and on some straight track renewals it is necessary to reverse car operation on short notice and without delay. Heretofore, the Cleveland Railway has accomplished this by the use of a right and left-hand set of portable crossovers placed at each end of the job. An accompanying sketch shows this arrangement, which was found to have many disadvantages, the principal one being that it required too much space in the street and consequently increased the hazards of vehicular accidents, and it also increased car delays. In addition, it required the constant attention of a man, day and night, as there was a tendency to creep and get out of gage.

With these things in mind a double portable crossover was designed by the Cleveland Railway which eliminates most of these disadvantages and dangers and which in addition has many advantages over the old method. This consists of a right-hand and a left-hand crossover built in one. It is 113½ ft. over all while the old crossover was 194 ft. long. Four pairs of run-off rails are needed for the double crossover, while six pairs are required by the use of two single crossovers. The double crossover will not creep as readily and will hold a true gage much better than the single crossover. It can be pulled in either direction by a single car if necessary. Work trains and material trains can pull directly into the clear without backing up or blocking regular car operation. A temporary overhead is installed so that the trolley follows the direction of the front trucks and does not have to be pulled. The double crossover is made to fit a specified devilstrip, which can vary 1 in. to 2 in. This variation can be taken care of in the run-off rails.

The double crossover weighs 67,700 lb. as compared to 45,100 lb. for a single crossover. The double crossover costs about the same as the single crossovers, but it is cheaper to install and to remove, as well as to maintain.





In this work two sets of double crossovers were placed for the renewal of the special work seen branching off to the left. The line drawing shows, at left, the new method with double crossovers, and at right, the old method with single crossover

Machinist Tool Cabinet

OFTEN the shop layout is such that it is impossible to erect a common tool room in a place which will be readily accessible to all departments of the shop. The men then lose time traveling to and from the tool room. This loss of time costs a large amount in the period of a year and retards production. A condition of this kind existed in the shop of the Richmond Railways, Staten Island, N. Y. Here a full supply of small tools has been installed near each group of workers, in order that maximum production may be maintained.

Tool cabinet in the shop of the Richmond Railways

The accompanying cut shows a tool cabinet with its tools as installed in the machinists' section of the Tompkinsville shop. This cabinet is made of pine and is 7 ft. 3 in. high, 3 ft. 6 in. wide and 13 in. deep. It is divided into various sized compartments and shelves for the storage of small tools such as drills, taps, dies, reamers, wrenches, etc. It is totally inclosed by a substantial two-section pine door. With this arrangement it is necessary to walk only a few steps to obtain any tool desired. The cabinet is placed in charge of the nearest machinist.

This arrangement has worked out satisfactorily. Frequent inventories show that the loss of tools is almost negligible.

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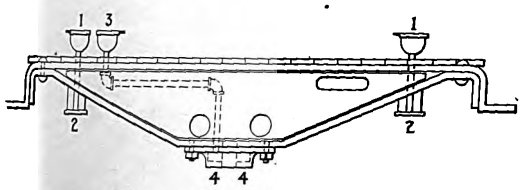
Methods

Oilers for Center and Side Bearings*

By F. A. Marsh
Superintendent of Equipment
Municipal Railways of St. Petersburg, Fla.

IN AN effort to reduce maintenance, labor and expense on cars of the Municipal Railway of St. Petersburg, Fla., all double-truck cars



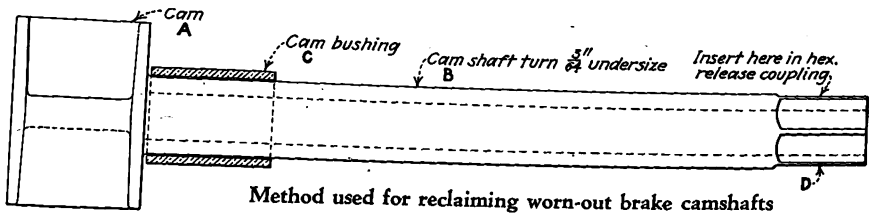
Arrangement of oil cups for center and side bearings on cars of the Municipal Railways of St. Petersburg, Fla.

are equipped with center and side-bearing oilers. The lubricant used is discarded bus crankcase oil. An oiler is used for each side and center bearing, making a total of six per car.

For the side bearings a $\frac{3}{8}$-in. pipe was connected to the top side-bearing plate, and a $\frac{1}{2}$-pint pressed-steel oil cup with a spring hinge lid was connected to the top of this pipe. A similar type of cup is used for center bearings, and this is installed by drilling through the floor to the top and bottom bolster members, so that oil is led to the top side of the bolster pivot plates. The pivot plates in use are cored out on the top side, and each cored pocket has a hole connecting with the adjacent pockets, so that all pockets are drilled with a $\frac{1}{4}$-in. hole to the face of the plate. Where oil pockets are packed with journal waste and oil, the oil from the oil cups keeps them saturated and the excess trickles through to the faces of the pivot plate.

Oil cups are filled when motors are oiled, which is every ten days. The cost of installation was $3.50 per car, including six oilers. With the old method it was necessary to jack up the cars, or else turn the trucks by making them split a switch. After heavy rain the plates were dry. With the oil cup method the cost after installation is very small, and while the actual saving is hard to compute it has been found that flange wear of wheels is reduced materially, and this indicates that there must also be a reduction in rail wear on curves, and a lower power cost, owing to freer movement of the truck. There is also a saving in the cost of renewal of center plates and center bearing bushings and washers.

*Submitted in Electric Railway Journal Prize Contest.



Method used for reclaiming worn-out brake camshafts

Repairing Bus Brake Cams*

By Charles Herms
General Foreman
San Diego Electric Railway
San Diego, Cal.

TO INSURE reliable brake performance on buses, frequent replacement of parts is necessary. Due to the high grade of material and labor used in the manufacture of bus parts, the replacements are usually very expensive. For this reason the bus maintenance man, in endeavoring to keep maintenance costs low, is often confronted with some vexing problems in repairs.

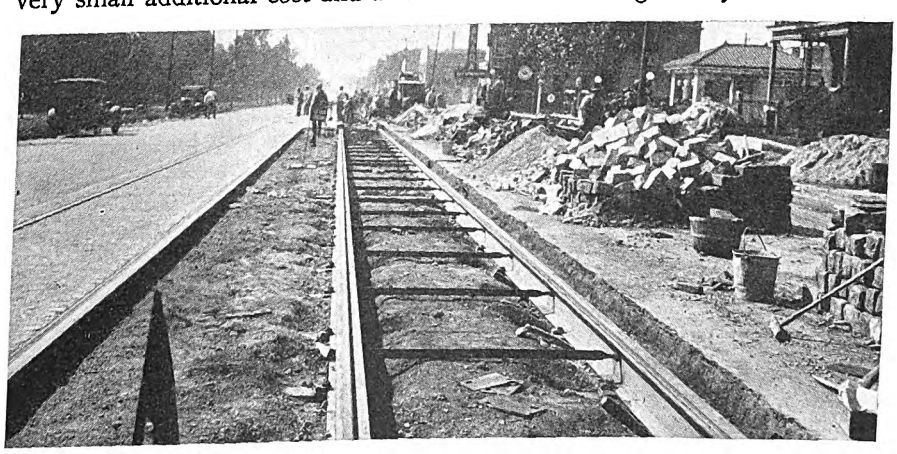
Very few of the bus parts will permit being built up by welding and then turned down, due to the danger of crystallization. In the shops of the San Diego Electric Railway it has been found that it is quite safe and practical to take the brake cams when they are worn $\frac{3}{64}$ in. undersize and turn the entire shaft so as to fit a $\frac{3}{64}$-in. undersize bronze bushing to it. After repairs, these are returned to stock and are issued as required. With this method we are able to increase the life of brake cams at a very small additional cost and also to maintain the brakes in better condition. The accompanying sketch shows how the shaft is turned down and the bushing applied.

The tendency, from an economical viewpoint, is always to allow wear to the maximum condemning point. With cam bearings this wear is approximately $\frac{5}{64}$ in. By turning these when $\frac{3}{64}$ in. wear is reached we are able to get an additional $\frac{3}{64}$ in. wear with but an added cost of $1 each for the turning.

Laying New Rail on Old Steel Ties

DURING the past three years, the Chicago Surface Lines has had occasion to rerail 3.6 miles of track on Cottage Grove Avenue. The original track was laid in 1907 with Carnegie steel ties, and when the paving had been removed, it was found that most of the foundation and substructure were in such good condition that it was not necessary to renew them. The percentage of steel ties which had to be renewed varied from 8.4 per cent on one section, to 13½ per cent on another section of track relaid. New tie plates and fasteners were installed with the new rail where the old ties were used, but about 98 per cent of the old paving blocks were relaid.

The accompanying illustration shows the method of construction employed. This view was taken on Cottage Grove Avenue looking south from 67th Street. As will be noted the foundation has not been disturbed except where it was necessary to get at the fastenings and joints.



Old ties on Cottage Grove Avenue, Chicago, laid in 1907, were found so good that they did not have to be replaced when new rail was laid

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New Offerings of
USEFUL EQUIPMENT

Silico-Manganese Steel for Special Trackwork

By George A. Richardson
Manager Technical Publicity Department
Bethlehem Steel Company

FOR a long time there has been a demand in the electric railway industry for something better than the hard-center type of special trackwork construction and not quite as costly as the solid manganese type. Anything of this kind would have to meet the following requirements, as well as that of reasonable cost: (1) ease and uniformity of manufacture; (2) hardness and toughness to resist wear; (3) ease of repair by welding.

The Bethlehem Steel Company, in an endeavor to meet these conditions, has carried on experiments which have led to an unusually successful conclusion.

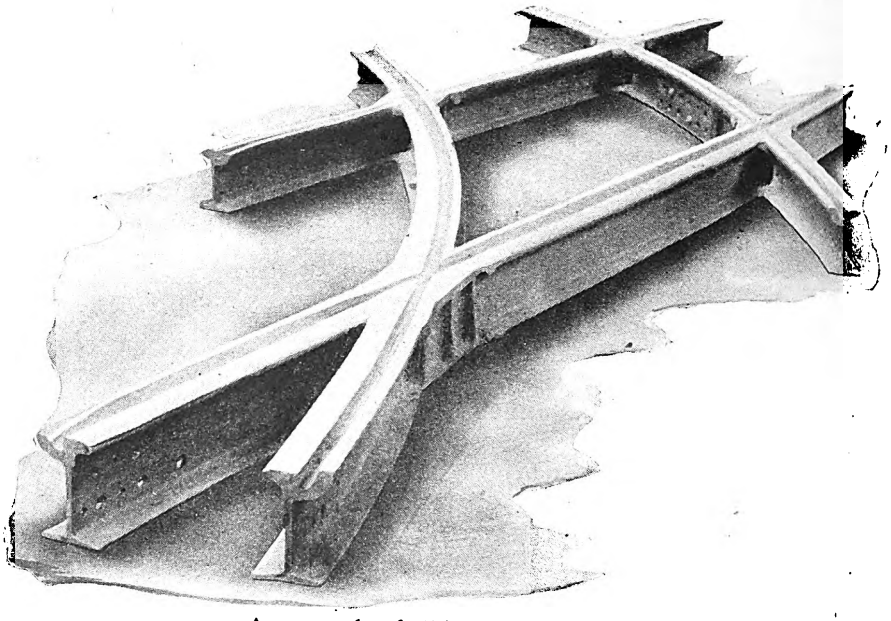
Other attempts to do this have been made before and many materials have been considered. Several alloy steels, other than manganese, are being tried out in various parts of the country and have made considerable progress. Chrome-nickel has perhaps received the greatest attention, but has not yet completely met the requirements in regard to certainty in manufacturing, cold straightening and reasonable shop cost.

Early attempts at improvement of hard-center special work were along the lines of making plates larger and thicker. This has the disadvantage of weakening the entire structure. The next step was to investigate the use of the casting to reinforce the binding in a manner analogous to that of the use of steel bars for reinforcing concrete. This soon led to short-cutting by welding rails directly to the center. Because manganese steel is not suitable for welding it became necessary to turn to some other alloy. For the moment at least silico-manganese steel has the greatest possibilities in this direction. It has been selected after careful consideration of a number of materials which seemed to have promising possibilities.

Silico-manganese steel is so-called because the silicon and manganese contents, particularly the former, are higher than normal. This steel for several years has been manufactured in very large tonnages for the highest grade automobile springs and other parts subject to great stress and fatigue. It has been used also with great success in the manufacture of punches for making holes in heavy plates, and the steel plants have used it for shearing plates and in cold chipping steel billets. It is only recently that the material has been used in castings for special trackwork and the results have been unusually interesting.

Once the type of steel had been decided the next question which arose was that of design. Manganese steel is the only steel that gives good results in large as well as in small castings. No other alloy can be handled so well where long castings are involved. Hence, solid manganese castings continue to be the best form to use for construction for tongue switches. On the other hand, silico-manganese steel is economical in the construction of mates, frogs, and crossings, particularly the last two.

The important thing in the new design was to obtain something which would give the strength of the one-piece cast type. It has already been mentioned that the natural result of investigations was to show that a solid center, thermit-welded to the rails, was preferable to the inserted-plate type of construction. As has been mentioned, one of the advantages of silico-manganese steel is that it can be welded successfully. In the designs developed it has proved possible to heat-treat the centers so as to secure maximum wearing qualities and at the same time not affect the ability



An example of silico-manganese trackwork

Material	Unpeaned Samples	Block No. 1		Block No. 2		Block No. 3	
	Brinell Hardness	Hammered One Minute 260 Blows per Minute Brinell Hardness	Reduced Thickness, In.	Hammered Two Minutes 260 Blows per Minute Brinell Hardness	Reduced Thickness, In.	Hammered Two Minutes 320 Blows per Minute Brinell Hardness	Reduced Thickness, In.
Silico-Manganese...	321	364	0.0020	375	0.0045	387	0.0075
Chrome-Nickel....	241	293	0.0040	286	0.0055	277	0.0020
Standard High Manganese.....	192	387	0.0075	418	0.0090	495	0.0225

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to weld the metal. One of the features of the Bethlehem design is to place an extra amount of metal in the floors of the treads and flangeways to provide sufficient metal to which to weld.

In any special trackwork layout there are four items; namely, frogs, crossings, mates and switches. For mates, frogs and crossings, short length castings can be used which lend themselves to good foundry and heat-treating practices. Due to the length of the switches, it is probably best to use the solid manganese type.

Various tests made show the advantages of this new type of construction. To stimulate the battering action of wheels on frogs, crossings, etc., a series of samples were prepared of silico-manganese steel, chrome-nickel steel and standard high manganese steel. These samples were given a peening or hammering test on a No. 5 Rochester high speed hammer, the die being shaped similar to the ball peen hammer. The test pieces were marked off in eight rectangular blocks, numbered 1 to 8, inclusive, with a 1-in. circle in the center of each rectangle. The hammering or peening was kept inside this circle. The rectangular blocks, marked No. 1 on each of the three test pieces, were hammered for one minute at the rate of 260 blows per minute; block No. 2 was hammered for a period of two minutes at the same rate; block No. 3 was hammered for a period of two minutes at the rate of 320 blows per minute. Blocks numbered 4 to 8, inclusive, were left for a future test. Some interesting results were obtained from this comparative test, as shown in the following tabulation.

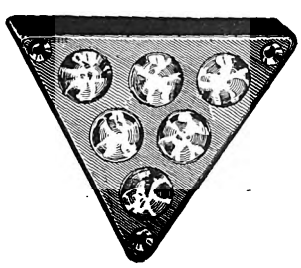
All samples were of the standard analysis and recommended for special trackwork. The silico-manganese samples had the triple treatment with oil quench mentioned above. The chrome-nickel steel samples were given the standard air quench treatment recommended for this product, and the high manganese samples were given the standard treatment for that class of steel.

Of the unpeened or normal samples, silico-manganese showed the greatest Brinell hardness, with chrome-nickel next and manganese last. After peening, manganese showed the greatest Brinell hardness with silico-manganese second and chrome-nickel last. Manganese steel, as might be expected, showed the greatest reduction in thickness after peening, which checks out with the well-known characteristics of manganese steel trackwork—to show very rapid wear during the first few months of service while the hardness is being developed, after which the wear is very slow.

Comparative welding tests have been made of the alloy steels mentioned above. The results have confirmed the information that silico-manganese steel can be welded very easily and uniformly.

Reflecting Lights for Cars and Buses

LIGHT reflecting devices, especially designed for use as marker or clearance lights on the front or rear of buses and electric railway cars, have been placed on the market by the Electric Service Supplies Company, Philadelphia, Pa. The need for such devices is readily apparent to the automobile driver of today. In night driving there is a constant doubt as to the exact width of the vehicle he may be approaching and there is always the constant menace of rear light failure and many other conditions which make it advisable to provide better lighting of the front and rear ends of all vehicles.



Typical Rayflector device

Rayflectors have been designed to fulfill this need, without adding to the cost of upkeep or maintenance of the vehicle on which they are installed. Being entirely automatic in operation they never fail to function and in this respect provide one of the essential features of a safety device. Each unit or reflector consists of a solid cylinder of glass, of $\frac{7}{8}$-in. diameter, scientifically designed to concentrate the light. Back of this cylinder is placed an aluminum reflector over which a copper protecting cap is applied and the same hermetically sealed with cement.

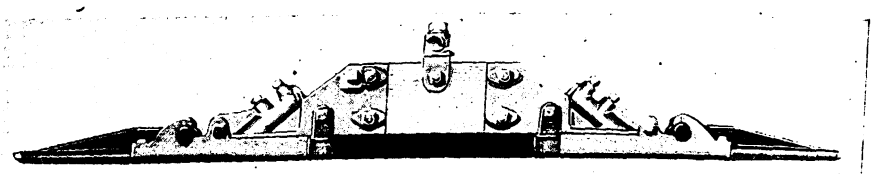
In operation, Rayflectors utilize the light of the approaching vehicle and light from other sources in close proximity. The design of the lens and reflector is such that they reflect more than 75 per cent of the original intensity of light back to its source. The approaching driver, therefore, receives an unfailing warning signal which is, in fact, the light from his own headlights reflected back.

The devices are practically indestructible and will withstand rough usage. They are mounted under spring pressure in cast iron or steel holders and present a very neat and attractive appearance. They are supplied in amber, red, green, blue or white.

Renewable Underrun Section Insulator

TO MEET the demands for a section insulator with wearing parts that can be renewed without disturbing trolley or span wires, the Ohio Brass Company, Mansfield, Ohio, has recently put on the market a new section insulator with renewable underrun. This insulator has an ultimate strength considerably in excess of the trolley wire. It is made with a single beam of second growth, oil-impregnated hickory; brittle-free Flecto malleable iron yoke, end castings and end runners; bronze arcing clips and a very substantial fiber runner. Bronze cam tip approaches are also furnished.

Once the assembly is in place, it is unnecessary to disturb trolley or span wires to renew worn parts. The removal of four bolts allows the end runners, arcing clips, cam tips and fiber runner to be renewed. End castings are provided with straight grooves for dead-ending, so that no wire forming is necessary. Arcing clips are of sufficient length and strength, so that it is practically impossible for them to release the fiber runner, thus preventing the chance of wheel dewirement. Wheel clearance of $1\frac{1}{4}$ in. is provided. The leakage distance of 5 in. provides an amply safety factor for 600 volts. The weight of the O-B renewable underrun section insulator is about 15 lb.



Section insulator with renewable underrun

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News of the Industry

Two Proposals in Akron

Transportation company offers to sell bus-miles to city at flat rate per mile

THE Northern Ohio Power & Light Company, which is seeking a new franchise contract in Akron, has submitted two proposals to the City Council. One provides for a four-year contract and the expenditure of $2,392,395 for improvements and extensions, with an initial fare of 10 cents, six tokens for 50 cents, 5-cent fare for school children, and a $1.50 weekly pass. The other proposal provides for sale to the city of as many bus-miles as the city demands at a flat rate per mile, the rate to be determined upon the present mileage cost. This proposition provides that the city fix its own rate of fare, the fares to revert to the city treasury and the company to bill the city monthly for the number of car and bus-miles used.

If the city does not care to enter into a four-year contract, the company has offered to try the proposed rate as an experiment for the next twelve months, and to make improvements and extensions aggregating $502,000, of which $237,000 would be spent for new buses.

The company's franchise expired last December, but the City Council extended it for 90 days. Announcement has been made that another extension will be granted in the event there is no settlement before the expiration of the present 90-day arrangement. The present fare in Akron is 7 cents cash, four tickets for 25 cents, seventeen tickets for $1, with free universal transfer.

The company also operates a city system in Canton and has submitted similar proposal in that city. The franchise there expired recently.

Harbor Unification Plan for Los Angeles Debated

Unification of the Los Angeles railway lines at the harbor, under the original agreement and not as specified in the recommendation of the Interstate Commerce Commission agent who made the report, appears to be nearer since a subcommittee of the commission heard arguments for the harbor terminal unification along the lines of the original agreement and without the modifications made in the first recommendation to the commission.

Representatives of the railroads and of the Chamber of Commerce of Los Angeles argued that the original agreement after years of negotiation made a thoroughly satisfactory and economical plan for handling in one body all rail transportation at the combined harbors of Los Angeles and Long Beach, and that the additional requirements recommended by the agent of the commission were not justified.

It is expected that the subcommittee will recommend that the original order be changed to meet this view, eliminating the objectionable changes, and that the full commission will sustain this position by a definite order.

The Southern Pacific, the Union Pacific, the Atchison, Topeka & Santa Fe and the Pacific Electric Railways propose to participate in a harbor development plan under which an independent operative unit, to be called the Harbor Belt Line, will be organized. The several railroads concerned in the agreement own tracks running into the harbor and the contract provides for the unification of their operation. It is expected that the Harbor Belt Line will facilitate the arrival and the passing of shipments to and from shipboard in the harbor.

Public Hearings Begin in Chicago

Question of enabling legislation looking toward unification thrown open to public discussion. It was hoped plans would include entire metropolitan district

PUBLIC hearings on the question of enabling legislation for a consolidation of Chicago transportation lines, unified operation and subway construction under a new franchise were opened during the week ended Feb. 2 in the courtrooms of Federal Judge James H. Wilkerson under the auspices of the Citizen's Traction Settlement Committee. At the first hearing on Jan. 30 nearly twenty persons, testifying as individuals and as representatives of Chicago civic organizations, expressed their views on the needed legislation.

Practically all who were heard by the committee approved in principal the fundamentals of the legislation as proposed in recent discussions between the City Council and representatives of the elevated and surface lines. It was apparent from the speeches of witnesses that the public generally is in favor of a fair and business-like settlement of the problem through issuance of a terminable permit, properly safeguarded, consolidation of the rapid transit and surface lines, local regulation and construction of a downtown subway system.

The points of difference, while important, concerned the question of form or method only.

In opening the hearings, James Simpson, chairman of the Citizens' Traction Settlement Committee, declared that before any further progress could be made toward the desired solution of the problem, definite conclusions would have to be reached on the following questions:

1. Shall the city by suitable enabling legislation be empowered to grant the consolidated company a terminable permit or a franchise limited to a fixed term?
2. Shall a bill be drafted providing for unification of all local transportation companies now operating in Chicago.
3. Shall the Legislature authorize some form of home rule traction commission? If so, what shall be its territorial limits and what shall be its powers and jurisdiction? By whom shall it be appointed?
4. Shall there be a bill providing for subway construction?

Attorneys for the companies who were first called to testify brought out some of the fundamentals upon which they think the settlement should be based.

James M. Sheean, counsel for the Chicago Railways, said that the companies were not interested in a term franchise but that they would not oppose legislation for such a franchise if agreement could not be reached on an indeterminate permit.

As to the aldermanic proposal for home rule by a local commission, Mr. Sheean declared that he doubted the constitutionality of any enactment of a transportation district which would extend beyond the city limits and providing, at the same time, for appointment of commission members by the Mayor. While the companies do not intend to oppose such a bill if the city desires it, he added that he would suggest that the Home Rule bill be drafted to provide for approval of the first securities of the new company by the Illinois Commerce Commission, so that in the event the local commission is held unconstitutional, these securities will be valid.

Several representatives appearing on behalf of neighborhood business and civic organizations indicated that they hoped for a settlement of the rapid transit problem which would embrace the entire metropolitan district instead of only the territory within the city's boundaries.

C. R. Bechtel, representing the City Club of Chicago, said that his organization desired a conditional indeterminate permit with supervision of issuance of securities by the Illinois Commerce Commission and of service and extensions by a local commission. He urged that the City Council, however, should be empowered to fix valuations, terms of purchase, fares, depreciation and rate of return on capital investment.

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Judge John M. Harlan, attorney for the F. J. Lisman financial group of New York, which for the last two years has been seeking a twenty-year surface lines franchise in Chicago, declared that the present companies oppose municipal ownership, yet insist the city shall build and own subways and lease them to the companies to operate. He expressed the opinion that a franchise ordinance should be agreed upon before enabling legislation is drafted. He invited members of the City Council and bankers interested in the problem to question his clients regarding their proposal.

Although members of the City Council local transportation subcommittee attended the hearings in the Federal courtrooms, none asked to be heard. John G. Drennan, assistant corporation counsel, asserted that the written statement of fundamentals recently sent to the Citizens' Committee adequately explained the city's attitude in the matter.

A second hearing was scheduled for this week, at which time persons principally interested in phases of a railway ordinance will be heard.

Fare Hearing in St. Paul Feb. 11

Having refused an indefinite postponement of the hearing on the application of the St. Paul City Railway, St. Paul, Minn., for an increased rate of fare from 8 cents cash and six tokens for 40 cents, the Minnesota Railroad & Warehouse Commission set the date for Feb. 11. Meanwhile an emergency order placed the rate of fare on the same basis as that ordered by the commission effective on Jan. 26 in Minneapolis, which is 10 cents or six tokens for 45 cents. The postponement was asked by the corporation counsel and concurred in by the St. Paul City Railway.

Members of the Minneapolis City Council meanwhile are discussing appeal to the courts from the increased fare order for Minneapolis, and Senator Charles Hauser, St. Paul; Senator Erling Swanson, Minneapolis; and Senator Henry Morin, Duluth, have sponsored a bill, introduced in the present State Legislature, for repeal of the Brooks-Coleman act of 1921 which places the rate determination in these three first-class cities in the jurisdiction of the state commission.

St. Paul pleaded that a hearing would cost the city $40,000 and that, if the commission orders a rate of fare for St. Paul higher than in Minneapolis, an injunction will be sought from the district court. This statement included reference to a stipulation entered into that the rate ordered for Minneapolis would be accepted by St. Paul.

Commissioner C. J. Laurisch said the commission cannot consider the stipulation other than temporary. Commissioner Frank W. Matson said that if the street railway is satisfied with the new fare it is not the commission's business to proceed further. The third commissioner, O. P. B. Jacobson, who had dissented from the Minneapolis order, was not present when these statements were made.

Another Combination Bus-Car Service in Detroit

Combination service was installed on Grand River Avenue several months ago after it had been in operation on Jefferson Avenue for some time and after considerable agitation on the part of the advocates of the Miller-Schorn system of rapid transit. Although the Grand River line was selected by advocates of the Miller-Schorn plan as being a typical one, the whole plan was recently rejected by the Street Railway Commission in a report to the City Council. The Miller-Schorn plan would include operation of local buses and express cars with a patented arrangement of raised safety zones, and loading stations in the center of the street between tracks, with sub-walks or pedestrian tunnels connecting with the sidewalks.

The system now in operation on Grand River Avenue is an extension of the skip-stop plan following the suggestion of G. Ogden Ellis, president of the commission. It is the opinion of Mr. Ellis that the speed of the cars might be increased by having from three to five-block intervals between stops instead of two, but in no case should the stops be farther apart than a convenient walking distance.

Local buses on Grand River Avenue were found to be running up a deficit. They are being placed on the Vernor Highway line, extending that line from the Michigan Central Station to Livernois Avenue on the west, as petitioned for by residents of the west side.

The use of local transfer buses that have been operated on Grand River Avenue in conjunction with railway service by the Detroit Department of Street Railways has been discontinued by the department, it being the opinion of Del A. Smith, general manager, that the trial of the combined express car-local bus system on that thoroughfare has been a failure. With the withdrawal of the local coaches, four additional stops were added to old express stops.

Municipal railway officials concluded cars were held up so frequently by the jam of automobiles that anything approaching real express service, such as is operated on Jefferson Avenue, was impossible. The action in removing the local buses from Grand River Avenue followed the circulation of petitions from residents of the district of the city served by the Grand River car line requesting that the so-called express-local bus system be discontinued.

Matt Is No Ordinary Mule

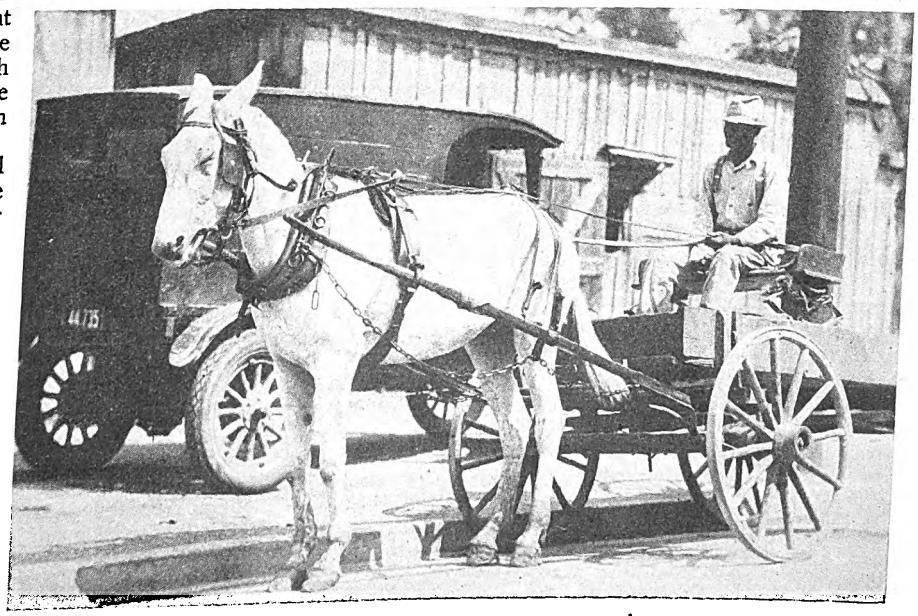
Twenty years of faithful service has brought an old-age pension and a green pasture for the rest of his days for a gray mule, known to motormen and conductors of the Houston Electric Company, Houston, Tex., by his first name of Matt.

In the pasture of Joe Taylor, retired lineman, on the highway from Houston to Galveston, Matt will spend the rest of his natural days. His shoes have been removed. A comfortable stall has been built for him near the little cottage of the lineman. And the $5 a month pension that officials of the company awarded to Matt will provide plenty of succulent oats and hay.

No ordinary mule is Matt. Just when he went on the company roster is lost in the mists of yesterday. The mule was working for the company as far back as the oldest "old-timer" can recall. That was in the days when electric cars were replacing mule-cars in the Texas city.

Some of the operators even insist that Matt saw service pulling the old cars down streets that were often seas of mud. Be that as it may, officials of the company, notably Carl Frazer, who is the superintendent in charge of traffic, insists that Matt is "40 years old if he's a day."

For most of the twenty years that Matt labored for the company his driver was Will Bradley, gray-haired darkey, as black as the mule is white.



Turned out to green pastures on a pension

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Twenty-Year Club in Portland Celebrates

The annual banquet of the Twenty-Year Club of the Portland Electric Power Company, Portland, Ore., was held on Jan. 19, when 66 men and 2 women were admitted to the club, having entered their 21st year of service with the company during 1928. The club now comprises more than 13 per cent of all employees. Frankling T. Griffith, president of the company, addressed the assembly, as did also O. B. Coldwell and W. H. Lines. R. R. Robley, retiring president, was toastmaster. W. P. Strandborg, genial publicity manager of the Portland company, put on an interesting feature of the program. Tribute was paid to six members of the club who died during the year.

Bonus in Wilmington

Bonus checks were distributed recently by Raymond Hunt, general manager of the Tidewater Power Company, Wilmington, N. C., to street car employees for the year 1928 in appreciation of the faithful and efficient service in the safe operation of cars. Every man received a bonus check, and fifteen received checks for the maximum amount of $21, representing $1 for each month in which there were no accidents, $1 for each quarter, and $5 for the year. The total amount distributed was $522. This sum was slightly in excess of the safety bonus checks for any previous year.

In presenting the bonus, Mr. Hunt not only congratulated the men for their conscientious efforts in accident prevention work, but also called attention to the fact that this record could not have been attained had it not been for the co-operation received from the public and for the interest taken by the public in helping the men operate through the busy streets without accidents. He also pointed out that this safety program meant not only the prevention of accident, but more important was the humanitarian side in avoiding suffering and possibly death on the part of passengers and pedestrians.

A similar bonus plan was announced for the year 1929, and each and every man pledged his best effort to operate safely during the coming year.

Oratorical Contest Decided in Kansas City

First prize in the oratorical contest sponsored by the transportation department of the Kansas City Public Service Company, Kansas City, Mo., was won by J. R. McMurran, who also won $25 in cash and a wrist watch given by the company. This operator at 18th and Olive Division led a field of 70 orators from the transportation department in the first contest of this kind ever held. L. F. Demming won second honors, or $15, while third place, or $10, went to A. E. Behrens. The subject was "The Street Railway Problem in Kansas City."

COMING MEETINGS OF *Electric Railway and Allied Associations*

***Feb. 14*—Central Electric Railway Master Mechanics' Association, Youngstown, Ohio.**

***March 1*—Metropolitan Section, American Electric Railway Association, 33 W. 39th St., New York, N. Y.**

***May 1-3*—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

***May 13-15*—National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***June 21-22*—New York Electric Railway Association, Bluff Point, N. Y.**

***June 27-28*—Central Electric Railway Association, Michigan City, Ind.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Fare Increased in Holyoke

The Massachusetts Public Utilities Commission has upheld the petition of the Holyoke Street Railway, Holyoke, Mass., for an increase in fares and has dismissed all protests.

Effective as of Feb. 1, 1929, the zone tickets went on a basis of three for 25 cents, and tickets for school children on one of ten for 42 cents. The present rate of fare in the zones affected by the new schedule is four tickets for 30 cents, and the price of tickets for school children is ten for 38 cents.

The finding follows in part:

The evidence showed that traffic on the railway had been falling steadily in recent years and had fallen off considerably in the past year. Despite economies in operation which had been put in effect by the company, and despite the increase in fares which went into effect in the fall of 1927, the company, after laying aside an insufficient amount of depreciation, earned only enough money to pay a dividend of 2 per cent. It is obvious that the company is entitled to be allowed to earn more money if it can. After consideration of all the facts, we are of the opinion that petitions against fare increases should be dismissed.

George E. Pellissier, manager, testified that the income of the company had declined by $50,000 in the last year, and that only for the rate revision made in 1927 the decline would have been $100,000 greater. This increase temporarily arrested the decline in income.

Hearing on Increased Fare for Superior Scheduled

A hearing on the application of the Duluth Street Railway for permission to increase its rates in Superior, Wis., will be held at Superior on Feb. 18. It asks for the increase on the grounds that, under the present rate, the operating income is insufficient. According to its financial statement, the rate of return is only 1.17 per cent of the fair value of its property as set by the Wisconsin Railroad Commission. No specific rate is requested. The existing rate will, if continued, be confiscatory, the petition stated.

The total operating revenue, including the non-operating income of the company, for 1928 was $1,907,125, a decrease of $38,369 over 1927, according to a statement made in behalf of the company.

Proposals Submitted for Springfield, Ohio

The Twin Coach Corporation of Kent, Ohio; The City Rapid Transit Lines of Newark, Ohio; Alexander S. Drescher, Brooklyn, N. Y.; and Samuel Lipp, Cincinnati, have submitted bids to furnish transportation service for the city of Springfield, Ohio. Request for bids was made by Springfield officials several weeks ago.

City officials were advised in a communication, submitted at the same time as the bids on the transportation facilities, that the Cincinnati, Hamilton & Dayton Railway and the Indiana, Columbus & Eastern Traction Company, which plan to merge, are now actively engaged with the Springfield bondholders protective committee for the formulation of a plan for a unified transportation service over Indiana, Columbus & Eastern-Springfield Railway tracks, with one or more bus routes included.

Robert W. Flack, city manager, said that negotiations would continue for two weeks, as the city is primarily interested in a transportation system for the community, and will be willing to consider any feasible plan for its establishment.

Bonus for Rushville Employees

Employees of the Indianapolis & Southeastern Railroad, formerly the Indianapolis & Cincinnati Traction Company, Rushville, Ind., will receive a 5 per cent bonus on their January pay under a new system started by C. T. DeHore, president of the company. The bonus is in return for courteous service to passengers and care in handling cars. The first dividend check will be mailed on April 1, as the bonus is to be paid in quarters. One of the chief factors in providing this bonus to motormen is that they keep their cars running on scheduled time. This bonus applies to employees working on both divisions of the road.

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Increased Tariff in Wheeling Suspended

A tariff increase, filed on Jan. 31 by the Wheeling Traction Company, Wheeling, W. Va., was recently suspended by the Public Service Commission. The increase, which was from 5 to 6¼ cents, was to take effect on March 3 and hearing on the application was scheduled for Feb. 9. Railway lines are operated by the Wheeling Traction Company connecting Moundsville, Wheeling and Weirton, a distance of 44 miles, on the West Virginia side of the Ohio River, and also between various communities in Ohio.

Prior to the Christmas holidays, announcement was made by A. C. Spurr, general manager of the Wheeling Traction Company, of his company's intention to make application to the Interstate Commerce Commission for an increase in rates. It was desired to make this increase uniform throughout the system by subsequent application to the Ohio and West Virginia Commissions. He said that the company was seeking an increased fare only after adopting every means of efficiency and economy; that during the past 22 months there had been a deficit from operations in excess of $200,000 and that to continue the improvement program required at least sufficient revenues to pay all operating expenses.

The tariff filed with the Interstate Commerce Commission requested a universal zone rate of four metal tokens for 25 cents and a 10-cent cash fare. This meant an increase for the Ohio and interstate riders. Advance in the commutation rates was requested in about the same proportions. The tariff in interstate traffic went into effect on Jan. 20.

The company was granted a general increase in rates in 1920 and in 1922 a decrease was effected in these rates. A partial increase was secured in interstate and Ohio rates in 1925, but the last general increase applicable to the transportation system as a whole was in 1920.

Wanted—A New Headpiece for Vancouver Buzzer

The coming of spring is blamed by the British Columbia Electric Railway, Vancouver, B. C., for its desire for a new headpiece on *The Buzzer*, its official pamphlet. It claims it's been running along for more than twelve years with the same old lid, and now it wants something new. Accordingly, all artists and pseudo artists have been invited to draw a new heading for the front page. To the design of the one that is chosen as most appropriate will be paid $25. According to the rules, any professional and non-professional artist can send in any number of pen and ink designs which must not be more than 2 in. deep, and must permit the addition of the usual date line, either within or without this depth. All designs are to become the property of the British Columbia Electric Railway. The contest closes Feb. 22.

Needs of Wisconsin Company Told to Commission

Hearing on the application of the Mississippi Valley Public Service Company for an increase in fare from 7 cents to 10 cents was held before the Wisconsin Railroad Commission at La Crosse, on Feb. 5. The company is also asking for authority to abandon the Badger Street line and take one car off the Seventh Street line.

In This Hard-Boiled Era

A LONE fare check issued by the United Railways & Electric Company, Baltimore, has been received by that company from a woman in Cincinnati. Accompanying it was the following letter:

I am sending you a car ticket I found in my work and I thot I wad send it to you. It wadnt Benefit me eny for I cant youse it here. I thot it wad Be rite to send it to you. Money is money now days. I noe it wad be to me. If I could spent it I wad have spent it and several more for I have worked for 20 years and I noe sumpthing about it. I hafto walk if I run short through the weak so I hope you will precheat this little ticket when it arrives Home.

The United has sent the woman 10 cents in payment for the token.

Higher Fare Experiment in Champaign-Urbana

The Illinois Power & Light Company and the cities of Champaign and Urbana, Ill., have received approval from the Illinois Commerce Commission, for their six-months' trial of a 6¼-cent fare for cars and buses in the two cities. On Feb. 1 the new schedule became effective. Books of 52 tickets are sold for $3.25. Tickets unused during the calendar month for which they are issued will be redeemed by the company at 6 cents each.

Hearing Set on Electric Bond & Share Plea

Argument on the application of the Federal Trade Commission for an order requiring the officers and employees of the Electric Bond & Share Company to produce certain records of the company and to submit to an examination, will be heard on Feb. 11 by Federal Judge Knox. Recently Judge Mack declined to act because he had relatives holding stock in the company. Judge Thacher also declined to act because he was a counsel for the company before he became a judge. The company denies that the commission has jurisdiction.

Ten Cents in Sioux City

Under provision of its franchise with Sioux City, Ia., the Sioux City Service Company on Feb. 7 put into effect a 10-cent car fare, supplanting the present 9-cent fare. Tokens will be sold at eleven for $1. E. L. Kirk, vice-president and general manager, announced the increase after conference with city officials and explained that continual decrease in railway patronage with mounting costs of operation made the higher tariff necessary. Eight months ago the company raised its fare from 8 to 9 cents.

Revenues in 1928 were $36,000 less than in 1927 and $282,355 less than 1921. On the basis of its legal return of 6.5 per cent, the company was entitled to $324,722 last year, but the actual income was $125,392, $199,330 below the legal limit. The franchise provided for a 1-cent increase in the event the income fell $75,000 below the legal return, but the 10-cent fare is the limit provided in the contract and any further increases will necessitate a new agreement. Passenger revenue for last year was $772,598 and other income $6,298. Expenses included conducting transportation, $207,938; taxes, $86,999; power, $80,164; miscellaneous, $78,606; ways and structure, $75,496, and depreciation, $70,000.

Flocking to the Omaha Street Cars Out of the Cold

While Omaha, Neb., has been held in the grip of zero or near-zero weather, the Omaha & Council Bluffs Street Railway has been profiting, in daily receipts between $600 and $1,000. This figure is obtained by comparing the records of mild, snowless days with those on which cold and snow abound. Is it that the warm street cars are tempting when one faces the difficulty of driving an automobile in cold weather?

Vote Down Green Line Fare Increase

City Commissioners of Covington, Ky., recently voted unanimously against granting the Cincinnati, Newport & Covington Railway a higher rate of car fare. The vote came abruptly when Mayor Donnelly presented a letter from H. C. Blackwell, president of the company, asking the commissioners to appoint a business man on the committee of eight from Northern Kentucky cities to confer with the company relative to granting increased fares.

The so-called Green Line holds perpetual franchises over Covington streets, established after litigation years ago in the state and federal courts. These franchises stipulate a 5-cent fare, including transfers. The company would relinquish its perpetual rights for a twenty-year franchise with a 10-cent fare or three tickets for 25 cents, if an agreement to this effect can be arranged.

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Recent Bus Developments

Boston & Maine Buses Into Boston

With Chairman Henry C. Attwill dissenting, the Massachusetts Department of Public Utilities has granted the Boston & Maine Transportation Company a certificate of public convenience and necessity to operate its passenger carrying buses into Boston. This certificate applies to the Fitchburg-Cambridge line now in operation and allows the buses to carry the passengers into Park Square, Boston, prohibited previously. The line starts at Keene, N. H., and passengers boarding the bus at that point were allowed to come into Boston, but any passenger boarding east of Fitchburg had to debark at Kendall Square, Cambridge.

Two restrictions attached to the certificate follow:

That this certificate is issued upon the condition that vehicles operated hereunder shall not, when bound toward Boston, take on or admit passengers in Cambridge or Boston nor, when bound in the opposite direction receive passengers to be discharged, nor stop to discharge passengers in Boston or Cambridge.

That this certificate is issued upon the condition that the applicant shall with its vehicles make such connections with such railroads or street railways at such points as the department may from time to time order, and shall in connection with said railroads or street railways provide such through transportation upon its vehicles and upon such railroads or street railways and such joint rates therefore as the department may from time to time order.

One-Mile Extension in St. Paul

The first bus line street car extension in St. Paul, Minn., has been put in operation following an order by the Minnesota Railroad & Warehouse Commission. It operates a distance of about 1 mile. The company offered the substitute bus service, giving as adequate service, in preference to building an extension of its railway lines. The fare is the same as on street cars, with transfers to and from the cars.

Taxi Ordinance Shelved in Seattle

All chances for an early agreement in the City Council, of Seattle, Wash., on the question of an exclusive taxicab franchise for Sam V. Taggart and his associates, have been removed by the Council shelving the franchise ordinance. John E. Carroll, chairman of the franchise committee, has asked the public safety and utilities committee to assist him in the preparation of some temporary regulatory measure for Seattle taxicabs. A new measure, placing the taxicabs under a license fee of about $50 a year per cab, and putting all cabs under meter service rates, providing for extra charges for extra passengers, is proposed.

Clouds Lifting in Columbia

The transportation problem in Columbia, S. C., a costly and stubborn jam it has proved to be, now bids fair to be solved, though the situation so far as it concerns the restoration of railway service is still with the courts. Responding to the insistent demands of the citizens that something be done the Columbia City Council recently decided to give "some bus company" protection from railway competition for a period of three years, no matter what the courts might decide as to compelling the restoration of street cars, withdrawn from service in March, 1927.

Immediately after this announcement was made, the Columbia Bus Company, which has been giving a "sort of service," ordered seven 29-passenger gas-electric buses and two 17-passenger buses. These nine vehicles, with the equipment the company already had, gave it a fleet of 30 buses and with this fleet it was able to cover the city fairly well. The bus company, in its efforts to make good under the protection offered by the Council, also placed small placards, with printed schedules, at each street intersection in the retail business section of Columbia, giving the time to the different suburbs.

When the City Council saw that the Columbia Bus Company was seriously trying to improve its service, it issued orders that the city ordinance relative to "jitneying" should be rigidly enforced. Under this ordinance, jitneys and unregulated buses are prohibited from "cruising" for passengers and required to have regular stands.

Heretofore, jitneys have operated in the peak hours, picking up passengers anywhere and carrying them to their doors. Some of this "jitneying" was a sort of "bootlegging," but since the bus company was not giving the service the people demanded, the practice was winked at for it was better than nothing. But this practice ate steadily into the revenues of the bus company and made it hesitate to invest more money in equipment. Too, there was always the menace that the Supreme Court would hand down a decision ordering the railway to restore street car service. The tracks are in position; the feed wires and overhead are in place and the cars are in the carhouse so the bus company hardly knew where it stood.

Not in so many words, but in a way no less positive, the Council has indicated to the bus company that if it can not make good under the protection now afforded, it should quit.

Taxi Developments in Worcester

Railway officials in Worcester, Mass., are watching with interest the latest development in the taxicab war in that city. Sometime ago a cab company startled other similar concerns by putting in a fleet of taxis that carried up to four passengers for 35 cents to any part of the city. The other companies were forced to meet the price change. However, while the 35-cent cab service had a wide appeal it was not always so convenient as the railway.

Now the taxicab war has been renewed with another concern starting a line of 25-cent cabs. While it is anticipated that this too may cut into the patronage of the Worcester Consolidated Street Railway, there is already evidence that the taxi companies cannot continue the service at a profit. With the 25-cent cab fares this will become a problem even more serious. Moreover many patrons of the 35-cent cabs feel the necessity of tipping the driver and the cost is more often 50 cents rather than 35 cents. The railway fare is 10 cents.

The Worcester Consolidated Street Railway is not disposed to permit taxicab operators to solicit business in violation of the rules laid down by the license commission in Worcester. Recently one license was taken away from a driver who was alleged to have entered a restaurant to solicit business. A clean bill was given to 47 others against whom charges had been made, but the presentation of the charges is a warning to the taxi drivers.

The company is at present maintaining its new service policy and, while the taxicab competition is a potent factor in determining business policy, the present efforts of railway officials are directed only against palpable violations by the taxis.

Reduced Fares Proposed on Nashville Line

The Tennessee Transportation Company on Feb. 2 filed an application with the Tennessee Railroad & Public Utilities Commission for authority to put into effect reduced fares on commuters' tickets between Nashville and Old Hickory. This company, a subsidiary of the Nashville Railway & Light Company, operates buses in co-operation with the railway service in Nashville and environs, and recently was awarded a certificate of convenience and necessity for operating buses to Old Hickory. The reduced rate on commuters' tickets is 50 cents under the former charge.

New Haven Would Finance Bus Subsidiary

The New York, New Haven & Hartford Railroad, New Haven, Conn., is seeking permission in a bill before the Legislature to loan money to the New England Transportation Company, a bus subsidiary.

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Financial *and* Corporate

Emmanuel Interests Buy Tulsa Property

The Tulsa Street Railway, Tulsa, Okla., was sold under foreclosure in Tulsa on Jan. 23 to Albert Emmanuel, representing a majority of the first mortgage bondholders, for $233,334. Mr. Emmanuel was the only bidder.

Reorganization of the property will follow, but no immediate change in management is contemplated. C. H. Bosler, president of the company since it began business in that city in 1907, will remain executive head. The Tulsa property has been in receivership for more than a year.

Protective Committee for Ohio Company Formed

Holders of the Youngstown & Ohio River Railroad first mortgage 5 per cent bonds, on which the company ceased interest payments in April, 1927, have formed a bondholders' protective committee, which will have full power to take such action as may be necessary to protect the bondholders' interests, and, if there is a favorable opportunity, to sell the bonds. The committee consists of Charles Delany, Charles E. Denison and Francis Ralston Welsh. Bondholders are urged by the committee to send their bonds to the Girard Trust Company of Philadelphia, which has been named as depositary.

Illinois Valley Change Effected

Approval has been given by the Illinois Commerce Commission to the change from the Illinois Traction, Inc., Illinois Valley Division, to the Chicago & Illinois Valley Railroad. Officers of the new company, referred to in the Feb. 2 issue, are:

J. E. Johnson, president; H. L. Hanley, executive vice-president; L. E. Fischer, vice-president; Henry I. Green, vice-president and general solicitor; E. W. Fowler, vice-president and general manager; D. H. Holmes, secretary; P. L. Smith, treasurer; C. F. De Witt, assistant secretary; W. M. Irwin, engineer maintenance of way; R. G. Near, general freight and passenger agent; J. H. Comyns, superintendent of transportation; R. C. Holcman, auditor; T. H. Ruyle, master mechanic; F. E. Fisher, industrial agent.

New Director in Cincinnati

Stanley M. Rowe, vice-president and treasurer of the Shepard Elevator Company, Cincinnati, was elected a director of the Cincinnati Street Railway at the annual meeting of the stockholders on Jan. 30. He succeeds John B. Hollister, local attorney, who resigned.

Slight Decline in Traffic

Washington Railway & Electric Company reports 97,967,102 passengers in 1928. In addition 7,841,465 people rode company buses

DURING the year 1928 the Washington Railway & Electric Company carried 74,462,681 revenue passengers and 23,504,421 transfer passengers, or a total of 97,967,102 passengers. This is a decrease of 1,286,623 revenue passengers compared with the previous year, equivalent to 1.7 per cent. In his annual report to the stockholders President Ham said that when it is considered that the use of private automobiles is the largest contributing cause of the loss in street car traffic and that the number of automobiles registered in the District of Columbia in 1928 increased 18 per cent over the previous year, this decrease in traffic is not so much as might be expected. It is also of interest to note that statistics compiled by the American Electric Railway Association indicate that the loss of traffic in the railway industry is general throughout the country and that the loss in Washington is considerably less than that suffered in several sections of the United States.

The loss in traffic caused a decrease of $65,456 in operating revenue for 1928, but the company was able to effect a reduction in operating expenses in excess of the loss in revenue, thereby showing an increase in operating income of $22,818 for the year. The accompanying statement shows the year's income record.

Substantial renewals and repairs to track structures were carried to completion in 1928, thus continuing the practice that has been followed for the last ten years. The expense of maintenance of way and structures, together with allowances for depreciation, totaled $788,589. Major projects covered the reconstruction of 2.4 miles of underground conduit track and $\frac{8}{10}$ mile of overhead trolley track, at a total cost of approximately $255,000.

In 1928 there were placed in operation twelve new one-man cars, costing approximately $172,000. These were equipped with automatic rear exits, quadruple motor equipment and leather covered de luxe seats. Twenty-nine one-man cars were equipped with automatic rear-exit doors, at a cost of approximately $32,000.

The fleet of buses was increased to 84 by the purchase of thirteen Yellow Coaches in 1928, costing $94,687, and three Dodge-Graham and one G. M. C. bus, acquired through the purchase of the Montgomery Bus Lines, Inc., operating from Rockville, Md., to the center of Washington. During the year the buses operated 2,669,792 miles over routes in excess of 115 miles; carried a total of 7,841,465 passengers with receipts aggregating $554,873. These buses are operated as auxiliary to and in co-ordination with street car service. All of the bus lines not only afford convenience to the people residing in the territories directly served but make available more extensive transportation facilities for all those who use the service by reason of the liberal transfer privileges to and from the rail lines.

Due to the congestion caused by the constantly increasing number of automobiles on the streets of Washington, the company is making every effort to maintain its track and equipment to give Washington and outlying districts the best and safest transportation service. In spite of these efforts, the increase of traffic on the streets of Washington has brought about an increase of approximately 8 per cent in the number of accidents in 1928. Accidents with automobiles were 72 per cent of the total during the year.

The unification agreement entered into by The Capital Traction Company, the Washington Railway & Electric Company and Harley P. Wilson, owner of 21,237 shares of the stock of the Washington Rapid Transit Company, was approved by the stockholders of the company March 14, 1928. Certain modifications of the original agreement were required by the Public Utilities Commission before approval, and an amended contract embodying such modifications was approved by the stockholders at an adjourned meeting held April 6, 1928. Extensive hearings were had before the House District committee, which finally recommended the passage of legislation approving the contract. The matter is now pending before the Senate District committee.

CONDENSED STATEMENT OF EARNINGS AT WASHINGTON

Gross earnings from operation	$5,783,826	
Miscellaneous income (including dividends from Potomac Electric Power Company)	1,431,367	
Gross income		$7,215,194
Operating expenses (including depreciation), taxes and miscellaneous charges	4,731,042	
Interest on funded and unfunded debt	750,196	
Payment of dividends on preferred stock	425,000	
Payment of dividends on common stock	455,000	
		6,361,239
Balance of income for year 1928 credited to profit and loss		$853,955
Miscellaneous items credited to profit and loss		3,146
Total credited to profit and loss during the year		$857,101

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The total bonded debt of the Washington Railway & Electric Company and its subsidiaries, including the Potomac Electric Power Company, now outstanding with the public is $23,814,200. Adding to this the $15,000,000 capital stock of the parent company, and $7,002,850 outstanding capital stock of subsidiary companies, makes the total outstanding capital at this time of $45,817,500. This excludes from outstanding bonds those purchased for sinking fund and for temporary investment.

During 1928 the amount of taxes accrued for the entire Washington Railway & Electric Company's system was $1,418,184 of which $940,555 was against the power companies, and the balance against the transit properties. These taxes consist of the 4 per cent gross earnings or gross receipts tax, federal income tax, real estate tax, personal property tax, crossing police tax and certain licenses.

In addition to the insurance and pension benefits flowing to the members of the Washington Railway Relief Association, sick benefits are allowed its members, the total being limited to $200 per member in any one year. In 1928 there was expended for this purpose the sum of $14,755.

Brooklyn Merger Being Effected

Negotiations for a merger between the Brooklyn-Manhattan Transit Corporation and the Brooklyn City Railroad, which between them operate virtually all the surface lines in Brooklyn, N. Y., are said to be headed toward a successful conclusion.

The lines of the Brooklyn City Railroad were included in the old Brooklyn Rapid Transit Company system, but split off when the latter company went into bankruptcy and continued to be operated separately after the reorganization of the old Brooklyn Rapid Transit into the present Brooklyn-Manhattan Transit Corporation.

Transfer to Worcester Consolidated to Be Effected

Approval of the transfer to the Worcester Consolidated Street Railway, Worcester, Mass., of the franchise and property of the Worcester & Shrewsbury Street Railway and the Worcester & Shrewsbury Railroad is expected by the Massachusetts Department of Public Utilities, which heard the matter recently. These two lines exist now in name only, the Consolidated operating over the lines and holding all stock.

According to Clark V. Wood, president of the Springfield Street Railway and of the Worcester Consolidated, both roads have been leased for years to the Consolidated. Actually all stock in both roads is owned by the New England Security & Investment Company, a holding company for the so-called Consolidated group. Mr. Wood is also president of these roads. The Worcester & Shrewsbury Street Railway lines are those over which the Consolidated operates its cars through Shrewsbury.

Capital Stock in Elmira Increased

The Elmira Water, Light & Railroad Company, Elmira, N. Y., has filed a certificate in the office of the Secretary of State increasing its capital stock from $4,096,200 to $6,200,000.

Messrs. Wilson and Emerson on Cleveland Directorate

At the annual stockholders' meeting of the Cleveland Railway, Cleveland, Ohio, on Jan. 30, Paul E. Wilson, vice-president and secretary, and Ralph W. Emerson, vice-president and general manager, were elected to the board of directors. They take the places of Leonard C. Hanna, Jr., and Fred W. Ramsey. Mr. Hanna withdrew from the board because his business interests took him out of Cleveland frequently, while Mr. Ramsey is devoting all his time to the Y. M. C. A., of which he recently was elected general secretary.

In his report to the stockholders, Joseph H. Alexander, president, declared the company had done everything within its powers to avert an increase in fare to 8 cents. The next move is up to the city of Cleveland, he said, which can reduce the company's expenses by clearing up the traffic situation and increase the company's revenue by requiring long-haul riders to pay more nearly the cost of their transportation.

Two drastic steps were taken by the company in 1928 to avert an increase in fare, Mr. Alexander reported. One was an arbitrary transfer of $125,000 from the ticket float to the operating reserve and the other was an increase of 2 cents a car-mile in the operating allowance and a reduction of 2 cents a car-mile in the maintenance, depreciation and renewal allowance.

It was his belief that, if general conditions of travel and expenses of 1928 continued in 1929, the operating allowance must remain at 31 cents per car-mile and might have to be increased 1 cent.

Mr. Alexander said:

We may not again reduce our ticket float. We may not again waive part of our allowance for maintenance, depreciation and renewals. Income is scarcely adequate to present total expenses. We believe the desire of the company to avoid charging an increased rate of fare has been well evidenced.

More Moves Toward Washington Merger

Apparently the merger of Washington's street railway and bus lines has been brought one step nearer to realization. On Feb. 6 Senator Capper reported to the Senate that his committee had approved the unification compact with the addition of a few modifications which they thought essential to the public welfare. The merger resolution is now on the Senate calendar, but despite this it is not believed that congressional approval is likely this session. In a minority report made on the measure to be filed by Senator Blaine, of Wisconsin, the opinion is expressed that, in providing for a revaluation of the properties, Congress should specify that the prudent investment method be employed.

The report submitted to the Senate on the subject, after calling attention to the desirability of unified railway and bus service, states that public sentiment is overwhelmingly in favor of a merger of the several properties. The demand recently has become particularly acute for a merger, the report continues, because of the petition of one of the railways for increased fares. Emphasis is placed on the clause relating to charges made by the holding company, which is described as protecting the company from being "exploited through the device of so-called super service fees."

The report says these advantages will accrue as the result of a merger:

Better service through unification; immediate saving through universal free transfers; protection for two years against any fare increase; protection thereafter and lower fares if possible under any circumstances, through fair valuation and a share for the public in the proceeds of the economies of joint operation.

St. Louis Valuation Argued

The valuation case of the St. Louis Public Service Company was argued before the Cole County Circuit Court at Jefferson City on Jan. 30, the city of St. Louis having appealed from the decision of the Missouri Public Service Commission which granted the company a flat fare of 8 cents and fixed its rate base valuation at $63,500,000 as of Jan. 1, 1927. Counsel for the city argued that the valuation should not exceed $53,000,000. It was contended that the state commission gave undue weight to the reproduction cost new theory in granting the company a value of $63,500,000 on its operating properties. The city held the commission should have used the prudent investment theory for the valuation.

The city also contended before Circuit Judge Westhues that 7 per cent would be a reasonable return, whereas the commission granted 7.14 per cent, and that a cash fare of 8 cents or two tokens for 15 cents would be a justifiable maximum and that with enterprising, business-like management it should be possible to reduce the fare to 7 cents; that the commission ignored the downward trend of material prices and that the valuation of land held by the company was excessive by $1,500,000.

The company was barred from appealing from the decision, as it was granted the fare asked for, although the valuation was much below the $75,000,000 the company asked. It reasserted its claim to a valuation of $75,000,000, a rate of return of 8 per cent, and an annual depreciation allowance of $1,500,000 which the commission reduced to $800,000. Both sides will file briefs.

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Book Reviews

British Electrification Committee Reports to Ministry of Transport

Published by His Majesty's Stationery Office, London, 1928, and distributed by British Library of Information, 5 East 45th Street, New York City. Fourteen pages, 5 diagrams and 3 maps. Price $1.70 net.

Following the formation of the Ministry of Transport the railway electrification committee was formed in November, 1927, to review the recommendations of the electrification of railways advisory committee, 1921, and to report what modifications, if any, should be made in these recommendations, having regard to the developments which have taken place since that date.

The principal recommendations in the present report are that direct current should be used for all British electrifications at 750 or 1,500 volts, with 3,000 volts subject to approval in special conditions. All motors, either for higher or lower voltage systems, should be capable of operating satisfactorily on the higher or lower maximum standard voltages respectively. Generation should be in the form of three-phase alternating current at 50 cycles and suitable voltage. For higher voltages overhead collection with uninsulated rail return is specified, while for the lower voltage the third rail with uninsulated rail return is standard, except that a fourth insulated rail may be permitted for tube lines, and for limited extension of systems now employing an insulated return.

Two standard clearance limits are specified, the first having a maximum height of 12 ft. 8 in. and the second a height of 13 ft. 2 in. Clearance diagrams are given in the report. Specifications for third rail and overhead clearances are also included. The three insert maps cover respectively England and Wales, Scotland, and London and its environs, showing in color the clearance limitations on all the main line railways of Great Britain.

Electrical Engineering—Alternating Current

Chester L. Dawes, S.B. Assistant Professor of Electrical Engineering, Harvard Engineering School. Published by the McGraw-Hill Book Company, Inc., New York, N. Y. 620 pages, illustrated, price $4.

Planned primarily to meet the needs for courses in alternating current which are semi-elementary in character, such as are given in the engineering schools, this book also contains much information of use to electrical engineers of railways. The chapter on transmission of power describes line and substation practice in transmission systems and gives line calculations. The various types of lightning arresters are treated and much information is given on line construction. This chapter also includes material on arrangement and operation of substations, a treatment of automatic substations and the latest equipment now being used.

Various pieces of alternating current equipment are discussed in special chapters such as those on transformers, induction motors, and others on synchronous motors and rectifiers.

Boston Elevated Railway Co-operation —1928

Index to Volume 7, 192 pages.

A bound indexed copy with title page of "Co-operation," the bulletin of the employees of the Boston Elevated Railway, Boston, Mass., published monthly is ready now. The twelve issues of 1928 are included and all important articles, tables and diagrams comprise the index. It is suggested that copies be preserved and filed with the title page and index. An index including "Don't Trouble Trouble" in verse by J. E. Hungerford and autographs of 45-year men testify to the human interest features in Co-operation.

Principles of Scientific Purchasing

By Norman F. Harriman. McGraw-Hill Book Company, New York, N. Y. 301 pages; price $3.

FUNDAMENTALS of the purchasing function rather than the technique of buying are dealt with in this concise account of the application of economic and engineering principles to the function of purchasing in industry. The rather meager literature in the form of books in the field of purchase has been devoted for the most part to the practical details in the purchase of particular commodities and to standard forms and routine office methods. Realizing the inadequacy of the available literature in this "buyers age," Norman F. Harriman has studied in considerable detail the fundamental economic, technical, financial, legal, psychological and inspection matters connected with purchasing.

Briefly tracing the evolution of merchandising and the market, the author arrives at a definite outline of the knowledge required of a modern purchasing executive. He then deals with the importance of the business of buying and considers separately the various aspects of the purchasing function. There are a number of economic forces that have come into play during the past two decades, among the most important of which are the higher price levels of today, the modern approach to standardization and mass production of commodities and the resulting decreased cost per unit, and the economies of mass purchasing. Appropriateness, quality, service and price are the buying factors, and their relative importance is in the order indicated.

Value should be distinguished from price. The author points out that perhaps one of the greatest economic lessons for a purchasing agent to learn is that the first cost is not the last cost; that the cost per unit of service is what determines the value of a product.

Good judgment in purchasing requires a combined knowledge of sound finance and sound economics. Financial problems are very definitely related to the phases of the business cycle. To purchase intelligently, the purchasing agent should be conversant with the financial resources of his company and should realize that bills for commodities contracted for have to be met. The purchasing department should closely collaborate with the financial department, should keep a minimum investment in the inventory, should study the relative advantages of long and short-term contracts, and the fundamental economic conditions and price trends.

On the psychological aspect of purchasing, the author raises the question: why should not the purchaser as well as the vendor determine the psychological moment in a sale. From the standpoint of the psychology of business relations, the purchaser's chief interest may be said to be in the manner in which his mental attitude affects the transaction. The purchaser has the power to discriminate, he has sources of information other than from the vendor alone, and his greatest offense, which cannot be over-emphasized, is his knowledge of his own reaction in the transaction. By close observation and by observing the vendor's tactics, the purchaser can soon come to recognize the kinds of persuasion to which he ought to control his reactions.

Fundamental principles that govern the business of buying are: Plain common sense, practical judgment, foresight, initiative, diversified knowledge, and ability for analysis. Of these, the ability to analyze a problem or reduce it to its elements is one of the most valuable. This faculty assists in the determination of the facts, and once the facts are known the solution of most business problems is relatively easy.

Supplementing the chapters on the organization and procedure for scientific purchasing, and the control of quality purchases, the author includes an extensive appendix on the purchasing organization and procedure of the Western Electric Company, the New York Central Railroad, the United States Navy, the Pittsburgh Plate Glass Company, and the certification and labeling plan of purchasing.

The author's wide experience in dealing with the practical problems of purchasing and its related subjects makes the contents of the book particularly adaptable to the electric railway industry.

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Personal Items

T. Norman Jones Executive Vice-President at Richmond

T. Norman Jones, general manager of the Virginia Electric & Power Company at Norfolk, Va., for a number of years, has been appointed executive vice-president of the company with headquarters in the general offices at Richmond. Mr. Jones assumed his new position on Feb. 1.

Mr. Jones has been actively identified with the Virginia Electric & Power organization for many years. He began as mechanical and electrical engineer in 1906. In 1907, he went with the former Richmond & Chesapeake Bay Railway, the electric interurban line between Richmond and Ashland, but returned to the Virginia Railway & Power Company a few years later as chief superintendent of railways. On Jan. 1, 1916, Mr. Jones was appointed assistant general manager of the company's properties at Norfolk. Later he was made general manager. Mr. Jones is a native of Richmond. He was graduated from the University of Virginia.

L. C. Lemon Will Go to Muscatine

L. C. Lemon has resigned from the Tri-City Railway and the Cedar Rapids, Davenport & Muscatine Railway lines in Davenport, to become affiliated with A. R. Menary, of Cedar Rapids, in establishing a motor coach system for the city of Muscatine.

Ohio Commission Completed

Judge Frank W. Geiger, of Springfield, has been appointed a member of the Ohio Public Utilities Commission, by Governor Cooper. In this capacity he fills the place left vacant by the expiration of the term of James W. Huffman. Judge Geiger served thirteen years as probate and juvenile judge of Clark County and for seven years presided in the Common Pleas Court of the county. Since 1923 he has been engaged in the active practice of law in Springfield.

With this appointment and the naming by Governor Cooper of Roscoe McCulloch as chairman of the commission, reorganization of that body has been completed.

Frank Mulks Assists President Shoup

In connection with the advancement of Paul Shoup to the presidency of the Southern Pacific Company, Pacific System, referred to previously in the ELECTRIC RAILWAY JOURNAL, Frank Mulks was appointed assistant to President Shoup. He is termed a Pacific Electric product, beginning in the accounting department of that company, later becoming assistant to the vice-president and general manager, Mr. Shoup, and going with him to San Francisco as office manager of the Southern Pacific Company. Mr. Mulks then became assistant to the executive vice-president, again Mr. Shoup, and more recently was honored along with his chief.

Frank A. Forty Heads Schedule Department in Chicago

Frank A. Forty has been appointed superintendent of schedules of the Chicago Surface Lines, Chicago, Ill., succeeding Daniel Boal, who died on Jan. 20.

During the summer vacations while he was attending the University of

Frank A. Forty

Illinois, he was connected with the mechanical department of the Chicago Surface Lines. After graduation he was employed for two years in the railway engineering department of the Westinghouse Electric & Manufacturing Company. During the World War he enlisted as a private in the 28th Division, and later was made captain in the 37th Engineers and served in France, making a splendid record in the Meuse Argonne offensive. In 1920 he was employed in the Beeler Transportation Survey in Chicago and the following year was engaged by the Surface Lines to assist in the schedules department. Since that time he has been connected with that department.

Mr. Forty was graduated from the University of Illinois in electrical engineering in 1915 and has a good background of experience particularly fitting him for the position to which he has been appointed.

DR. JULIUS KLEIN is sailing shortly for Europe, where he will attend the annual meeting of the commercial attachés to be held in Vienna. He is also making some observations which have to do with certain economic questions concerning the Mediterranean area.

Illinois Terminal Appointments Announced

A. P. Titus, new vice-president, assigns Messrs. Powell, Twohy, Bodge and Kester to his staff

A. P. TITUS, formerly vice-president and general manager Chicago & Alton Railroad, who was recently appointed vice-president in charge of operation of the Illinois Terminal Railroad System, will have charge of operation of both the steam and electrified lines of the Illinois Terminal Railroad System. It is understood that Mr. Titus in his new position will assume the executive duties heretofore performed by D. W. Snyder, Jr., vice-president of the electrified lines, and H. H. Ferguson, vice-president of the steam lines of the Illinois Terminal Railroad System. His office will be in St. Louis.

Mr. Titus has announced the following appointments to the traffic department: H. G. Powell, general traffic manager, St. Louis, Mo.; H. A. Twohy, freight traffic manager, St. Louis, Mo.; E. L. Bodge, assistant freight traffic manager, St. Louis, Mo.; E. E. Kester, passenger traffic manager, Springfield, Ill.

Mr. Snyder is taking a five-week leave of absence, after which announcement of his future plans will be made public.

Mr. Titus has been in railway service for more than 36 years. He was born on April 11, 1875, on a farm near Princeton, N. J., and attended Princeton Preparatory School and Princeton College, entering railway service on July 1, 1890, in the car department of the Lake Shore & Michigan Southern (now part of the New York Central) at Cleveland, Ohio.

From 1893 to 1895 Mr. Titus was connected with a mining company in Mexico, then returned to the Lake Shore & Michigan Southern. In May, 1900, he was appointed car distributor and chief clerk to the superintendent of car service Wheeling & Lake Erie, being promoted to superintendent of car service at Pittsburgh, Pa., in November, 1905, to assistant superintendent at Canton, Ohio, in May, 1907, and later to superintendent at Canton.

He entered the service of the Alton in September, 1912, as general superintendent at Chicago. In November, 1915, he was further promoted to general manager, with headquarters at the same point, and in February, 1922, he was elected vice-president in charge of operation. When the Alton went into receivership Mr. Titus' title was changed to chief operating officer, with headquarters as before at Chicago.

A. G. Wadleigh Eastern Massachusetts Chairman

At the initial meeting on Jan. 15 of the new board of three public trustees of the Eastern Massachusetts Street Railway, Boston, Mass., Arthur G. Wadleigh, one of the number, was elected chairman of the board.

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F. W. Woodcock Heads New Utility Company

Floyd W. Woodcock, who as vice-president of Day & Zimmermann has been in charge of public utility properties under their management for eight years, has been named president of the Empire Public Service Corporation, formed recently, as a new holding company controlling properties in Maryland, Ohio, Kansas, Louisiana, Oklahoma, Texas and Colorado with assets of $35,000,000. Mr. Woodcock was connected with the public utility management department of Day & Zimmermann in Philadelphia. Later he was named acting general superintendent of the Martinsburg Power Company, Martinsburgh, W. Va., and after a short association with that utility he was appointed general superintendent of the Eastern Shore Gas & Electric Company, Salisbury, Md. This position he held for four years, from 1916 to 1920. Mr. Woodcock is a member of the American Institute of Electrical Engineers, the American Electric Railway Association and other similar societies.

T. J. Hanlon, Chairman Florida Bureau

T. J. Hanlon, Jr., general manager of the Tampa Electric Company, Tampa, Fla., was recently made chairman of the Florida Public Utilities Information Bureau. Mr. Hanlon has been in the employ of Stone & Webster since he was graduated from college in 1907.

L. W. Hess Retires

L. W. Hess, general manager of the Northern Illinois group of properties of the Illinois Power & Light Corporation, has retired after 31 years of service. Mr. Hess has been identified with public utilities since 1898, when he was appointed receiver for the Ottawa Street Railway. When the bondholders, represented by E. H. Rollins & Sons interests, retrieved the property from the jurisdiction of the courts, he was appointed manager. Later he also became manager of the Thomas Light & Power Company, which was bought by the Rollins interests. In 1910 the combined property was bought by the Illinois Traction Company, later becoming a part of the Illinois Power & Light Corporation.

F. A. Fitzpane Succeeds R. S. Pilcher

F. A. Fitzpane, assistant transport manager of Edinburgh (Scotland) tramway and bus department, has been unanimously recommended by the transport committee of the Town Council for appointment to the post of general manager, succeeding R. S. Pilcher, who was recently appointed general manager of Manchester Tramways. Mr. Fitzpane has held a number of important appointments, notably the managership of Leith tramway undertaking. When, a few years ago, Leith was amalgamated with Edinburgh, he was appointed deputy transport manager of the combined undertakings of the two towns, and he collaborated with Mr. Pilcher in the change-over of the Edinburgh system from cable to electric traction.

C. D. Andrest, bus manager of the Citizens Rapid Transit Company, Newport News, Va., controlled by the Virginia Public Service Company, has resigned his position and on Feb. 1 became connected with the Omaha & Council Bluffs Street Railway, Omaha, Neb., as assistant to the vice-president in charge of transportation. Frank Hudson, the present superintendent of transportation at Omaha, will continue in that capacity.

Wray T. Thorn, formerly assistant engineer of cars and equipment of the Board of Supervising Engineers, Chicago Traction, and more recently with the Garford Motor Truck Company, Lima, Ohio, has become connected with Dwight P. Robinson in the work that organization is doing in connection with the proposed construction of the new subway in Buenos Aires, Argentine. Mr. Thorn served the Chicago board for more than ten years. His first experience in the electric railway industry was with the Union Traction Company of Indiana.

C. I. Crippen, a vice-president of the American Electric Power Corporation, New York, parent organization of the Iowa Public Service Company, the Sioux City Gas & Electric, and the Sioux City Service Company, has been elected president of the Iowa group. He succeeds Don M. Sterns, who retires as president to become chairman of the board of directors of the Iowa Public Service Company. Mr. Crippen served at one time as assistant to the vice-president and general manager of the Penn-Ohio System, covering all phases of operation.

W. Findlay Downs has been elected president of Day & Zimmermann, Inc., and Day & Zimmermann Securities Corporation. In this post he succeeds John E. Zimmermann, resigned. Mr. Downs' association with Day & Zimmermann, Inc., began in 1919 in the capacity of report engineer. Early in his career he was associated with the United Gas Improvement Company, Philadelphia, and later worked for the J. G. White Engineering Corporation. From 1915 to 1918, he served as assistant engineer of the Public Service Commission of Pennsylvania.

John Lee Gainey, Jackson, has been elected secretary of the Mississippi Railroad Commission, to fill the vacancy caused by the resignation of Paul D. P. Spearman, now attorney for the Federal Radio Commission.

OBITUARY

Samuel Wylie Miller, consulting engineer of the Union Carbide & Carbon Research Laboratories, Inc., of Long Island City, N. Y., well known as a pioneer in oxyacetylene welding and an authority on its application, died on Feb. 3 at his home on Long Island. His first professional activities were as master mechanic for the Pennsylvania Railroad plants at Logansport and Indianapolis, Ind., and Columbus, Ohio. Following this he was with the American Locomotive Company at Dunkirk, N. Y., and Providence, R. I., after which he founded the Rochester Welding Works at Rochester, N. Y. In 1921 he joined the newly formed Union Carbide & Carbon Research Laboratories, Inc. He was 62 years old.

Matthew Slush, builder of electric railways, died at his home in Mount Clemens, Mich., on Jan. 22. He constructed the interurban line from Kenosha to Milwaukee, Wis., which later became a unit of the Chicago, North Shore & Milwaukee Electric Railway. He also assisted in building other lines of the kind, among them the Mount Clemens, Lake St. Clair Shore Line, Fort Wayne & Huntington, Ind.; Detroit Toledo Line, and Chicago to Kankakee, Ill. Mr Slush was born in Ontario in 1856 and went to Michigan when he was sixteen years ago. After a successful career in the lumber industry, he then turned his attention to electric railways.

Thomas Riedy, for 57 years an employee of the Chicago Surface Lines, Chicago, Ill., died recently. He began his services with the railways in Chicago in 1872 at the Western Avenue carhouse. Later he was promoted to the position of supervisor. The last few years he was attached to the general offices. Mr. Riedy was born in Ireland 73 years ago.

Harold B. Whiteman, assistant to the vice-president Allied Power & Light Corporation, died on Feb. 1. Mr. Whiteman in the five years following his graduation from Amherst College in 1912 was employed by the Columbus Railway Light & Power Company, Columbus, Ohio, and Chattanooga, Tenn.; the East St. Louis Railway & Suburban Company and the Nashville Railway & Light Company, becoming secretary-treasurer of the Nashville Company. In August, 1917, he became assistant general superintendent Chattanooga Railway & Light Company. In 1920 he was also made assistant general superintendent Tennessee Power Company, retaining this position with the Tennessee Electric Power Company upon its organization in 1922. Two years later he became commercial manager and subsequently was called to New York to assume executive duties with Hodenpyl, Hardy & Company, which last year was succeeded by the Allied Power & Light Corporation.

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Large Track Construction Programs Are Planned

International Railway, Buffalo, N. Y., will spend $1,000,000 for track reconstruction during 1929. $634,500 Improvement planned for Minneapolis. 150 New subway cars recommended for Brooklyn

RECONSTRUCTION of track amounting to more than $1,000,000 will be made by the International Railway, Buffalo, N. Y., during the year 1929. This program was agreed upon recently at a conference of representatives of the railway and members of the Common Council. The actual track reconstruction and repaving will amount to approximately $630,000, and the general maintenance cost will be about $400,000.

The program calls for track construction and repaving on Seneca Street from Main to Michigan Streets, and from New Bailey to Peabody Street on William Street; from Babcock to the Erie Railroad tracks on Virgil Street and, also on Virgil Street, from Tacoma to Taunton Street; on Clinton from Michigan to Pine Street; on Clinton from Cedar to Jefferson; on Fillmore from Genesee to Seneca; on Swan from Washington to Ellicott and from Jeferson to Seneca Streets; on Erie from Main to the lower Terrace, and on Ferry Street from Jefferson to Fillmore.

This program agreed upon will bring the total amount expended by the International Railway in the past three years up to $2,500,000. Of the $1,000,000 appropriation for this year more than half will be spent for reconstruction, which is 70 per cent more than last year and 150 per cent more than two years ago. The company will build about 10 miles of single track and paving. The tracks and paving at several important intersections will be renewed in whole or in part.

The largest construction job will be on Fillmore Avenue, which is the approach to the new New York Central Terminal. This construction will cost more than $250,000. Although a number of other construction jobs were suggested by the city, this work must be deferred until more money becomes available. Work on the present reconstruction program will be commenced as soon as favorable weather arrives.

Minneapolis Improvements

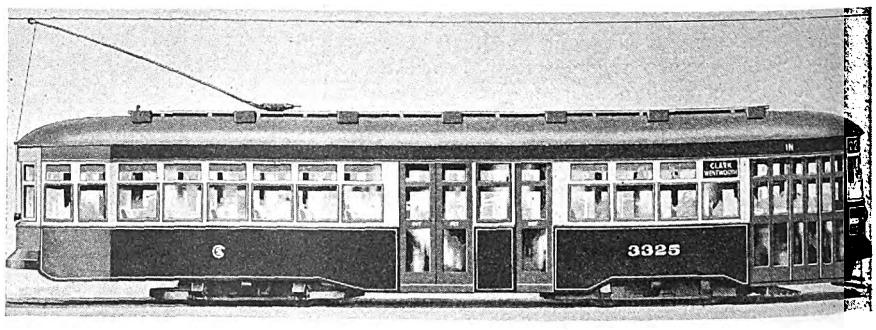
The budget for proposed improvements in 1929 by the Minneapolis Street Railway, Minneapolis, Minn., includes track relaying and renewals costing approximately $634,500. The program calls for reconstruction on East Hennepin Street from Fifth Street to the Missouri River to cost $21,950, relaying of tracks on University Avenue to cost $80,000, relaying of tracks on Tenth Avenue and on West Broadway to cost $75,900, and the relaying of tracks on Hennepin Avenue from Seventh Street to Eleventh Street to cost $32,200. Reconstruction is planned on Nicollet Avenue from Eighteenth Street to 24th Street, to cost approximately $30,000, and on Glenwood Avenue at a cost of about $9,200. Special work at Hennepin Avenue and Third Street will cost $29,000, and paving between the tracks on several additional lines will cost about $86,800. New work on tracks on Washington Street between Seventeenth and Nineteenth Avenues will cost $18,000, and another relaying job will amount to about $30,470. Extension of the 28th Avenue line from 50th to 54th Streets will amount to $21,000, and the Como-Harriet line on France Avenue, between 50th and 44th Streets, will cost about $33,600. In addition, an outlay of approximately $166,400 will be made for general purposes. This amount will be prorated between thirteen wards, each being credited with about $12,800.

Cars for Brooklyn

Commissioner Lockwood of the New York Transit Commission has received testimony on the proposal of the commission to have the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., purchase additional equipment and furnish improved service during the non-rush hours. The engineers of the commission consider that it will be necessary to add 150 new cars in the Brooklyn subway system to speed up the service. As for non-rush hour service, the engineers have recommended that the railway be required to run full-length trains during these periods.

During this year most of the appropriations of the $7,000,000 improvement program of the Georgia Power Company, Atlanta, Ga., will be spent on the

Chicago to Order 100 New Cars



The new cars will be the first of the front-entrance, center-exit type placed in service in Chicago

Chicago Surface Lines, Chicago, Ill., will soon purchase 100 new single-end, double-truck, city type passenger cars. As mentioned in the Jan. 19 issue of Electric Railway Journal, the Chicago Railways authorized the purchase of 60 of these cars, and the Chicago City Railway authorized the purchase of the remaining 40. In accord with the program for higher scheduled speed being carried out by this company, these cars will be equipped with sufficient motor power to give quick acceleration and high running speeds. Each of these two-man cars will seat 60 passengers.

Departing from the usual practice, these cars will be the first front-entrance, center-exit type to be placed in service in that city. To facilitate the loading and unloading of passengers in these large units, double and single folding entrance doors are provided in the front end, and double and single sliding type exit doors are installed in the center of each car. A light color interior painting scheme will be used instead of the usual mahogany stain. In the rear section of the car cross-type seats will be employed. In the front end, cross seats will be installed on one side and longitudinal seats on the other thus expediting the movement of passengers from entrance to exit. All seats will be fully upholstered in leather.

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street railways in Atlanta as the Macon, Rome and Athens Street Railway Systems have been overhauled recently. Some of the money, however, will go to other cities where street railway lines are operated.

According to word received recently, plans for the proposed extension of the Hill Street Tunnel of the Pacific Electric Railway, Los Angeles, Cal., to Glendale Boulevard and Riverside Drive are being made by the New York office of this railway.

In two bills passed by the City Council of Seattle, Wash., extensions of the Beacon Hill street car line are provided for. One bill allows for a $28,100 extension from Spokane Street to Columbian Way, and the other for the extension of Columbian Way to Graham Street, at a cost of about $27,900. Residents of this district have been requesting this extension for some time.

The Illinois Terminal Railroad will construct nine new locomotives at its Decatur shops. Five small electric locomotives of the class O type are being built at the present time, and work on four of the large class C engines is scheduled to start on Feb. 1. The large locomotives will be used in regular train service and the smaller engines will be used in switching and pulling small work trains. The large locomotives weigh approximately 150,000 lb. each and generate 1,000 hp., giving a pull of more than 40,000 lb. It is estimated that they will cost approximately $50,000 each. The smaller type locomotives, costing approximately $20,000 each, will weight about 80,000 lb. and develop 250 hp.

The Key System Transit Company, Oakland, Cal., has ordered ten urban type Twin Coaches. Three of this type of coach have been ordered by the Detroit Street Railways and four of the same type have been purchased by the Jacksonville Traction Company, Jacksonville, Fla. The United Electric Railways has ordered nine suburban express type Twin Coaches.

Cars Remodeled

Thirty cars are being remodeled for one-man operation by the Duluth Street Railway, Duluth, Minn. In connection with this work this company has purchased 30 sets of front and rear pneumatic door controls, 30 sets of safety equipment and 30 sets of leather upholstered seats for remodeling the cars. This company has also purchased 5 miles of No. 00 round trolley wire.

The Virginia Electric & Power Company, Richmond, Va., has placed orders for ten kegs of 1x5-in. track bolts, five kegs of ⅞x5-in. track bolts and 80 kegs of track spikes. This company also ordered 500 rail bonds, 35 tons of 98-451 steel rail and 30 tons of section 132-443 steel rail. Among line materials ordered by this company are included 700 trolley cars, 350 trolley suspension clamps, 30 trolley section insulators and six trolley frogs. For handling coal at its Twelfth Street plant this railway has purchased one 43-ton locomotive from the Equipment Corporation of America, Philadelphia, Pa. This company has also purchased five urban type Twin Coaches. Six of this type of coach have been purchased by the Northern Ohio Power & Light Company, Akron, Ohio, and one by the Houston Electric Company, Houston, Tex.

Turnstile Equipped Car Tried in Brooklyn

A surface car with equipment adapted to the subway method of fare collection by automatic turnstile was placed in service recently for experimental operation on the Vanderbilt Avenue line of the surface lines of the Brooklyn-Manhattan Transit Company, Brooklyn, N. Y.

The car is designed for front entrance, with exit facilities at both the front and read. Passengers boarding

The car is equipped with an automatic fare collection turnstile

the car pass behind the operator to a turnstile just inside the body. The turnstile is of the mechanical type with revolving arms and is manufactured by the Perey Manufacturing Company. The turnstile operates with less noise than those used at subway stations and is of lighter construction. The slot in which the coin is deposited is situated at the corner of the machine handiest to the entering passenger. The operator is provided with fare tokens to be given to passengers who board the car with transfers, so that they may also pass through the turnstile, which is constructed so that either a fare token or nickel will release the mechanism and admit passengers.

Modern type safety devices have been installed in the new unit. The doors are operated by pneumatic engines, which are interlocked with the operation of the motorman's brake valve. The rear exit doors are treadle operated and are also interlocked with the brake valve, so that they will function only when the car is stopped. The controller is the "dead man" type.

Longitudinal seats and a wide center aisle permit passengers readily to move through to the rear exit. Enameled handhold rails extend the entire length of the car on each side, suspended at a convenient height, and take the place of the old straps provided for standing passengers. As a protection for alighting passengers and reminder to drivers of approaching automobiles the words "Obey the 8-Foot Law" are painted on both ends of the car close to the exit doors.

To Have Exhibit Days at Convention

Due to the general success during the several previous conventions in setting aside one day during the convention week for the intensive inspection of exhibits by operating members, the American Electric Railway Association executive committee, at its meeting in Indianapolis on Jan. 25, resolved that, at the coming convention to be held in Atlantic City, Monday afternoon and Wednesday morning of the convention week are to be devoted exclusively to the exhibit inspections, and requested that no meetings of any kind be scheduled during those periods.

At this meeting, the executive committee expressed its appreciation of the co-operation during previous conventions, upon the part of the manufacturers in abstaining from demonstrating operating equipment, staging exhibits in hotel rooms and other places away from the exhibit halls, and inviting delegates to their demonstrations and exhibits. It has requested the continuation of the manufacturers' support in this matter.

Electrical Manufacturers Revise Constitution

The revised constitution and by-laws just passed by the National Electrical Manufacturers Association marks a new departure in association management. The outstanding feature of the constitutional revision is the creation of a council of the chairmen of all groups in the N.E.M.A. In the new section council the leaders of the individual groups, both sections and divisions, will be able to accelerate and render their efforts more efficient through the closer relationship with the board of governors to which they will annually elect nine of their number. In view of the fact that all association activities originate in the groups, which are now represented on the governing body, an astonishing degree of mobility has been obtained.

The revised constitutional set-up also provides for the regrouping of sections into new divisions in which it is believed that a closer and more effective degree of co-operation can be obtained by the individual sections thus organized. A new divisional grouping has been suggested and is at present being considered by the sections. Final approval of this regrouping will probably be given at the time of the spring meeting and will then become effective.

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By decreasing the number of meetings from six to three each year, the association believes that approximately $300,000 will be saved annually to the membership. The annual meeting of the association will be held in the fall instead of the spring as heretofore. In addition, two other meetings of the association may be held each year.

Westinghouse Enlarges Advertising Activities

Significant of its extensive effort to sell the idea of the Westinghouse institution as a leader in the development of the electrical industry, the Westinghouse Electric & Manufacturing Company has announced a considerably larger advertising program for 1929. This increase in advertising will be made in technical, trade and business publications, as well as in the daily newspapers, according to the plan stated before the McGraw-Hill editors and business executives in a recent meeting with J. C. McQuiston, general advertising manager for the company. Rotogravure advertising in Sunday newspapers will be resorted to on a large scale in 35 metropolitan centers throughout the country, supported by newspaper advertising in other papers. Advertising of all types will be co-ordinated for each of the metropolitan areas.

A major feature of this program is a definite tie between advertising and sales efforts of the company. It is an impressive program, first started two years ago, that has resulted in making the Westinghouse organization "advertising conscious," according to Mr. McQuiston. The entire campaign is to be based first, on the development of community markets for merchandise equipment through newspaper advertising; second, on the development of industrial and trade markets through business and technical paper advertising; and, finally, to co-ordinate and time all advertising to suit the seasonal and territorial demands.

The list of business and technical magazines selected by the company is well over 150, covering practically every American industry. In addition, as in the past, the leading state farm papers will be used for such advertising as is applicable to the rural community. Financial publications will also be utilized.

In addition, reprints of important technical magazine articles and several descriptive leaflets on apparatus will be available, presenting a complete line of literature on any subject needed. Aside from the regular schedule of trade paper advertising, in which advertisements will be alternated on oil-electric, gas-electric and electric locomotives, a special series of electrification advertisements will be run this year.

This extensive group plan of advertising, to be promoted in large centers of population and made increasingly effective by a saturation of the surrounding territories through local mediums, will be backed up by an increased presentation in technical and trade publications. With the intimate co-operation and enthusiasm of its sales force, this plan should be of particular value to the electric railway industry in its present trend toward modernization.

METAL, COAL AND MATERIAL PRICES F.O.B. REFINERY

	Feb. 5, 1929
Metals—New York	
Copper electrolytic, cents per lb.	16.275
Copper wire, cents per lb.	19.375
Lead, cents per lb.	6.65
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	50.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons.	$4.375
Somerset mine run, f.o.b. mines, net tons.	1.875
Pittsburgh mine run, Pittsburgh, net tons.	1.80
Franklin, Ill., screenings, Chicago, net tons.	1.45
Central, Ill., screenings, Chicago, net tons.	0.975
Kansas screenings, Kansas City, net tons.	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$5.75
Weatherproof wire base, N. Y., cents per lb.	20.375
Cement, Chicago net prices, without bags.	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.6
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.25
Turpentine (bbl. lots), N. Y., per gal.	.645

New Electric Railway for Japan

One of the most important developments since the earthquake will be undertaken in the city of Yokohama, Japan, according to plans which are now under consideration.

It is reported that Ryosaku Kume, of Tokyo, and twelve other promoters are planning a new electric railway to run around the city of Yokohama. The company has already applied for a license and will be known as the Yokohama Junkan Denki Tetsudo K.K. to be capitalized at 3,500,000 yen, approximately $1,662,000. The projected line will start from the New Yokohama Station and terminate at Isogo Machi, via Hodagaya Machi, Kusaka Mura and O-oka Mura, approximately 5 miles.

Waste Elimination Supported

That the individual is taking a greater interest in the work of the U. S. Department of Commerce in assisting American industry to eliminate waste, through simplification and standardization, is evidenced in a report just made public by the Department reviewing the progress report of this group for the 4th quarter of 1928.

According to this report, the number of acceptances for simplified practice recommendations increased during the quarter from 12,342 to 14,190. During the calendar year 1928 the total number of acceptances increased from 8,546 to 14,190. During 1928 industry developed 22 new simplifications, under the auspices of the Department. There are more than 100 effected simplified practice recommendations.

After a proposed simplification is approved at a general conference of interested manufacturers, distributors and users, it is then sent to the industry for signed acceptance. When the division of simplified practice has received signed acceptance pledges from at least 80 per cent of the industry, by volume of annual output, the recommendation is then endorsed and published by the Department of Commerce. These recommendations are subjected to periodical review or audit, which not only gives the industry concerned an opportunity to determine the support given its program, but also the opportunity to revise or modify it, if changes in the industry so warrant.

Of the more than 100 developed simplified practice recommendations, 89 have received sufficient endorsement from industry to warrant the Department publishing them, of which number 84 are already in print.

Booklet Describes British Electric Locomotives

In view of the recent order received by the Metropolitan-Vickers Electrical Company, Trafford Park, Manchester, England, for 21 additional electric locomotives for the Great Indian Peninsula Railway, special interest is attracted to an illustrated book just issued by the Metropolitan Vickers Company. This publication gives particulars of various types of electric locomotives supplied to the Great Indian Peninsula Railway, the South African Railways, the North Eastern Railway (England), the Metropolitan Railway (England), the Paulista Railway (Brazil), the Oeste de Minas Railway (Brazil), the Government of Western Australia, the Japanese Government Railways, the Broken Hill Proprietary Company (Australia), and the Czecho-Slovakian State Railways.

As a preliminary to the details in regard to each type of locomotive, there is a useful introduction in which the electric locomotives are described. Besides being illustrated by photographs, the book contains a number of drawings.

Cutler-Hammer Changes Name

Announcement has been made of a change in the name of the Cutler-Hammer Manufacturing Company, Milwaukee, Wis., manufacturer of electric motor control, wiring devices and allied lines. The new name of the company will be Cutler-Hammer, Inc.

The new company is organized as a Delaware corporation with the following officers:

Chairman of the board, F. R. Bacon; president, B. L. Worden; vice-president, F. L. Pierce; vice-president, J. C. Wilson; treasurer, H. F. Vogt; secretary, W. C. Stevens.

In the change from a Wisconsin to a Delaware corporation the Cutler-Hammer Manufacturing Company, Milwaukee, the Cream City Foundry Company, Milwaukee, and Cutler-Hammer Manufacturing Company, New York, are united under one name.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL,
Publishing Director

Volume 73 New York, Saturday, February 16, 1929 *Number 7*

A Race Against Time

SINCE the first of the year, millions of dollars have been appropriated by electric railways for track construction. It is at this season of the year that these budgets become operative and large orders are placed for the activities of the coming construction season. It is worthy of note that for several years the volume of track construction has been steadily increasing. This indicates that electric railways are alert to the need for modernization of their properties. Developments in track equipment and material have kept pace with these increasing requirements, and consequently the electric railways are able partially to respond to the demand for improved facilities and service.

Contrast the track situation with that of electric railway cars. Experiments in car improvement were delayed until after the demand for cars to meet modern transportation conditions had become acute. Three years have been spent in experiments with new designs during a period when the necessary improvements should have been available—tested and tried in service—for the replacement of much of the obsolete equipment now in operation. True, there have been available cars of more or less conventional design, with few untried construction features, that offer advantages in operating economy and increased attractiveness ample to justify immediate replacement of the old equipment on many properties. The records of those properties that have gone ahead on replacement programs prove definitely that the industry is paying a high price for the continued operation of its obsolete equipment. But, apparently, the best types of conventional equipment available have not measured up fully to the average executive's ideas of what is needed to meet automobile competition, for during the past several years there has been a steady decline in the number of new cars ordered each year. Although this year promises a considerable increase in car buying, the full tide of replacement activity cannot be expected to set in until the present experimental stage is past. Perhaps consideration should be given, also, when the subject of car replacement is being studied, to the question of merchandising acumen in the car equipment field.

Undoubtedly, the lag in the development of cars has held back the entire rehabilitation program. It avails little for a railway to improve its roadbed if its equipment continues to discourage the public from using its service. Furthermore, to say the least, it is rather expensive to hammer and pound new track to pieces with tons of obsolescence. It seems quite reasonable to expect that with the expedited modernization of cars, track reconstruction will continue to show accelerated gains. Only then will the rehabilitation process in the industry have reached its proper pace. Today, the industry is engaged in a race against time. The automobile has acquired a tremendous momentum, driven forward by the courage and confidence of its sponsors. The public has tasted luxury in transportation and likes it. Nothing short of full measure will now satisfy it in public transportation. The industry must meet the changed conditions—and that quickly, or the street car will be literally crowded off the streets.

Digging Below the Surface

GOOD performance is something of which to be proud. Freedom from trolley breaks, pull-ins, accidents, etc., are accomplishments that reflect credit upon those charged with maintenance responsibility. But for those to whom the records established on a neighboring property serve as a stimulus toward greater efficiency, there is needed something more than the surface figures. A knowledge of just how the good results were accomplished is all-important. Below the figures themselves are questions of policy, organization and methods. It is to these that we must look for the explanation of favorable records.

Efficient maintenance of track, lines or rolling stock demands a well-balanced and capable supervisory force. Upon it largely lies the responsibility of planning and organizing day-to-day operations. Here alone there is a wide range of opportunity for saving or waste. A second fundamental in efficient maintenance is a definite and carefully considered program for systematic inspection. The adage that an ounce of prevention is worth a pound of cure is of particular importance to the maintenance man. Defects should be prevented rather than repaired. Renewal before a part actually fails in service is the secret of establishing favorable records for freedom from car pull-ins or trolley wire breaks. Furthermore, it is extremely significant that favorable service failure records are usually accompanied by relatively low unit maintenance cost figures.

Systematic maintenance records represent a third and very important factor in efficient maintenance. Simple, accurate and adequate historical data on important equipment parts enable the maintenance executive to detect sources and causes of difficulty and expense. Adequate records should permit responsibility for poor workmanship or defective material to be located readily when a failure occurs. An efficient record system should serve to give reliable information as to the life of equipment and parts. It should help to identify the type and

This is the issue in February that is devoted essentially to maintenance and construction subjects

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make of apparatus which gives the best results in service and so should guide in purchasing new equipment. Proper records also aid in the work of keeping a quantity of renewal parts on hand sufficient to permit repairs to be made promptly, without at the same time building up heavy accumulations of surplus stocks.

There is no greater stimulus to maintenance efficiency than frequent visits to other properties—provided these trips are taken seriously and the other man's practices are viewed with an open mind. One is impressed with the great variety of practices that are followed in doing common maintenance jobs. Some methods are better than others, but all too frequently men responsible for maintenance are inclined to be self-satisfied, or have not been given the opportunity to inspect the methods used in other shops.

It is in these methods that the explanation is found of creditable pull-in and cost achievements. Only a determined attitude of self-improvement will accomplish this much to be desired purpose.

Specification for Special Trackwork Materials Approved

ANOTHER step in the advancement of the purpose of the American Standards Association has been accomplished in the recent announcement by that body of its formal approval as "American Tentative Standard" of the specifications for materials for use in the manufacture of special trackwork. This project has been going forward for several years sponsored by the American Electric Railway Engineering Association.

The specifications cover materials for which there are but two principal user industries—the steam railroads and electric railways. It is perhaps the first time that the electric railway industry has had an opportunity to take the lead in sponsoring a work which so vitally affects the interests of the steam railroad. Somehow, the thought in steam railroad circles has apparently prevailed that there were inherent differences in the tracks and special trackwork used by the two industries. The fact that a specification for materials entering into special trackwork manufacture could be prepared by the sectional committee under A.S.A. procedure, goes far to dispel such a thought and leads to the realization that the tracks used by both industries differ more in location than in any other way, and even here many electric railways have locations similar to steam lines, upon private rights-of-way. Tracks in the electrically operated subways require rails and special trackwork just as heavy and as complicated as do the trunk-line tracks of many steam railroads. At the same time, the steam lines have a sizeable mileage of tracks in paved streets where tongue switches, mates and frogs such as are used by electric street railways are a requirement of their track construction.

The Engineering Association and the sectional committee in charge are to be congratulated upon the outcome of their labors on this project, particularly in view of the fact that the mutuality of interest of the two great transportation industries in specifications for track materials has been proved. The new specifications merit careful study by managers, engineers and purchasing agents with the purpose of putting them into effective use in the control of purchases for material which, in the electric railway industry alone, runs into expenditures of millions of dollars annually.

Heavy Inspection a Means of Cutting Costs

IMPROVEMENTS and refinements in the equipment of cars have made it possible to increase the time between overhauls to a considerable extent. Inspection work which ordinarily includes light repairs is done on a mileage basis on most railways. This brings the cars into the shop at intervals of a week or ten days. There are many parts that can go longer than the regular inspection periods without attention but which must have considerable work done on them between general overhauls.

This has led many railways to introduce another period that comes between inspection and overhauling. By some, this is called heavy inspection; by others, intermediate overhauling. The work done, however, is quite similar in character. This includes repacking of bearings, testing and setting of circuit and line breakers, cleaning and painting of string bands on armatures, cleaning and painting of many equipment parts that are subjected to arcing, testing and replenishing of fire extinguishers, lubrication of side and center bearings and similar work.

Many advantages result from a program of this kind. It eliminates much work that is unnecessary at such frequent intervals as regular inspection periods. Consequently there is a saving in labor and cars are returned to service quicker. Furthermore, inspectors are relieved of much heavy work that can be done better by partial dismantling and removal of parts to a bench at the heavy inspection time. This, in turn, insures more thorough attention and better workmanship.

For greatest flexibility the heavy inspection interval should be a multiple of the regular inspection period. If cars are inspected every 1,000 miles, the heavy inspection period would be every 10,000 miles so that the heavy work would be done every tenth time that a car comes into the shop. In making a general effort to increase the interval between regular inspections, as a means of cutting costs, the heavy inspection plan has proved advantageous from the standpoint of insuring against service failures and in the interest of economy.

Philadelphia Looks Ahead in Planning Its Subway

GUIDED by the principle that the greater the number of people that can be carried through a subway in comfort and safety, the greater the potential benefit to the public in return for the expenditures made for tube and equipment, the city of Philadelphia spared no expense in making the Broad Street subway, its newest transit facility, capable of expansion to meet the city's future requirements. The subway, as now being operated, has two through tracks from City Hall to Olney station on the north, but the tube was constructed to accommodate four tracks, and as soon as the traffic warrants, the other two will be laid and express service started. Other considerations were borne in mind when this newest subway was designed. For example, station locations and arrangements were selected to permit co-ordination of the subway service with other transit facilities, and to make for easy and rapid movement to and from trains. Car seating and door location were planned for rapid loading and unloading. Also, the alignment, profile and track layout, the signal and other safety devices, the car

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motors, brakes and couplers, the terminal and yard connections, etc., all were designed for expansion of service to provide frequent, rapid and safe train operation.

Before the actual construction details of the Broad Street subway were prepared, the Department of City Transit made an extensive study of rapid transit needs and submitted plans for a city wide system. The Broad Street subway unit is a part of this comprehensive plan. It was designed as the backbone of the entire system. This accounts for the attention given to provisions for expansion and extension, as described in the article in last week's issue of ELECTRIC RAILWAY JOURNAL. At the extreme northern end of the line extra track spaces were provided a little beyond the regular line to allow the extension of the four tracks northward at any time, without disturbing the existing structure or the present operation of trains. At Ridge Avenue, a little more than a mile north of City Hall, provision was made for a two-track branch to extend to Darby through West Philadelphia, by a special six-track, two-level connection. Other important provisions for future development include a ramp at Erie Avenue to permit local trains to turn back without crossing the express tracks at grade; an extension to South Street, now under construction, the separation of mezzanines to allow for the crossing of major utility structures; plans to expand the shops and terminal yard to accommodate the maximum number of cars that will be needed on the completed system, and the pedestrian concourse project at City Hall.

When this project is completed, passengers arriving at City Hall either by the Broad Street subway, the Market-Frankford subway-elevated, underground street cars, the Pennsylvania Railroad or the Reading Railroad, will be able to walk underground among the several transportation systems or to buildings adjoining City Hall Square, as well as to points several blocks in any direction from City Hall. The entire improvement program is a very comprehensive one. It shows great vision on the part of those responsible for it, in planning for future as well as present requirements.

The Subsidy As a New Shibboleth

INDISPOSITION on the part of cities resolutely to face their local transportation problems, and inability of operating companies to devise a schedule of fares that will be compensatory and which will not at the same time drive away riding, have given rise to the revival of talk of subsidies as a way out. It is the weak way out, if it really is a way at all, but since the matter in one form or another has come up for discussion in recent proposals made in the Twin Cities, in Akron, in Grand Rapids, in Seattle, and in other places, the issue is one that needs to be met. All of these cases have been reviewed recently in this paper.

In only one of them, Akron, has the subsidy suggestion come from the railway and then only as an alternative to an out-and-out franchise as remote in its conditions from the subsidy idea as could be wished. So unusual is the Akron suggestion, however, that it seems well to repeat that it is presaged on the local companies' billing the city at a fixed rate for the number of bus or car-miles the city may deem it will need, the city in turn to fix the fares that may be charged, presumably at a rate less than enough to raise the sum the company would receive from the city. In the Twin Cities the subsidy proposals emanated from a Councilman. In Grand Rapids it was the city engineer who made the suggestion. In Seattle it was purely a political proposal, intended to cover up the failure on the part of the city to convert the municipal railway into a paying proposition except possibly at a fare that would be so onerous as to attract unfavorable attention.

The situations in these cities do call for heroic treatment, but it would scarcely seem that the need exists for the application of oxygen by means of the political pulmotor which apparently is to be tried. Under such treatment the patient's breathing doubtless would be restored but it would keep up only as long as the treatment was continued. No, the electric railways do not want to be put on any such basis. It would be bad for them and it would be bad for their communities. New York is a shining example of the fact that people ride for 5 cents on the subways while $40,000,000 goes into the ctiy's budget to make up various charges, among them one of $14,000,000 a year alone to meet the excess costs over the receipts on the original subway lines. Furthermore, under this unsound policy New York continues to lag far behind its growing need for transit facilities. An unsound economic policy may be expected to reproduce this condition in any city that ventures to adopt expedients in the solution of its transit problems.

Local transportation is an essential industry. It should be so treated and should stand on its own feet financially, if it is to be developed on a sound basis that will permit it to keep pace with changing conditions and growing community requirements. That is not to say that construction costs for rapid transit lines and even surface railways, that create property values in exactly the same way that a new highway creates them, should not be assessed against the benefited property instead of carried perpetually by the car rider. But that is a far different matter than the several forms of economically unsound subsidies that are surreptitiously coming to the forefront. Instead of these, efforts should be directed toward the development of scientific schedules of rates under which the fares paid by various classes of riders will be more nearly in proportion to the cost of the service which each class of rider buys. The issue must be faced squarely, and it will prove futile to resort to any means that would make local transportation a political step-child.

ELECTRIC RAILWAY JOURNAL lends its space to a discussion of the matter only in the hope that its word of warning may have the effect of staying the possible course of a movement it is convinced is a futile compromise with sound economics and sound political policy. Of course, where a city will not face the issue squarely, its only hope of retaining the service it desires is by the subsidy route. That is the way of compromise. It is the weak way, not the virile way. Just such expedients as these and lack of foresight that, in the past, loaded on the industry fixed term franchises, paving charges, and flat fares. All the blind alleys of the subsidy proposal lead to the inescapable conclusion that a subterfuge is still a subterfuge, no matter how it may be labeled in the tax budget. Subsidy is surely a step toward political tampering. At the last Cleveland convention Owen D. Young pointed out that the greatest objection to public ownership of utilities is that it substitutes a political check on management for an economic check. Subsidy eliminates the economic check and opens the gates to a horde of socialistic Utopia makers.

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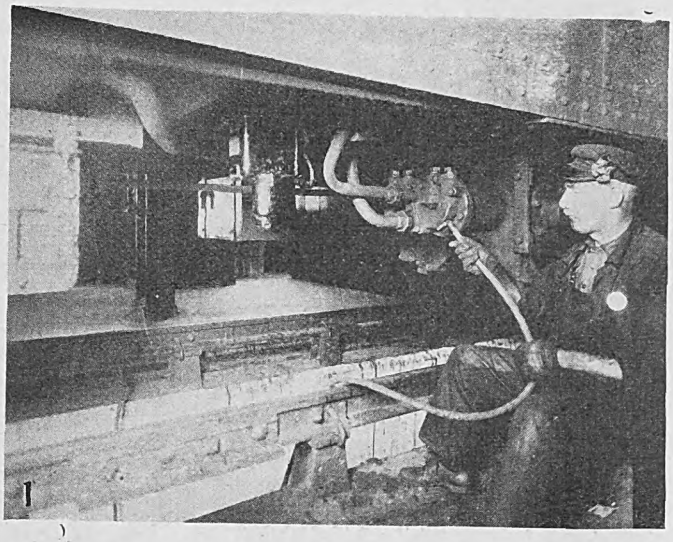
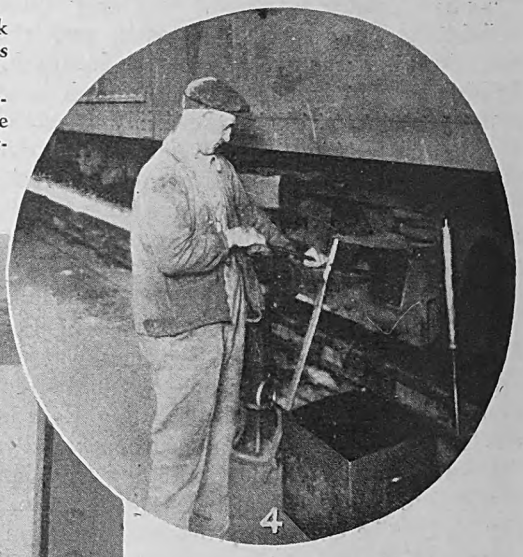


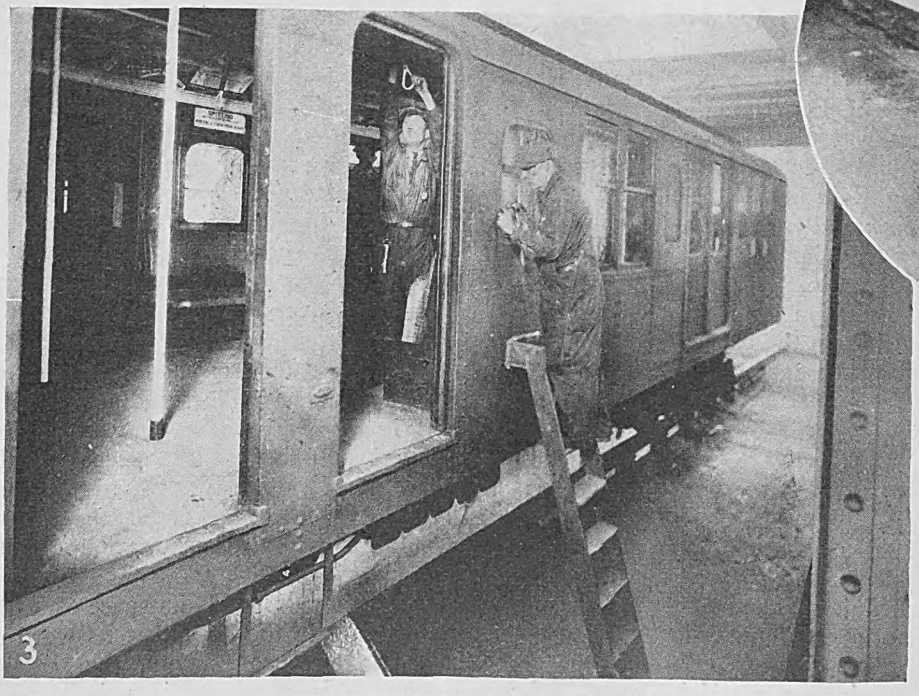
No. 1. Workmen cleaning equipment by use of compressed air

No. 2. Inspector at work on switch group. The receptacle for drop light and the cut-out switch can also be seen at the left

No. 3. Car body inspectors at work repairing windows and hand straps

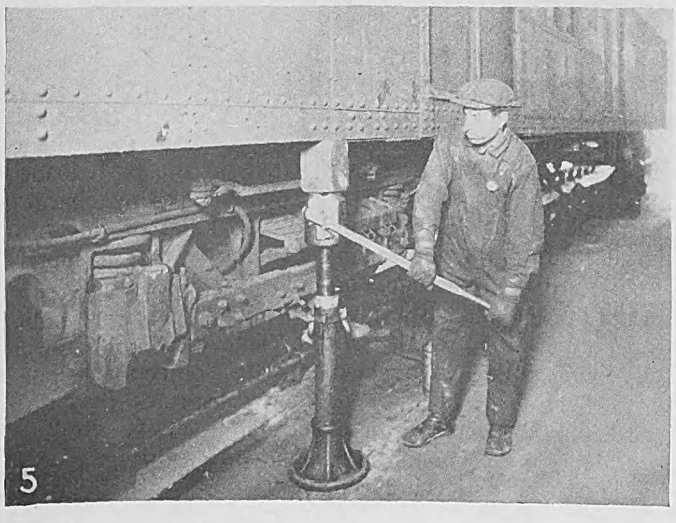
No. 4. Packing of journal boxes is removed and new oil soaked waste used to repack on 180-day inspection basis





No. 5. To lubricate center and side bearings, cars are raised by pneumatic jacks

No. 6. Dressing up trucks and connecting their brake rigging after receipt of cars from the intermediate truck overhauling shop



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SPECIAL INSPECTION

Increases Shop Efficiency

By Clarence W. Squier
Associate Editor *Electric Railway Journal*

By concentrating the work of inspecting subway cars at the Coney Island Shops, the Brooklyn-Manhattan Transit Corporation has built up a force of specialists who perform their duties with unusual skill and speed

This is the seventh of a series of articles describing methods and equipment in the Coney Island shops of the B.-M.T. Corp. Others were, "Truck Overhauling," published April 21, 1928; "Intermediate Truck Repairs," published May 5, 1928; "Wheel, Gear and Axle Maintenance," published May 19, 1928; "Motor Overhauling," published June 16, 1928; "Bearing Practice," published July 21, 1928; and "Forge Shop Equipment," published Aug. 18, 1928.

Electrical inspectors at work on panelboard and door operating contacts

PREVENTING delays and equipment troubles in service is the real function of the inspection shops of the Brooklyn-Manhattan Transit Corporation. If a car gives trouble on the road the first question is: "When was that car inspected last?" and next: "What work was done and who did it?" This information is made available through a simple but accurate record system that starts as soon as a car is delivered at the shop for inspection by the transportation department and continues through the various stages of the repair work. Car numbers are entered in a book by the inspection clerk as the cars are received. The clerk then hangs four inspection cards on each car. There is a blue card for car-body work, a buff card for truck inspection, a green card for electrical equipment and a pink card for pneumatic equipment. Each card has a list, arranged alphabetically, of the equipment to be inspected, lubricated or tested. At the top of each card is space for the car number, the date and the name of the shop. The body of the cards has three columns. Items are listed in the first column. The second provides space for the signatures of inspectors, and the third is for the names of the assistant foremen who checked the work. At the bottom is a line for the signature of the foreman inspector. The work of inspection is divided into four major classifications corresponding to those given on the inspection cards. A foreman supervises the work for each classification. There is also a general

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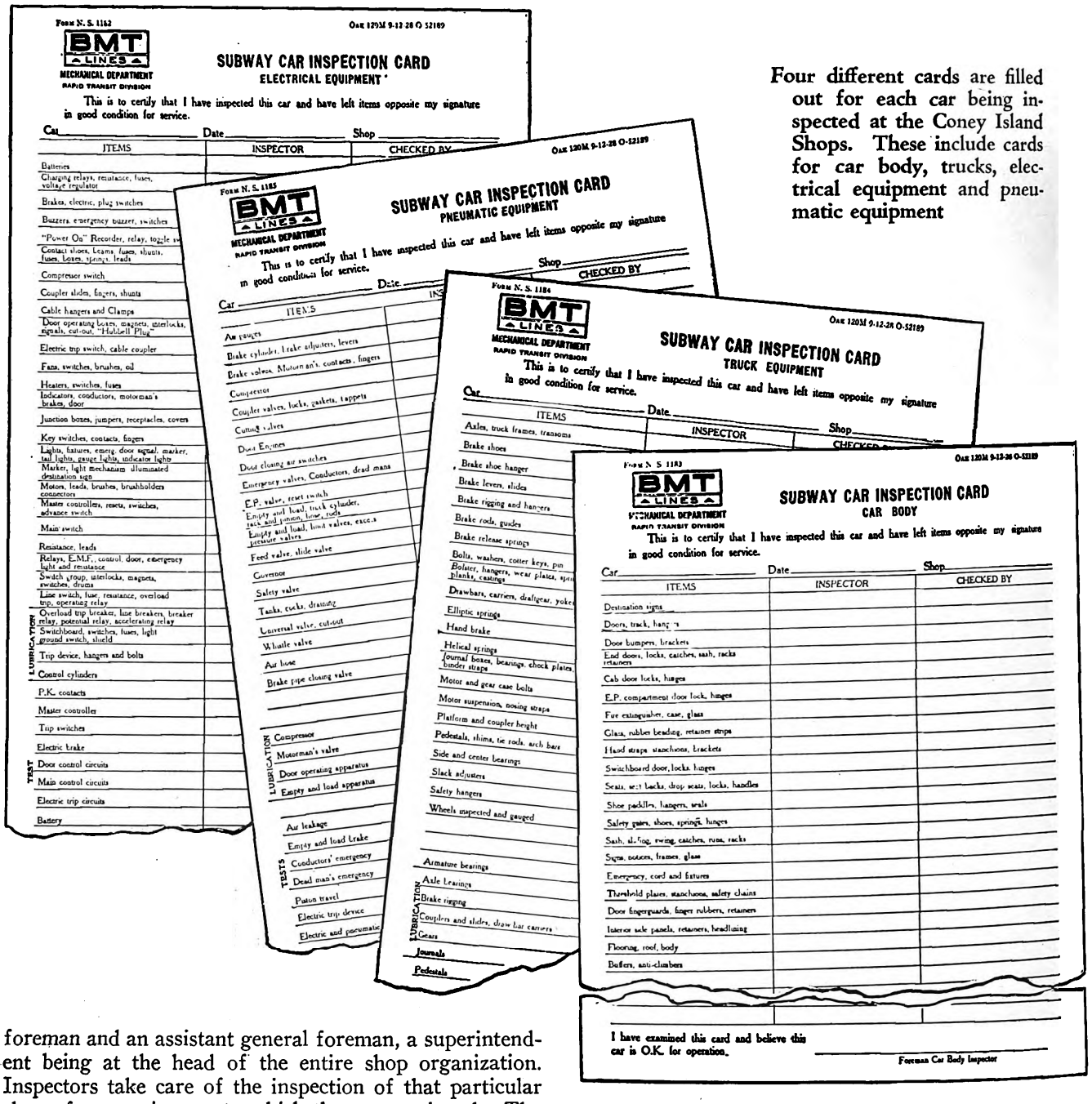

Four different cards are filled out for each car being inspected at the Coney Island Shops. These include cards for car body, trucks, electrical equipment and pneumatic equipment

foreman and an assistant general foreman, a superintendent being at the head of the entire shop organization. Inspectors take care of the inspection of that particular class of car equipment to which they are assigned. The work under each of the major classifications is further specialized so that in electrical equipment, for example, items are subdivided into eight groups, each of which has an inspector and assistants who devote their attention to that particular work. Pneumatic equipment is likewise divided into six groups, with special inspectors for each classification. The inspector certifies, by signing the card, that he has inspected the particular class of equipment opposite his signature and put it in good condition. As a final check on the work the foreman of each major classification signs each card for his class of work to indicate that he has examined the car and believes it to be in fit condition for operation.

The cards are made part of the official shop record and provide an easy and accurate source of information as to who inspected an individual item of equipment and the date when the inspection was made. The individual signatures on the card leave no possibility of question as to who is responsible. After the cards leave the custody of the foreman and before they are filed each is checked by the office staff to make sure that there is individual certification as to the inspection and checking of each item of equipment and also the general certification by the foreman on each card.

An idea of the degree to which specialization is carried and the manner in which the electrical equipment is subdivided may be obtained from a brief outline of the work. One man inspects and tests the batteries. A second inspects and lubricates the electric brakes and the plug switches, "Power On" recorder, relay and toggle switch. A third man takes care of the inspection of the buzzers, switches, door-operating boxes and incidental magnets, interlocks, signals, cutouts and plug contacts. A fourth devotes his attention to the inspection of contact shoes, and beams with the incidental fuses, shunts, fuse boxes, springs and leads. A fifth inspector specializes in coupler equipment such as slides, fingers and shunts together with the cable hangers and clamps, junction boxes, jumpers, receptacles and covers. A sixth man is detailed to inspect electric trip switches, cable couplers, the motors with their leads, brushes, brush-holders and connectors. The lubrication of the automatic stop device, hangers and bolts

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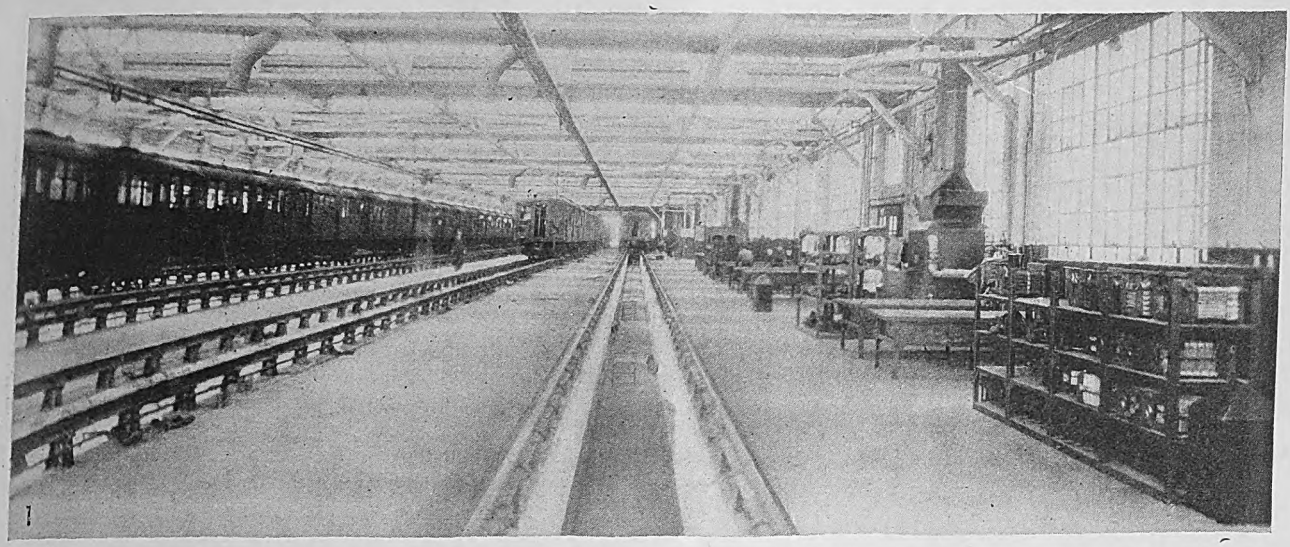
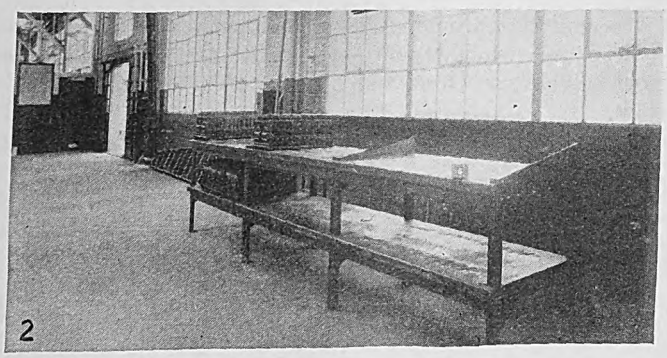
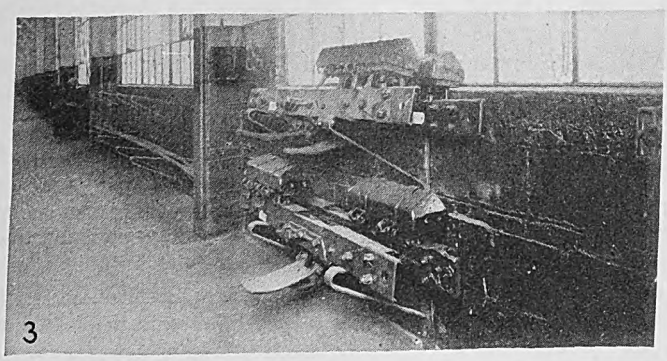
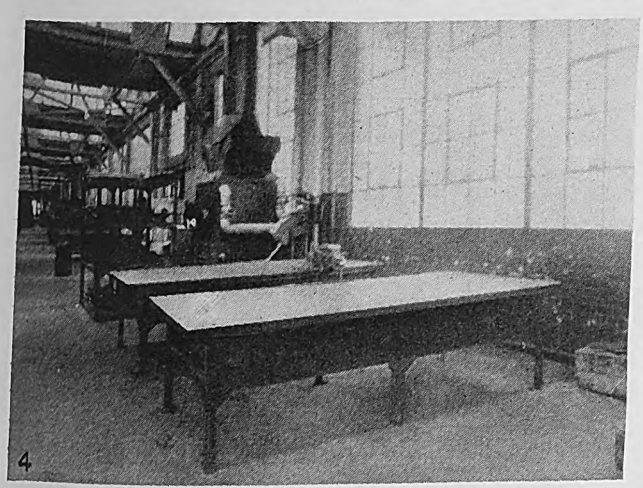


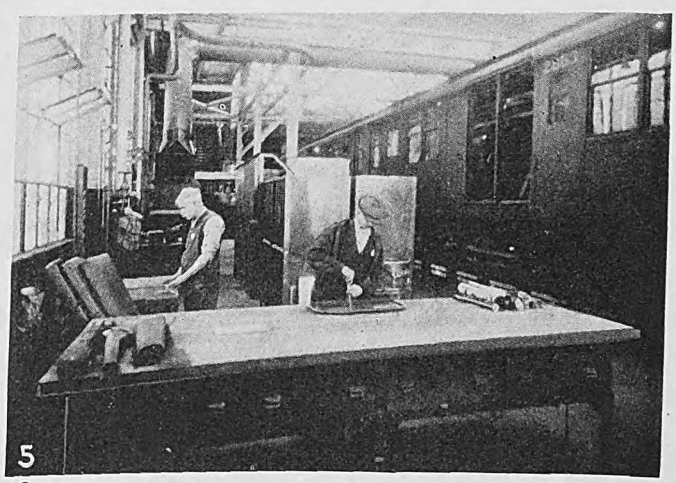
and the trip switches, together with the testing of main control circuits and electric trip circuits is taken care of by this inspector. The compressor switch, main switch, resistance and leads, line switch with its fuse, resistance, overload trip and operating relay, together with the interlocks, magnets, switches and drums of the switch group are inspected by a seventh man, who also lubricates the overload trip, the line breakers, the potential and accelerating relays, control cylinders and control contacts. An eighth man inspects charging relays, fans, heaters, indicators, key switches, lights, markers, destination signs, master controllers with incidental reset switches, advance switches, EMF and other relays for control contacts, doors, emergency lights and resistances, in addition to which he tests door-control circuits.





Specialization of work and the efficiency of its performance have been assisted by having a new up-to-date shop. The inspection shop is a separate building located at the west side of the Coney Island shop group. It is 86 ft. wide and 600 ft. long. Vacant space to the west of the present building is to be used for additions as the volume of





No. 1. General view inside inspection shop. At the right is seen the arrangement of racks and benches for material
No. 2. The battery bench has a shelf underneath for storage of batteries
No. 3. Shoe beam racks along the wall of the shop
No. 4. Work benches and maintenance material rack
No. 5. Carpenter and glazier's work bench. Racks for glass are seen in the background

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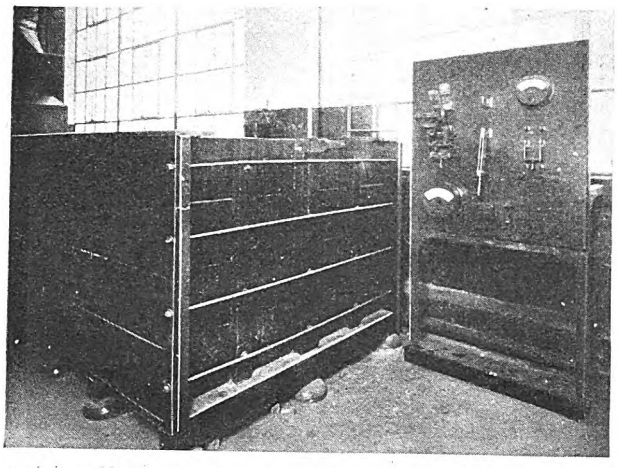


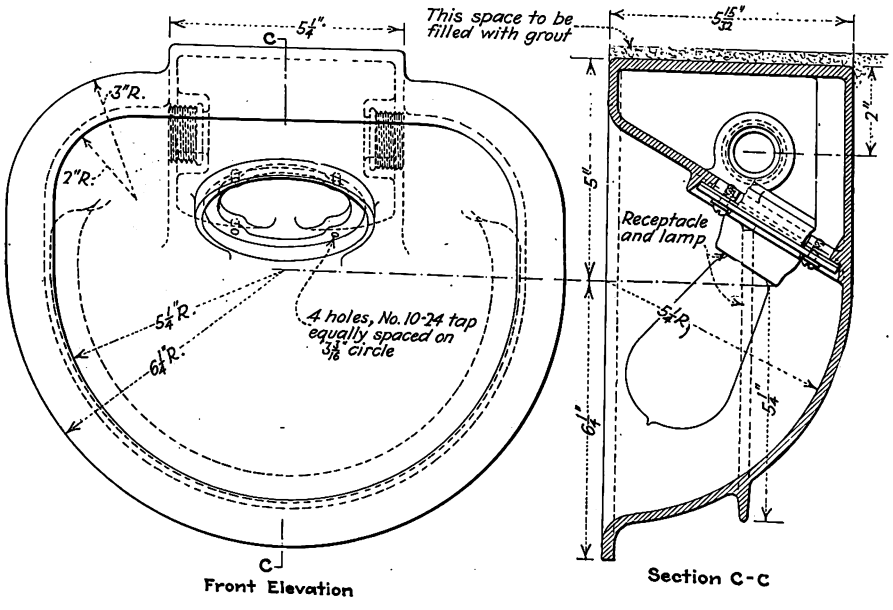
At left—Water rheostat and switchboard used in the testing and adjusting of line switches. At right—In the foreground are cabinets for workmen's tools. Back of this are racks used for distilled water and behind these is the foremen's pulpit office used by the electrical foreman

work increases. Four tracks pass entirely through the building from end to end. These are provided with motor-operated curtain-type doors so cars can enter and leave from either end of the shop.

Each track has a pit for its entire length. Tops of track rails are 15 in. above the floor level. The rails are supported on cast-steel chairs so there is a clear space of 9 in. between the floor and the bottom of the rail. Pits have a depth of 3 ft., 9 in. below the tops of the rails and are 4 ft. wide. The pit walls and floor are of concrete, and the floor is sloped to a drain at the sides. Special attention was given to the lighting arrangement for the pits. Lamps are spaced 14 ft. apart and are staggered in relation to those on the opposite side of the pit. White enameled porcelain reflectors in the wall nitches, with lamps projecting at an angle, throw the light upward to illuminate the undersides of cars. Receptacles are provided for plugging in drop lights. With each receptacle there is an inclosed switch so connected that with the drop-light plug in position, operation of the switch connects the drop light in the circuit and cuts out the adjacent pit light.

Receptacles are provided also for inserting plugs to furnish current for testing various pieces of electrical equipment on the cars. Where the apparatus to be tested is inside the cars it has been found most convenient to use a pole test circuit which hooks over the overhead trolley. There are no third rails inside the shop, and as the subway cars are provided with contact shoes but not with trolleys a special overhead traveling trolley with cable connection is used to supply power for moving the cars. The construction and operation of this overhead traveling trolley was described in ELECTRIC RAILWAY JOURNAL, March 18, 1922, page 474.

A compressed air pipe runs alongside each pit, with cut-in valves approximately every 20 ft., for use by the inspection force when testing the pneumatic equipment on cars and for cleaning purposes. Pits are provided with steps at each end and, at frequent intervals along the side, there are toehold niches to enable workmen to get in and out without having to go to either end. Cross planks with metal angles at the end to keep them firmly in place are also provided at frequent intervals, so that it is unnecessary for shop employees to jump pits when going from one side of the building to the other. Short stepladders are kept in the pits, so that there is no excuse for men standing on boxes or other makeshift equipment when their work requires them to get up close to the floors of the cars.



Light from the pit lamp is reflected upward

Subway cars, with the exception of service cars, electric locomotives, etc., have their regular inspection on a 1,500-mile basis. A leeway of 150 miles either way from the standard is allowed. This makes it possible to place the same number of cars over inspection pits each day. Where any subway car has not made the specified mileage in a period of 30 days it is arbitrarily ordered into the shop for inspection.

Inspection work is done at the Coney Island shop on 537 subway motor cars, 12 trailers and 116 triplex units. In ordinary service the cars operate the 1,500 miles in about a week's time. At present inspection work is done by both day and night forces, each working 50 hours per week. About 60 per cent of the cars are inspected by the night forces and 40 per cent by the day forces.

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In addition to this regular mileage inspection, certain special heavy inspection work is done on a 180-day basis. Six cars are given this heavy inspection by the day forces each day. This 180-day heavy inspection is a convenient way of taking care of work that would interfere with the regular schedule if included in the ordinary inspection. Moreover, by working on only six cars a day, the men have more time to do the work carefully and efficiently than if done on regular inspection.

With this systematic arrangement of work and with the various inspectors classified so that they have a definite portion to do, it is possible to plan the work so that it is done most efficiently. To prevent interference between groups whose work is located in the same part of the car or of groups whose work might interfere because of a common location on certain definite parts of equipment to be inspected, two groups usually start working from opposite ends of the pit so that they cross each other's path only once.

In the regular work of inspecting trucks, inspectors examine the brake rigging, axles, wheels and brakeshoes. If there are any adjustments of brake equipment required that make it necessary to send the trucks to the intermediate repair shop, the inspector notes this on a prescribed form and arranges to have the truck transferred to the other shop. So as not to withhold the car from operation, the regular procedure is to substitute a serviceable truck for the bad order one. The inspection force then prepares the bad-order truck for delivery to the intermediate repair shop and also makes all connections on the good truck that has been substituted.

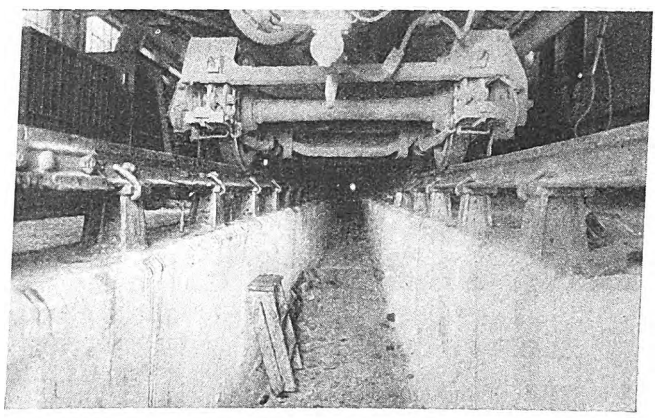
Other inspection work on trucks includes the lubrication of all wearing or movable parts. The waste in journal boxes is inspected and a packing iron is used to make certain that the waste is properly placed under the journal seat. Oil in armature and motor axle bearings is measured by gage provided for this purpose, and additional quantities, as indicated by the gage, are supplied. The packing used in the motor axle bearings and journal bearings is removed and re-treated on the 180-day inspection period. A two-man crew also lubricates both side and center bearings at the 180-day inspection. Car bodies are raised by pneumatic jacks placed on both sides. Shoe beams also are given a heavy inspection on an 180-day basis. This includes cleaning and scraping off the dust which has accumulated. After the cleaning the beams are repainted with an insulating paint.

To inspect the motors the covers are removed, the carbon brushes examined for wear and the commutator brush-holder and field leads looked over. Polepiece clearance for the armature is checked also. Surrounding parts of the armature and brush-holder are examined to discover any accumulation of dust, and compressed air is used to clean where necessary. After having been blown out with compressed air, porcelain insulators of brush-holders and the V rings at the ends of commutators are wiped off carefully. Motor leads and motor lead connectors are examined closely on regular inspection. Attention is also given to shoe fuses, terminals, fuse boxes, contact shoe leads, jumpers, etc., and repairs and renewals are made where necessary. Contact shoes are gaged and adjusted to proper height.

The control equipment, including the master controller, line switches, reversers, unit switch groups and operating interlocks are inspected carefully. Contacts are replaced where necessary, and any accumulation of dust is removed by blowing out with compressed air. After cleaning, the parts are lubricated. Operating magnet valves are tried out individually and also in their regular operation from the master switch. Motor resistors are inspected as part of the control inspectors' duties. Where it is found necessary to replace any parts, these are changed by a separate repair crew so as not to interfere with the regular inspectors' work. Switchboard contacts are cleaned and insulating paint is applied on the 180-day basis.

Electric parts of the automatic air and electric couplers used on the subway cars are overhauled on the 180-day basis. The slide contact pads are removed and contact fingers are replaced where excessively worn. The interior housing is cleaned out thoroughly. The tension on contact fingers is tried and fingers are gaged for proper height. The contact pad is inspected for wear on the contact surface. Where necessary, new pads or other parts are replaced at this time. On regular inspection where the electric portion is not dismantled the slide pad is pressed in so as to make an inspection of the contact fingers, and whenever an unusual condition is observed the housing is taken apart and required adjustments made. The drawbar automatic locking devices and equipment are tried out on regular inspection.

Men assigned to the work of inspecting couplers also inspect train line cables, jumpers and receptacles as well as the hangers from which they are suspended. This work is done on the 1,500-mile inspection basis. Electric automatic stop trips with which subway cars are equipped are tested on every inspection. Covers are removed, the electric contacts and fingers are inspected, the interior wiped and parts lubricated lightly. Tips are then reassembled and gaged for proper adjustment above the running rail and the proper centering of the trip arm after it is applied. The action of the electro-pneumatic valve used in the circuit is tested. Where adjustments or renewals are required on the trip equipment these are done by the inspector who examines them.



Pit and rail construction

The main panelboard, which includes the light, heat, fan, battery and compressor switches and also the various fuses used in connection with these switches, is examined on every mileage inspection, as are also the control and door-operating circuits.

Car cleaning is taken care of by the inspection shop. This includes the sweeping out of cars every 24 hours and the wiping off of interior portions. This work is all done at night or early in the morning before the cars go into morning rush service. Cleaning of glass is done at the time the cars come in for regular inspection on the mileage basis. This cleaning also includes the cleaning of globes and interior fittings. A combination of sand and pumice is used in damp form to cut the grease which collects on the window and door glass.

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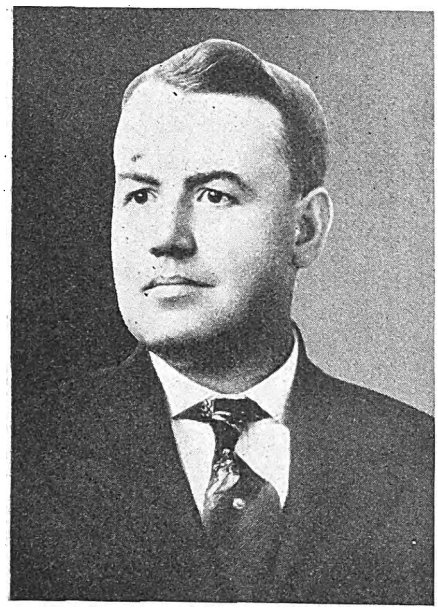
Winners in First Group of Department

Maintenance

April 15 is the closing date for the second section of "Electric Railway Journal's" Prize Contest. An early start will help each contestant and department to win the recognition they deserve for improved maintenance work. A folder giving full information and instructions will be mailed to those interested on request.

Automatic drain valve for air piping as submitted by HARVEY L. BULLOCK, *Electrified section New York Central Railroad, awarded prize in Rolling Stock Division — Double portable crossover described by* F. E. DAVIDSON, *Cleveland Railway, receives prize for Way and Structures Division— Piston ring compressor description by* CHARLES HERMS, *San Diego Electric Railway, given award for Bus and Garage Division—Auxiliary ground box for connections to electric track switches submitted by* L. H. MCADAM, *Toronto Transportation Commission, awarded prize in Electrical and Line Division.*



Harvey L. Bullock

IN THE rolling stock and shop division of ELECTRIC RAILWAY JOURNAL'S Maintenance Contest, Harvey L. Bullock was awarded the prize. He has just entered upon his duties as superintendent of the electrical equipment department at the Cleveland Union Terminal, Cleveland, Ohio. He formerly served as general foreman of electrical equipment in the White Plains shop of the New York Central Railroad since 1908, and during this period initiated many improvements in mechanical and electrical devices pertaining to multiple-unit cars and locomotives. He has been concerned particularly with the maintenance of rolling stock and has also brought out many improvements in maintenance and shop practice.

Mr. Bullock began his electric railway experience as electrician for the Schenectady Railway and later was promoted to carhouse foreman. He also worked for the General Electric Company at Schenectady in the construction department on electric locomotives. At that time the bipolar type ordered by the New York Central Railroad was being developed, and upon the electrification of the Grand Central Terminal in 1906 Mr. Bullock was transferred there as foreman in charge of multiple-unit cars and electric locomotives for the Harlem division. Mr. Bullock was born in Cohoes, N. Y., 45 years ago.

THE breadth of its field of utility and the advantages and economies resulting from the use of a device or method, were considered of particular importance by the judges of ELECTRIC RAILWAY JOURNAL'S Maintenance Contest in awarding the first group of prizes. The committee met at the headquarters of the American Electric Railway Association in New York City on Jan. 21 and devoted the entire day to the consideration of about 100 items submitted in the contest. All members of the committee of judges were present. Four prizes of $25 each were awarded for the best maintenance material submitted in the contest prior to Jan. 15, which was the closing date for the first group of articles. The prizes were divided, one each for the departments of (1) rolling stock and shops; (2) way and structures; (3) electrical and line, and (4) buses.

The rolling stock prize goes to Harvey L. Bullock, New York Central Railroad, for his automatic drain valve for the air piping of cars. Much trouble results from the freezing of air lines, therefore an automatic device for removing the water that accumulates will satisfy a long-felt want. The judges were impressed particularly with the high

F. E. Davidson

THE winner of the prize for the way and structures division of the contest, F. E. Davidson, is assistant to the superintendent of way for the Cleveland Railway, Cleveland, Ohio. He has been with that company since 1914, and his duties consist of measuring up and laying out special track work, and inspecting it at the factory before shipment. At present he is in charge of the drafting room and engineering work. That department designs all special work furnishings and provides data necessary for manufacture. He also worked for the Pennsylvania, Nickel Plate and Wheeling & Lake Erie Railroads.

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Prizes in Contest

class of many of the methods and devices submitted in the rolling stock and shops group, and decided to give honorable mention to the cotter key extractor as described in the Jan. 19 issue of the JOURNAL by Farrell Tipton, electrician of the San Diego Electric Railway.

For the best item on way and structures the prize was awarded to F. E. Davidson, assistant to the superintendent of way Cleveland Railway, for his description of the double-portable crossover described in the Feb. 9 issue. Use of this crossover reduces the amount of space used in the street to 58 per cent of that needed with two single crossovers. Vehicular accidents and car delays are reduced also.

In the electrical and line department division the auxiliary ground box used in connecting wires from poles to electric track-switch boxes as described by L. H. McAdam, electrical department Toronto Transportation Commission, was awarded the prize. This box overcomes the difficulty of water entering the conduit and freezing in winter, which was experienced previous to its use.

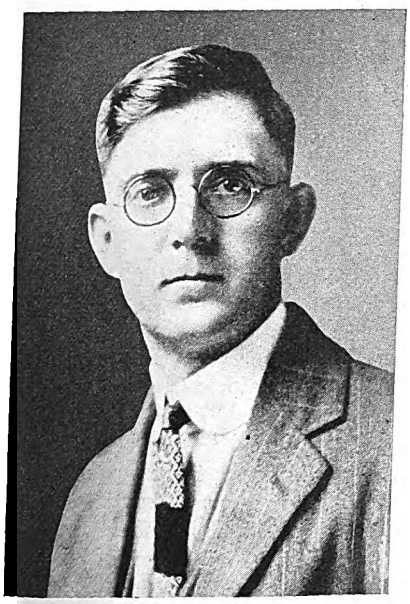
The compressor for piston rings being installed in bus engine cylinders as developed in the garage of the San Diego Electric Railway receives the prize in the bus and garage division. This was submitted by Charles Herms, general foreman.

Most of the material received in the first division of the contest was of unusually high class and the judges were impressed particularly with the value of the practices described. A large number of ideas related to work in shops and to car equipment improvements. The other railway departments, particularly the line, electrical, bus and garage departments, are urged to send in more items connected with their work. The closing date for the second division of the contest is April 15 and all material should be sent in promptly so as to be eligible for one of the next lot of prizes.

Opportunity Is Knocking—Are You Alert?

READ the items submitted by these men who have won industry-wide recognition through their participation in ELECTRIC RAILWAY JOURNAL's Maintenance Contest. The winning articles were published in the following issues: Nov. 17, 1928, page 483, "Automatic Drain Valve"; Dec. 15, 1928, page 1043, "Auxiliary Ground Box for Track Switches"; Jan. 19, 1929, page 129, "Piston Ring Compressor"; and Feb. 9, 1929, page 252, "Double Portable Crossover."

These items represent the kind of maintenance practices and devices that are constantly being developed by electric railway men throughout the country. You owe it to yourself and your company to enter this contest. Writing ability is not necessary. Send in a brief description of the practices that you think will be of interest to other railway men, and include a photograph or sketch. See the issue of ELECTRIC RAILWAY JOURNAL for Oct. 20, 1928, for full details or write in for a pamphlet describing the contest and giving full information for preparing articles. Don't put this off for the future. There is no limit to the number of items that can be submitted by any individual or department. Take your place with those who are winning industry-wide recognition in this contest. Entries for the second group of prizes must be received by April 15. Early entries receive preference in publication.



Charles Herms

THE winner of the prize in the bus and garage division of the contest is Charles Herms, general shop and carhouse foreman for the San Diego Electric Railway, San Diego, Cal. He has been with that company since 1923. He began his electric railway experience in 1919, with the San Antonio Public Service Company in Texas, as general repair man. He continued in this capacity for four years, when he was promoted to foreman over a crew engaged in remodeling cars.

Mr. Herms has always been interested particularly in mechanical construction, and during the war was attached to the first army headquarters in a motor repair unit. Other experience outside of the electric railway field includes supervision of the mill department of the San Antonio Portland Cement Company, and a position with the Boston & Superior Mine in Arizona, reconditioning the electric and telephone system of that company.

L. H. McAdam

FOR the electrical and line department division of the contest, the winner was L. H. McAdam, who is general inspector of switches and signals for the Toronto Transportation Commission. He joined the comptroller's department of the Toronto Railway in July, 1907, and was transferred to the electrical department in 1909, where he made a thorough investigation of electrolysis.

He served overseas from 1915 to 1919 with the Canadian army, in the motor machine gun corps and tank corps, returning to the Toronto Railway in 1919. The company was taken over by the Toronto Transportation Commission in 1921 and he was placed in charge of special construction work, such as the installation and operation of electric switches, signals, etc.

Mr. McAdam received his early education in the Toronto public schools and at St. Albans Cathedral school in Toronto. He is 37 years old.

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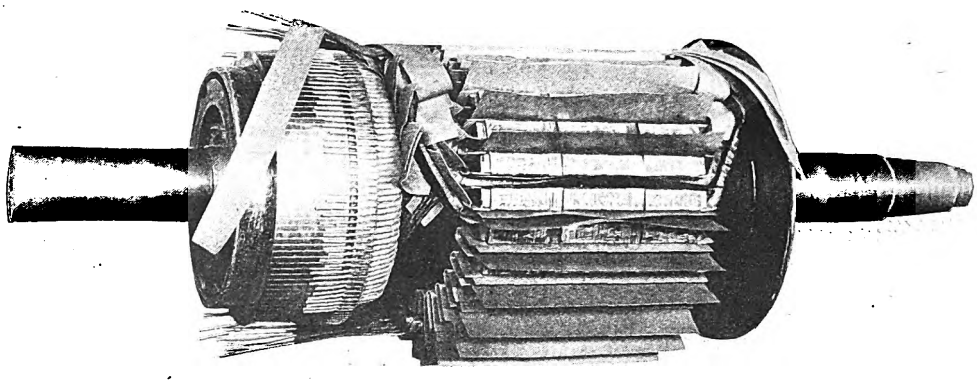
Reducing Costs of

Armature Rewinding

By A. C. Roe
Renewal Parts Engineer Westinghouse Electric & Manufacturing Company



Careful insulation is essential at points where leads cross

Care should be taken to insure correct shape and the use of none except high-grade materials throughout. Proper insulation and reinforcement at vital points are important. Banding an aid in obtaining dependable service

ARMATURE repairs can be divided into two classifications, one including the mechanical group of cores, shafts, commutators, coil supports, fans, etc., and the second dealing with the electrical equipment, which includes the armature coils and the additional insulating materials necessary for protection of the coils and their leads from the core, from adjacent leads and all parts of the winding where either a difference of potential or a mechanical contact exists.

In the original design armature coils are considered part of the electrical winding. In almost every instance details are embodied that protect them from injury during installation. For example, in Westinghouse coils, a strip of fishpaper is placed on top of the upper half of the coil and under the finishing tape. This top strip is used only when tin strips are placed under all core bands, thus protecting the insulating material on the coil from mechanical injury.

A tight fit of the coils in the slots is required, and the coils therefore are allowed to project $\frac{1}{32}$ in. to $\frac{3}{64}$ in. above the top of the slots at the band grooves. The armature is heated and a temporary band applied while the armature is hot. This is called "hot banding," and pulls the coils down flush with the band grooves. Some means for protecting the insulation on the coils must be provided because considerable pressure is applied to a small area of the coil, thus causing a cutting action. There are three methods of applying protecting strips. These include: (a) short strips under each band on top of the coil, (b) a long strip the full length of the slot on top of the coil, and (c) a long strip on top of the coil and under the tape on the coil. Method (a) is subject to the criticism that the strip is likely to work out. With method (b) the strip is likely to become loose and bow up between the bands into the air gap. Both methods increase the time of the banding operation. Method (c) provides maximum protection with a minimum of expense.

All insulation applied during the installation of the coils can be classified as winding material, and this can be subdivided into two major groups, one including treated tape, friction tape, surgical tape, cord, twine, solder, banding wire, varnish, shellac and cements. This group can be termed "bulk material," as it is purchased in standard packages, or standard units, such as 50-100-lb. rolls of banding wire, 36-yd. rolls of tape, $\frac{1}{2}$-lb. balls of twine, etc., and each armature requires only a small fraction of the standard package, yardage or total weight.

The second important group includes all material cut or formed to a predetermined shape or size; such as winding cells, hoods, banding clips, strips under the end bands and under the leads, etc. All such items can be grouped under the term "cut winding insulation." Because of the method of applying these cut pieces, the classification "cut winding insulation" can be further subdivided into three minor groups, (1) cut core insulation, (2) slot and end insulation and (3) cut banding material. The material required to prepare the core for the armature coils is grouped together, as shown in an accompanying illustration. In addition, there are items needed when installing the coils, and while banding. It is seldom that one workman insulates the core, winds, con-

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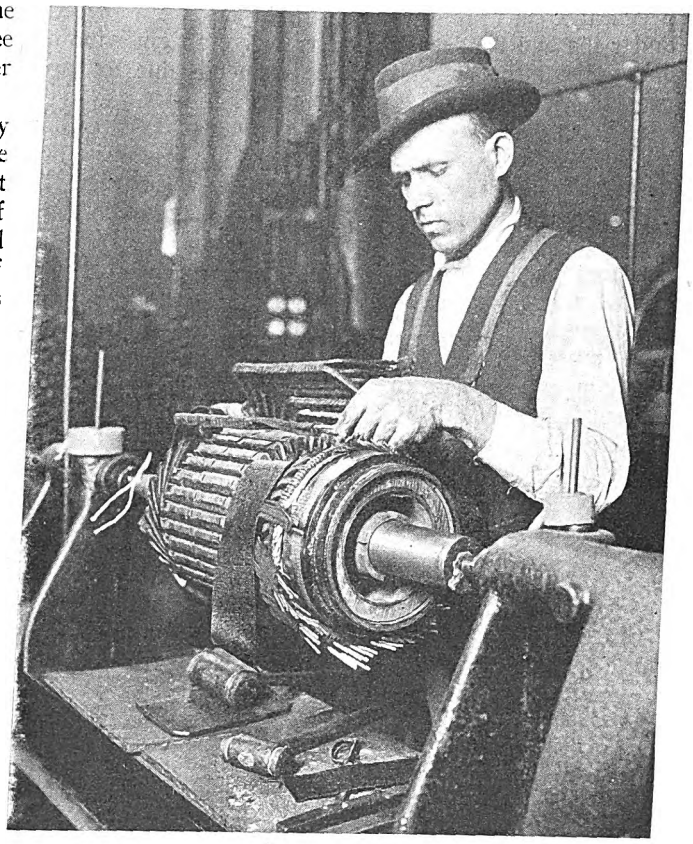
nects, solders and bands an armature. Therefore, the division and packing of the material into the three groups allow it to be distributed in the shop to better advantage.

Details of cut winding insulation are standardized by the manufacturers. This is of considerable value to the operating companies, because in most instances one cut piece can be used on a number of different types of armatures. For example, twelve graded sizes of tinned sheet steel clips take care of the banding of all types of armatures used on one large railway. Manufacturers distribute drawings for each type of armature, listing the cut pieces, and each piece has an identification number, so that the workman can select certain items and order them in large quantities. The armatures in any one shop can be grouped so as to use a number of standard cut insulation pieces that will apply to all, thus the ordering, stocking and using are simplified.

When insulating materials, such as fishpaper, treated cloth, oiled duck, etc., are purchased in standard 50 or 100-yd. rolls, 36 in. wide, and then stored in the shop where each winder cuts his own, a condition results that is not productive of economic maintenance.

Many sizes and shapes are needed to suit the different ideas of each winder and only a few pieces are cut at one time. Excessive waste of material when cutting a few pieces prohibits the use of the full quantity. Time is wasted as a workman could cut enough pieces for five or more sets in the same time as that required to cut a single set. Odd shapes and excessive lengths or widths necessitate trimming, which wastes the material and the winders' time, and inadequate facilities for cutting, shaping, assembling, etc., add to the time wasted. A larger stock assortment of grades and types of materials must be carried with such a method than is necessary.



Winding the armature of a type 508-A railway motor

Materials for Core Insulation

The purpose of core insulation is to interpose a barrier of insulating material between the armature coil and any metal part of the core that it may touch. This may be tape, special molded pieces, formed mica, or special shapes of treated cloth, fishpaper and mica, or a combination of these, depending on the type of coil and coil supports used. Materials are selected to suit operating conditions. Thus mica is used when the voltage is high, or when there is a temperature that is higher than class A insulation can safely withstand. To use the wrong material at any point, or to abuse or strain it during application, results in a waste of time and material. For example, by stretching bias-cut treated cloth, the tape varnish film and the seal between the fibers of the base materials are broken, thereby reducing the dielectric strength. Similarly, applying a thick wall of tape on a front or rear coil support will force the end windings up, and necessitate excessive band pressure and pounding. This strains the insulation on and in the coil proper, and burnt-out coils often are the result.

Another important factor in core insulation is the method and material used back of the commutator to support the leads. The space that requires filling is quite deep, and if soft, yielding materials, or materials that are affected by varying temperatures, are used, the supporting wall is weakened and broken leads generally result. Specially formed pieces of core insulation, such as wood collars for the back of commutators, and molded mica, or formed treated paper, coil support pieces, etc., have the advantage that they can be used repeatedly.

Slot and end insulation can make or mar a good winding job. There are numerous vulnerable places, which, if not protected properly, may develop into weak spots that ordinary testing will not show up but which will result in a pull-in later.

Armature coils should fit tightly both in the slots and on the end windings, therefore slot fillers are used. A winding cell protects the coil while it is driven into the slot. The double winding cell is a valuable help, as a thin, one-piece cell will pull down and crease under a tightly fitting coil. The double winding cell consists first of a bottom cell, that is, just wide enough to cover the bottom and each side of the bottom half of the coil. When winding the armature this bottom cell is sprung into a channel shape and placed in the top of the slot, or it can be placed around the bottom half of the coil. In either event, the winding cell, which is paraffined on both sides, and the coil are both driven down to the bottom of the slot together.

When the throw coils are in, a top winding cell, cut wide enough to project 1½ in. or more above the slot on either side of the coil, is placed in the slot over the bottom coil half. This provides additional insulation between coils and, also, the winder's time is conserved because all factory cells are paraffined on both sides, which eliminates the necessity of paraffining the bottom coil halves.

With the type of coil used in the Westinghouse Nos. 306 and 514 armatures, an oiled duck pad is used at the front and rear diamond points, and to obtain full protection a dummy piece should be used while each coil is drifted into place. After this, the coil-up should be eased up, the dummy removed and a new oil duck pad inserted. This assures that the protective pad will not be punctured at the point where the two adjacent coil ends cross. When there is considerable space between adjacent coil ends, filling strips are used and placed be-

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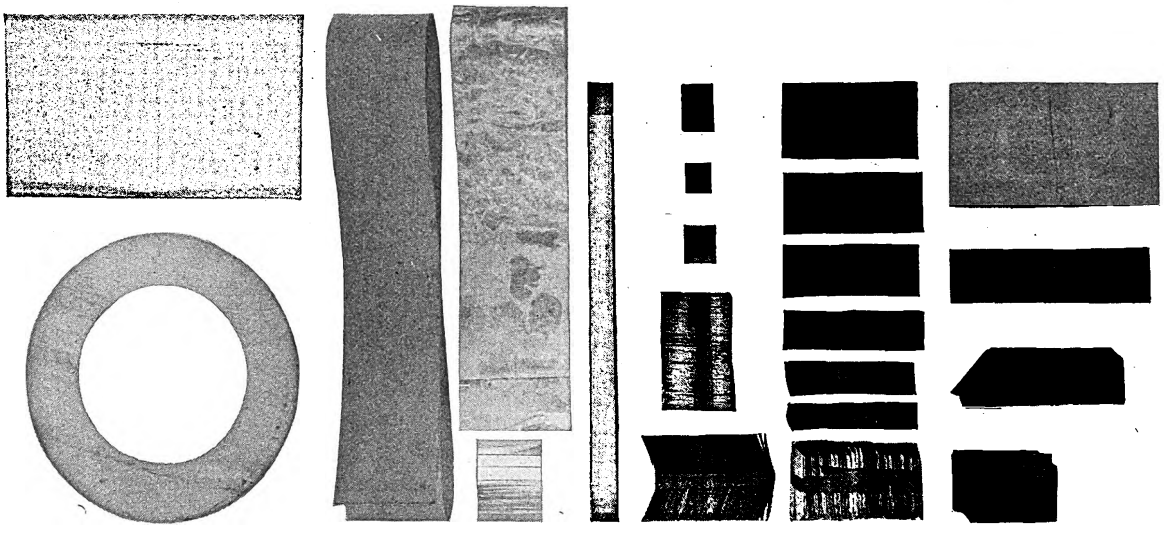
tween the coils in a location that puts them directly under the end bands. These strips give a tight winding and prevent the collapse of the coil ends due to band pressure or pounding during winding.

Other vulnerable points are at the leads. Where four or five leads come from the bottom of the coil in one layer they must be changed to two layers between the coil and commutator. Here are two points where leads cross and change their plane. At the coil end a small rectangular piece of oiled duck is placed at the crossover point, and at the commutator, surgical tape is interwoven between the leads. The bottom and front end of the coils must be protected from the layers of bottom leads. Here again one piece of oiled duck protects three points. A small strip of fishpaper is used to protect the top leads from cutting into the top edge of the adjacent coil.

armatures are then dipped and baked. After cooling, the temporary bands are removed and the permanent bands are applied.

All light traction railway motor armatures of recent design have strips of tin under all permanent core bands, and in some instances strips of thin asbestos paper placed under the tin strips. To protect the front mica V ring, the mica should be cleaned and the ring sandpapered smooth. A coat of shellac, and a band of Italian twine should then be applied, the turns being kept tightly together. The twine should next be coated with shellac, using a hot iron to smooth in each coat. Two to four coats should be applied until the twine band is well filled. After sandpapering this surface, three or four coats of Westinghouse No. 672 cement should be applied. This can be made a part of the final banding operation.



Set of cut winding insulation for a typical motor

There are numerous other cut insulation details that vary with the type of coil, voltage and operating conditions, but their proper location is indicated on the drawing supplied with each set of cut winding insulation, so that it is an easy matter for the workman to determine to what use each piece should be put.

Cut Banding Material

The banding operation is an important part of the winding or rewinding process. The main function of all bands is to hold the coils in place, and to make the coil ends compact and free from movement. This requires correct band pressure, size of wire, selection of materials, and shapes that will not change during operation.

Hot banding assures a tight band with minimum abuse to the winding. The armatures are heated in an oven at 105 deg. to 115 deg. C. until they reach a temperature of about 75 deg. C. The time required to reach this temperature varies with the size of the rotor. The approximate time for armatures up to 12 in. diameter is six hours, for armatures of 12 in. up to 30 in. diameter, eight hours, and above 30 in. diameter, ten to twelve hours.

Temporary bands are applied while the armatures are hot, the wire being started on the core to a set tension, and the rear end band started at the end of the core and then run out onto the end-winding, then back across the core to the front end. Protecting strips should be applied under end bands to protect the winding. The

All railway armatures should be preheated, dipped in a high-grade baking varnish and baked. The varnish should be held to a specific gravity of 0.850 plus or minus 0.005 for best results.

Proper testing is essential in the winding or rewinding of railway motor armatures. All armature coils should be tested for breakdowns between adjacent single coils and on multi-lead coils and a lighting-out test made to weed out crossed wires. After installing coils and connecting the bottom leads to the commutator on multi-lead coils, the winder should lightout the top leads for proper sequence. Before soldering, and after connecting, the armature should be tested for grounds and for short circuits.

A new test developed by J. L. Rylander of the motor engineering department of the Westinghouse Company is termed a "high frequency test." It consists of passing a high voltage at high frequency through the winding. This voltage varies from four times normal plus 1,000 to twice normal plus 2,000, according to the design, operation, voltage, etc.

The test shows up weak spots in the mica between bars, between turns, between adjacent coils at any point where they touch, between adjacent leads, between leads and front coil ends. In fact, the high frequency test searches out and reveals all weak spots and enables the insulation engineers to add material, change shape, or make other modifications to strengthen the winding at the points where it is required.

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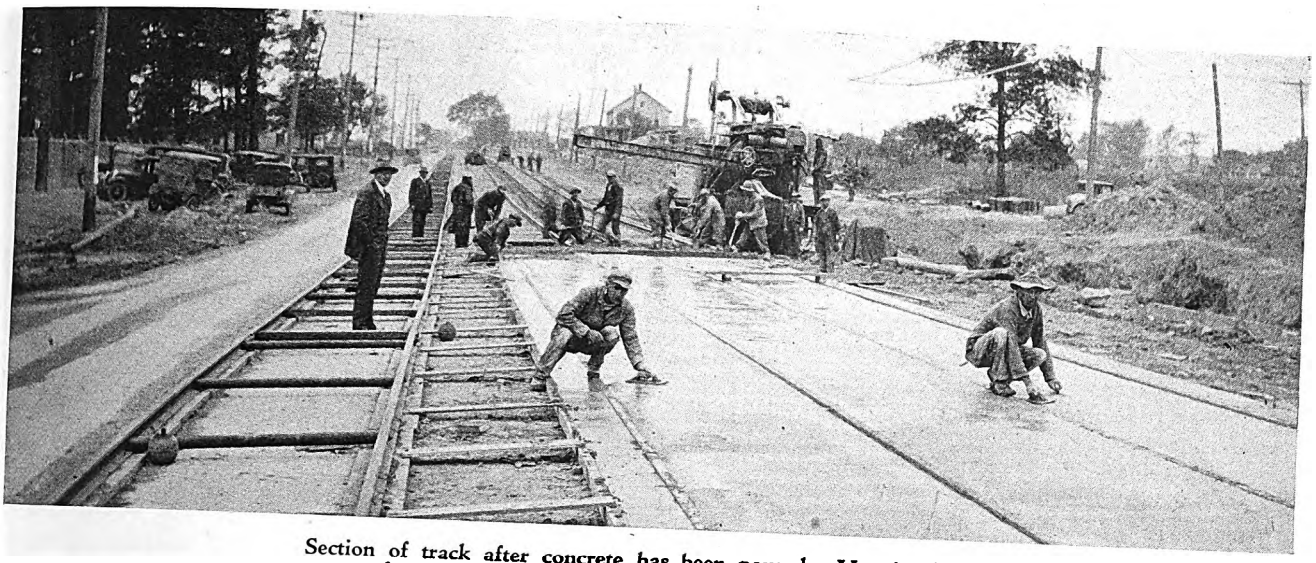


Section of track after concrete has been poured. Men in the foreground are trowelling off the finished surface

Shallow Steel Tie Construction

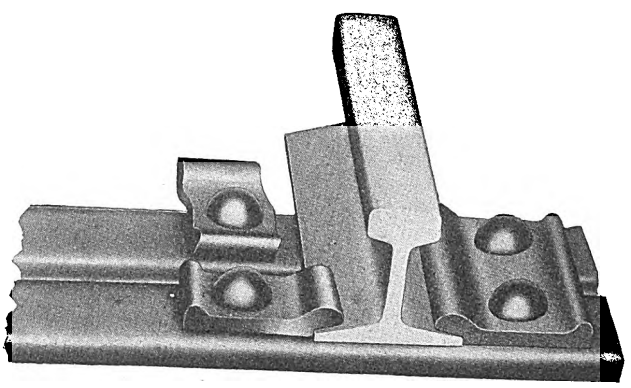
Used in Flint and Pontiac

Eastern Michigan Railways has installed economical type of track structure employing shallow ties originally developed for use in mines

RECENTLY the Eastern Michigan Railways was confronted with the problem of making extensive improvements to track in the cities of Pontiac and Flint. Passenger cars weighing from 15 to 25 tons, and freight cars having a gross weight as great as 55 tons, operate over these tracks. Before coming to any decision as to how the work should be done, a careful investigation was made of all the present-day types of street railway track construction. The chief points considered were cost, ease and speed of construction, paving surface, support of the rail, and the ability of the track to stand up under the vehicular and rail traffic that would pass over it. Another important consideration was the fact that the city engineers of the municipalities contiguous to Detroit require concrete under the ties in all paved track. The railway's investigations led to the belief that shallow steel ties spaced 2-ft. centers would give satisfactory results and economy in construction costs. It was, therefore, decided to use Bethlehem No. 3 steel ties.

COMPARATIVE COST OF WOOD AND STEEL TIE CONSTRUCTION

	Cost Per 100-Ft. Section
Wood Ties	
Excavation—87.52 cu.yd. at $1	$87.52
Concrete—79.29 cu.yd. at $10	792.90
One hundred oak ties at $1.47	147.00
Labor—spiking at 8 cents per foot	8.00
Spikes—400 at $6.90 per keg of 340	8.12
Engineering, superintendence, tools, etc. (10 per cent)	$1,043.54
Total	104.35
	$1,147.89
Steel Ties	
Excavation—63 cu.yd. at $1	$63.00
Concrete—63 cu.yd. at $10	630.00
One hundred steel ties at $1	100.00
Labor—installing at 14 cents per tie	14.00
Spot welding at 20 cents per tie	20.00
Engineering, superintendence, tools, etc. (10 per cent)	$827.00
Total	82.70
Saving	$909.70
	238.19
	$1,147.89



Shallow steel tie used by Eastern Michigan Railways, showing fixed and movable rail clips

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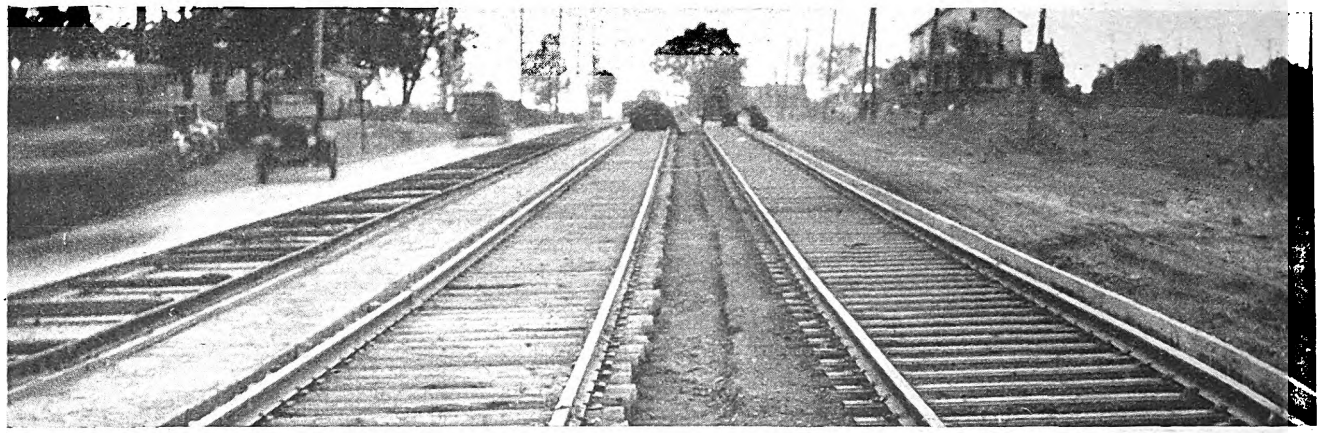


Double track with ties and rails in place ready for concreting, the right-hand track utilizing steel ties and the left-hand track wood ties. Extra excavation necessary where wood ties are used is clearly seen. At the extreme left is a temporary track

During 1928 nearly 15,000 lineal feet of track was laid in this manner.

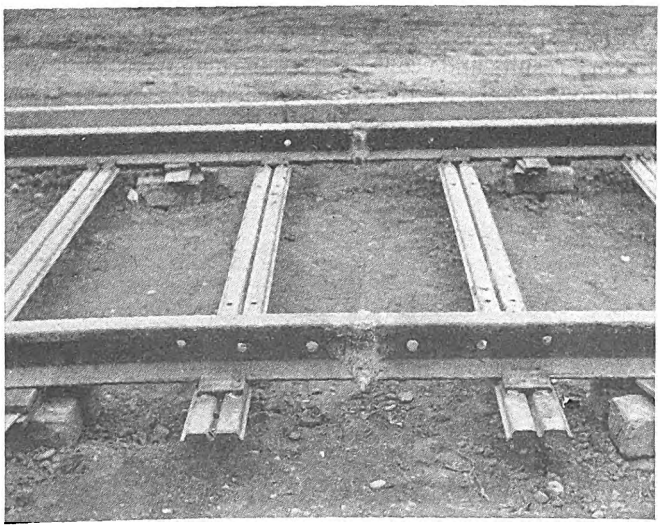
This tie is shallow in depth and is designed with the feature that all rail clips are fastened to it and ready for use. It was originally developed for use in mines. At each end are one wide clip held permanently in position with two large rivets, and two smaller movable clips which are also held in place with rivets. Ties of this type are shipped with the locking clips open and ready for immediate installation. All that is needed is a blow of the hammer to turn the locking clips into position. Another important feature of this tie is the fact that the stationary clip is on the outside of the rail at one end and on the inside at the other. This permits the installation or removal of ties without taking the track apart. There is a considerable saving in handling and distributing cost because of their light weight and small section, which reduces bulk in shipment.

The type of track construction used consists of 70-lb. A.S.C.E. relay rail with Thermit welded joints and Bethlehem No. 3 ties, 6 ft. 6 in. long, spaced 2-ft. centers. Tie clips are spot welded both to the tie itself and to the rail base to provide good cross bonding.

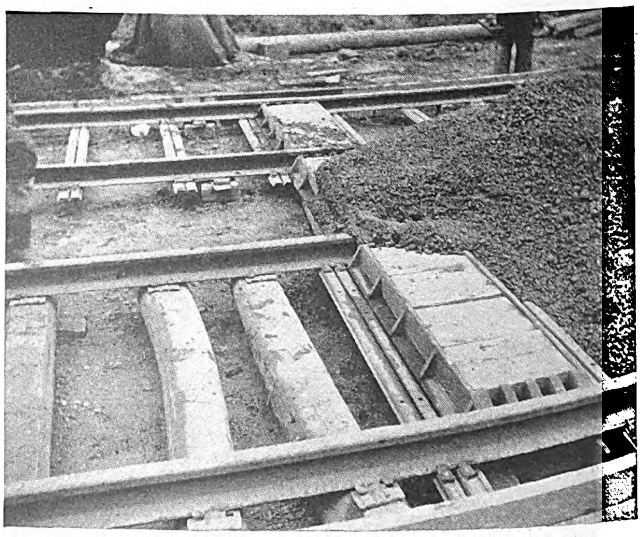
After the completion of the excavation and grading the rails were laid out and supported by three or four cedar ties to each rail. Temporary plates and two bolts were then laid out and either placed alongside the track excavation or slipped under the rail. Crews of four men, each supplied with two pinch bars and two mauls, were detailed to the job of installing ties. The duty of one man was to lift the tie up to the rails, after which it was held in place by the second and third men with the aid of the pinch bars. The fourth man then drove the tie over with a maul until the fixed clips engaged the base of the rail. Lastly this man hammered the movable clips into position. The tie was then in place in its proper position. A crew of four men installed about 125 ties a day. As the ties were installed the track was blocked up to the proper elevation and lined up. Welders followed the tie-laying crew and did the spot welding.

The concrete used is a $1:2:3\frac{1}{2}$ mix, which is standard with the Michigan State Highway Department for one-course concrete and was specified by the city engineers. It was poured in one course from the bottom of the trench to the top of the rail, care being taken to have the concrete immediately adjacent to the rail heads and on the outside thereof $\frac{3}{8}$ in. lower than the top of the rail to prevent double flanging.

No difficulties were encountered in the construction work on these jobs. Estimates of the cost of construction compared to conventional practice indicate an approximate saving of 20 per cent in favor of the track design used. In the six months that have elapsed nothing has developed that would give cause for any belief that this unusual type of construction is not satisfactory for the conditions under which it was installed.



Thermit welded joint with steel ties on both sides. This shows how the rail clips were spot welded to the ties



Track drains are supported in place by the lower flange on the steel tie. This construction is used also on the wood tie track

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Electric Railway Journal Maintenance Data Sheet

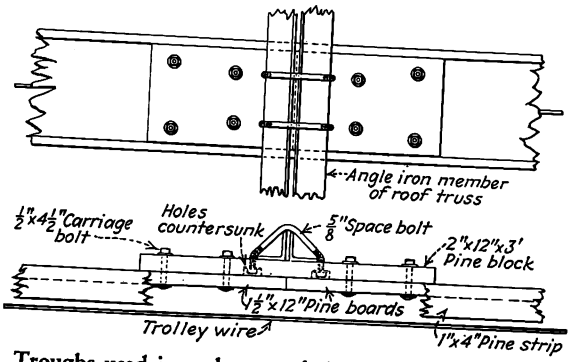
LINE DEPARTMENT—12

Trolley Troughs in Carhouse Reduce Fire Hazards*

By H. G. ENGELHARDT

New Orleans Public Service, Inc., New Orleans, La.

BURNING of the overhead wires in the carhouse of the New Orleans Public Service, Inc., caused by a trolley wheel leaving the wires and grounding on the steel roof beams, has been overcome by the use of pine troughs over all trolley wires inside the buildings. In the construction of these troughs a pine block 2 in. x 12 in. x 3 ft. is fastened to the metal roof truss by two U bolts made from standard $\frac{5}{8}$-in. space bolts. The holes on the under side of the wood block are countersunk 1 in. to receive the nuts. To this block are bolted the ends of $1\frac{1}{2}$x12-in. boards which extend from center to center of the roof trusses. Carriage bolts $\frac{1}{2}$x$4\frac{1}{2}$ in. are used for holding these boards in place. The sides of the troughs are made from 1x4-in. strips nailed on. Center support for the trough is provided by the use of one or more guy wires suspended from an upper member of the roof truss to an eyebolt in the trough. A porcelain strain insulator is used in the guy. Hangers are spaced approximately 7 ft. apart. The completed trough is painted with a creosote compound. This procedure was adopted in accordance with the recommendations of the National Board of Fire Underwriters and contributes considerably toward a low premium for fire insurance.



Troughs used in carhouses of the New Orleans Public Service, Inc.

Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—22

High Rate Discharge Tester*

By F. W. BRAUND

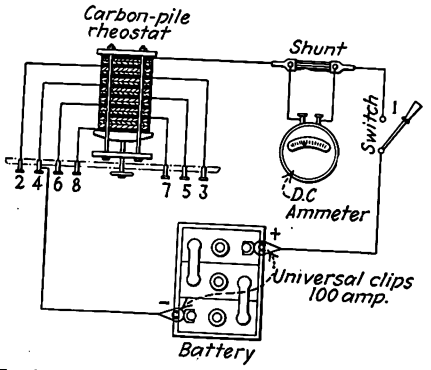
Superintendent of Power Conversion
Cleveland Railway, Cleveland, Ohio

UPON leaving the service station, a storage battery may show correct potential and gravity and still lack the high rate of discharge necessary to crank a cold engine of considerable horsepower. A high rate momentary discharge is necessary when the battery is mounted in a bus. For this reason the Cleveland Railway has built equipment for high rate discharge testing of batteries.

The top connectors of batteries are built of tinned copper straps with lead lugs on either end for burning to the element post of the battery. In the process of burning the strap to the post, or due to sulphation between the copper strap and the lead lug with the battery in service, the bond may be broken or partially destroyed between the copper straps and lead lug. This forms a high resistance joint that can be detected only by actual high rate discharge of 1,000 amp. or more.

Batteries used are either of the 6 or 12-volt type. In giving these a high rate discharge test the positive terminal is connected to a switch, the other terminal of which has a connection through an ammeter shunt to a carbon pile rheostat. Universal clips of 100 amp. capacity are used for quickly connecting and disconnecting the battery under test. In locating high resistance joints on a 12-volt fully charged battery the terminals 1 and 8 are used. In the event that a 12-volt battery is partially discharged, it is necessary to connect the negative terminal of either 5, 6 or 7 taps. With a fully charged, 6-volt battery, connections 1 and 4 are used, and with a partially discharged 6-volt battery, the negative is connected to terminals 2 or 3. When testing a single cell of a battery terminals 1 and 2 are used.

By means of a jumper used to connect terminals 2, 4, 6 and 8 in parallel, and a second jumper to connect 1, 3, 5 and 7, the carbon plates can be placed in parallel so as to give an extremely high rate of discharge.



Testing equipment used for high rate discharge testing of batteries

Taps	Resistance
1 to 2	0.1200 ohm
1 to 3	0.0793 ohm
1 to 4	0.0737 ohm
1 to 5	0.0620 ohm
1 to 6	0.0415 ohm
1 to 7	0.0169 ohm
1 to 8	0.0084 ohm

Submitted in ELECTRIC RAILWAY JOURNAL Prize Contest.

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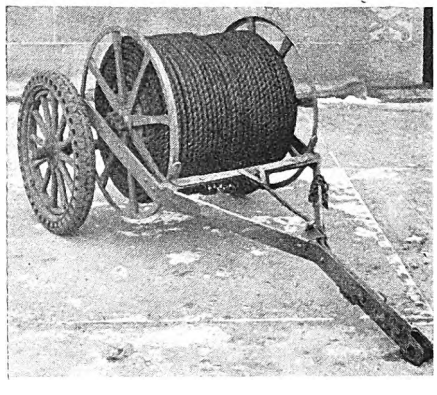
Electric Railway Journal Maintenance Data Sheet

LINE DEPARTMENT—13

Portable Rope Reel*

By Angus G. Scott
Assistant Superintendent of Overhead Lines
The Cleveland Railway
Cleveland, Ohio

TO FACILITATE the handling of large coils of rope, such as are used by electric railway line departments, a reel of the type shown in the accompanying illustration is used by the Cleveland Railway. This provides for 1,200 ft. of rope and can be moved readily from one location to another. A small metal brake band is part of the equipment. To facilitate winding, the sides are left open. Ford automobile wheels, mounted on a specially made axle, are used. Tires are of hard rubber.



Type of portable reel used by the Cleveland Railway

Before this reel was devised rope was wound on an ordinary trolley reel or done up in large coils and tied. Both these methods made handling difficult. The reel offers many advantages. It can be towed easily, handled by a single man and can be set up in practically any location.

**Submitted in* Electric Railway Journal *Prize Contest.*

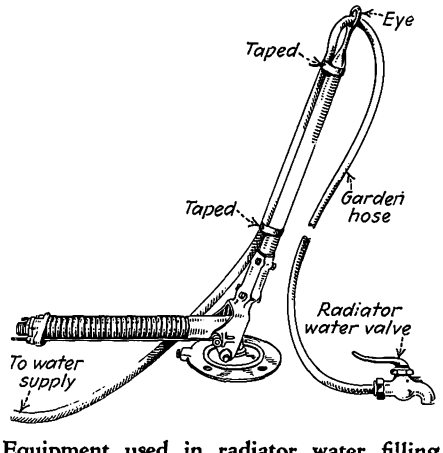
Electric Railway Journal Maintenance Data Sheet

BUSES AND TRUCKS—23

Radiator Filling Station for Buses*

By Arthur E. Clegg
Foreman Electrical Department San Diego Electric Railway
San Diego, Cal.

TO PROVIDE a convenient method for filling bus radiators, special equipment has been devised by the San Diego Electric Railway. The device consists of a U. S. No. 6 form A trolley base mounted on a bracket and a pole which has an eye at the top end through which the filling hose passes. One end of the hose is attached to the water supply line while the other is provided with a radiator water valve. The hose is fastened to the pole of the trolley base by means of friction tape. This device is placed at the entrance to the gas filling station at the company's garage and is located high enough to clear buses as they move in and out in regular service.



Equipment used in radiator water filling stations by the San Diego Electric Railway

A wall hook is provided to hold the water valve. With the trolley pole in its normal position the hose is just long enough to allow conveniently hooking of the valve in position. While buses and other auto service equipment are being serviced for gas the radiators can be filled quickly with water by pulling the trolley pole down so as to give necessary length of hose to reach the radiators of various types of equipment. The simplicity and convenience of the radiator water filling station has effected a big time saving.

**Submitted in* Electric Railway Journal *Prize Contest.*

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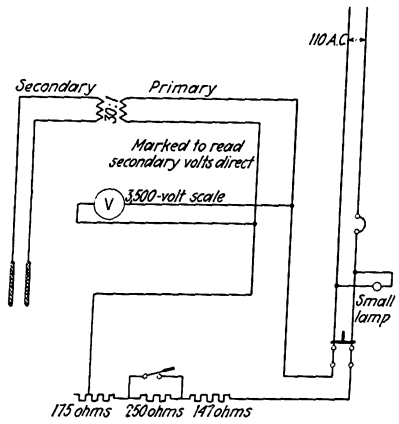
Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—63

Simple High-Potential Test Set*

By H. J. Beadle
Equipment Engineer Dallas Railway & Terminal Company
Dallas, Tex.

BY THE USE of a transformer test set built by the Dallas Railway & Terminal Company many defective rewinding jobs have been detected before armatures were put back in service. The set cost approximately $55 and since its use it has paid for itself many times by detecting weak spots in the insulation which ultimately would have caused trouble in service. The equipment used consists of a transformer, circuit breaker, switch, voltmeter and regulating rheostat. The transformer has a ratio of 30:1. The circuit breaker is connected in series in the line and is rated at 1 amp. A red light is connected across the line and is used as a warning signal. The rheostat is divided into three sections of 175 ohms, 250 ohms and 147 ohms. The 175-ohm section is variable and is used to change the secondary voltage. A test voltage of 1,500 is used for old jobs which are dipped and baked, and 2,000 volts is used for rewinding jobs. The potential is applied for one minute.



Wiring diagram for high-potential test set

*Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet

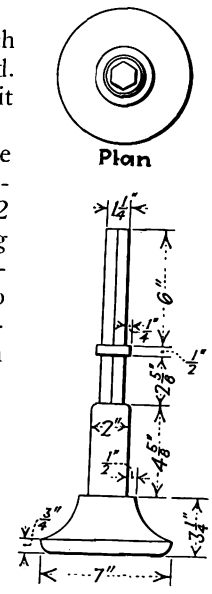
TRACK AND WAY DEPARTMENT—42

Heavy Tamping Pads*

By Louis T. Botto
Superintendent Maintenance of Way Department
San Antonio Public Service Company
San Antonio, Tex.

EXCELLENT results have been obtained through the use of heavy tamping pads in air-operated concrete breakers by the San Antonio Public Service Company, San Antonio, Tex. Some difficulty, however, was experienced, due to the commercial tamping pads not being of sufficiently rugged design to stand up for any length of time under the 80 lb. pressure applied by the concrete breakers. Experiments were made and, as a result, a special tamping pad has been designed, much stronger than that previously used. This does the work required of it without breaking.

After rolling the track sub-grade with a 7-ton steam roller, these tamping pads compact the soil from 1 to 2 in. and are invaluable in tamping around pipes, manholes and approaches to bridges. They are also used in tamping concrete and in consolidating gravel between the ties in gravel ballast tracks.



Special reinforced tamping pads used by the San Antonio Public Service Company

*Submitted in Electric Railway Journal Prize Contest.

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Electric Railway Journal Maintenance Data Sheet

ROLLING STOCK—ELECTRICAL—64

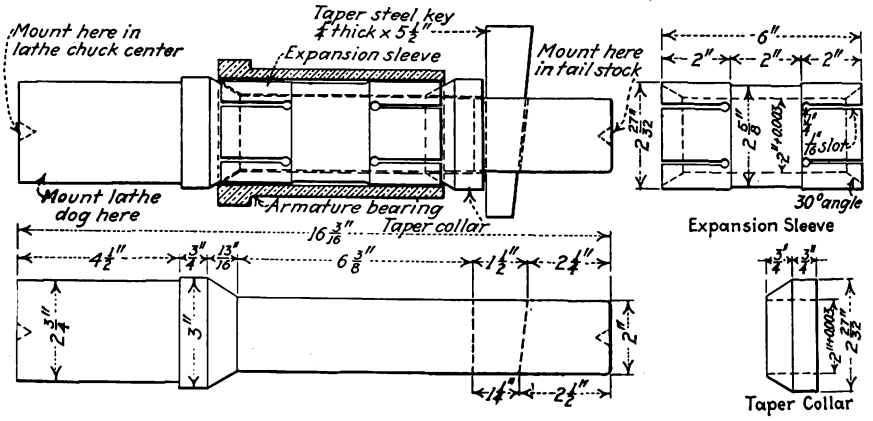
High Speed Chuck for Armature Bearings*

By Charles Herms

General Foreman San Diego Electric Railway
San Diego, Cal.

On car equipment operated by the San Diego Electric Railway it has been found that the life of armature bearings for the modern high speed motors with helical gears is 50 per cent less than that which is obtained for low speed spur gear type motors. As a result, particular attention must be given to keeping maintenance costs of these bearings as low as possible. To facilitate this work several special chucks and jigs have been made. The accompanying illustration shows a high speed chuck used for turning armature bearings.

In using this, the first operation is to chuck the bearing in a Universal chuck and bore the inside to exact size with a boring bar. In the second operation, the bearing is slipped over the expansion sleeve of the high speed chuck and the taper collar is driven firmly into place by striking the taper key a light blow. This expands the sleeve and centers and chucks the bearing automatically. The whole assembly is then installed between lathe centers by screwing up the tail stock a few turns. The chuck is driven by means of the lathe dog which always remains on the chuck shaft. The lathe chuck jaws are not used because this would require an additional operation. The entire operation requires only 30 seconds.



High speed chuck used for turning armature bearings

Submitted in Electric Railway Journal Prize Contest.

Electric Railway Journal Maintenance Data Sheet

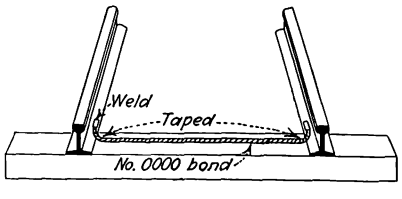
TRACK AND WAY DEPARTMENT—43

Taping of Bonds Prevents Electrolytic Action*

By Charles F. Coyle

Assistant Engineer Overhead Line Department
Memphis Street Railway, Memphis, Tenn.

Considerable trouble has been experienced because of electrolytic action where cross bonds are in contact with the earth on the lines of the Memphis Street Railway. To overcome this difficulty it is now the practice on open track construction to tape all cross bonds to a point as near as possible to the weld. After taping they are painted carefully with an insulating paint. This method of taping bonds has proved very successful in reducing the amount of trouble from this cause. The tape also conceals the bond to a certain extent and so has reduced the loss of bonds due to theft. The accompanying sketch shows the method.



Method used for installing bonds on the Memphis Street Railway

Submitted in Electric Railway Journal Prize Contest.

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Prolonging the Life of Electric Railway Armatures

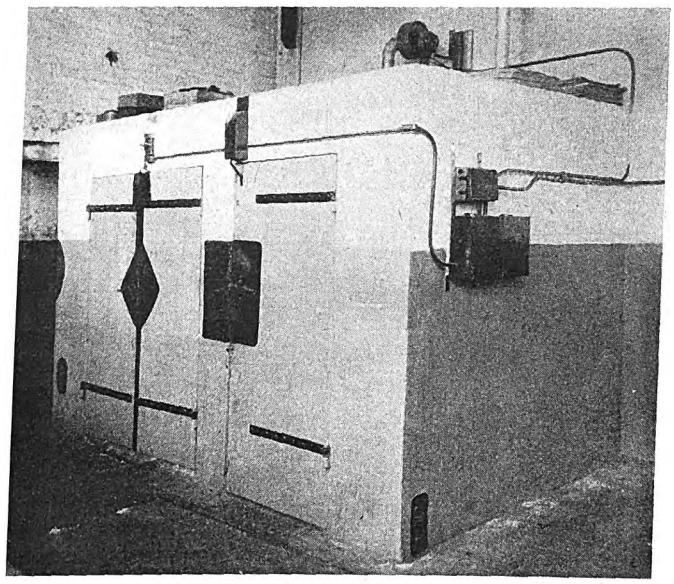
Yearly dipping and baking is a desirable practice. Correct selection of varnish important. Careful temperature control needed

By R. S. Beers
Railway Engineering Department General Electric Company

IN THE maintenance of railway motors it is an accepted fact that dipping and baking of armatures and field coils when they are rewound or overhauled is the best method of increasing their life. As the varnish gradually loses its solvent, because of repeated heating and cooling, it is essential that the dipping and baking be repeated from time to time. While best results will be obtained by a yearly dipping and baking, comparatively few railways have an overhaul program that brings the apparatus through the shop so frequently. The usual practice is to dip and bake the armatures and field coils when the cars go through on a general overhaul.

A concrete example of how rewinds were reduced on one railway by dipping and baking is given in the following tabulation:

Year	Armatures Dipped	Armatures Rewound
1924	94	266
1925	106	220
1926	128	163
1927	173	155
1928 (ten months)	304	86



Baking oven in the shop of the Schenectady Railway

On this property baking and dipping was started in 1924. The greater number of armatures dipped in 1928 is the result of a definite overhauling program that includes the dipping and baking of all fields and armatures every two years. The purpose of dipping and baking is twofold. One is to put a waterproof covering over the insulation of the armature; the other to prevent movement of the armature coil by filling the spaces between it and the slot. Before dipping, the armature is heated to free it from moisture, and to warm the insulation so the varnish will penetrate easily. Temporary binding is applied at this time to insure a tight final binding.

Two general methods of dipping armatures are in vogue. One method is to rotate the armature through a shallow pan of varnish; the other to use a tank of varnish and lower the armature, with its pinion end down, until the varnish is within $\frac{1}{4}$ in. of the ear on the commutator segment. The armature is left in the varnish from 10 to 30 minutes, or until the bubbles cease rising.

It seems reasonable to expect that, when an armature has been dipped, the varnish will penetrate the minute openings in the coil insulation to a greater depth and in a more successful manner than when the armature has been rotated in a shallow pan. This is borne out by the fact that it requires a shorter time to bake an armature that has been rolled in a pan than one that has been dipped in a tank.

A few operators submerge the entire armature. The advantage claimed for complete submersion is that it closes small holes in the commutator shells, preventing oil from entering the commutator and short circuiting its bars. The disadvantage is that a much longer baking time is needed because varnish gets into the commutator, mica cones, etc. The canvas head dressing should be removed before dipping, as the varnish either does not penetrate or else fills the spaces under the dressing, necessitating a long time for baking.

After the armature is soaked full of varnish it should be removed from the dip tank and allowed to drain until the varnish stops dripping. If it has been dipped in a vertical position, draining should be with the shaft at about 30 deg. from vertical. When dripping ceases the armature should be turned half-way around, whereupon dripping will start again. The varnish may be washed off the bearing and pinion fit with gasoline while the armature is draining. If it bakes on, a paint remover should be used to clean it off.

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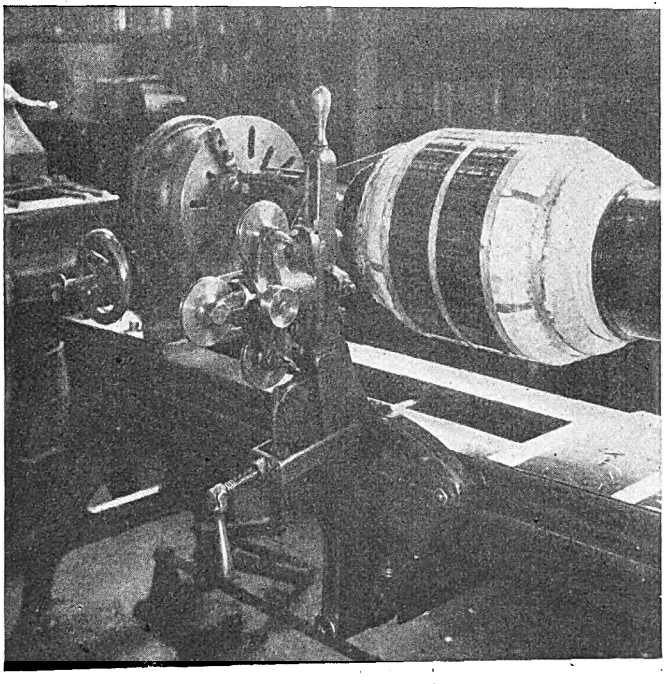
For the best results it is essential to use a varnish that will remain flexible for a long time without cracking. Baking varnishes fulfill this requirement much better than air-drying varnishes, because the former retains its solvent at ordinary temperatures much longer than does an air-drying varnish. For the same reason, a baking varnish must be baked a longer time than an air-drying one.

Whether a clear or black baking varnish should be used is largely a personal preference. Good results may be obtained with either. As a matter of fact, the majority of railways use a black baking varnish for railway motors. It is obvious that a thin liquid will penetrate the windings of an armature much deeper than a thick one. Likewise, if the liquid is all solvent, there will be very little solid matter left after baking to form a waterproof covering or to act as a filler and keep the coils tight.



Tension device on armature banding lathe

The specific gravity of a varnish is measured at 70 deg. F. with a hydrometer divided in a decimal scale. The specific gravity used for brushing is 0.860. For dipping, a specific gravity of 0.835 to 0.845 is customary. As the specific gravity changes with temperature it should be measured with a hydrometer that includes also a thermometer. While the gravity of varnishes is given at 70 deg. F. a variation of 10 deg. plus or minus is immaterial for all practical purposes. As the hot armature is put in a relatively small quantity of cool varnish, the latter is thinned further by the heat from the armature. The best penetration of varnish into the armature windings will be when its temperature is above 110 deg. F.

An approximate means of estimating the amount of gasoline thinner, when this is suitable, for each 100 gal. of varnish is given in the accompanying table.

GALLONS OF GASOLINE THINNER FOR EACH 100 GALLONS OF VARNISH

Observed specific gravity	.....	0.870	0.864	0.859	0.854	0.849	0.843
Desired specific gravity.	0.849	17	13	9	4	0	.....
	0.843	23	18	14	9	5	0
	0.839	28	24	19	24	9	5
	0.833	35	30	25	20	15	10

While two dippings and bakings are better than one, it is customary practice for the railways to dip their armatures only once, whether they are being rewound or overhauled. When baking armatures it is necessary to have an oven temperature high enough to remove the moisture, but not high enough to weaken the cotton insulation. The usual oven temperature ranges are between 220 deg. F. and 235 deg. F. for railway work.

Inasmuch as the temperature inside the oven may vary as much as 50 deg. between the floor and roof, it is best to place thermometers on the armatures and then move the thermostatic control device up and down the side wall of the oven until a location is found that gives the desired temperature at the armature. Successful baking requires an adequate supply of fresh air for the oven to insure quick drying of the varnish and to prevent the mixture of solvent (gasoline) and air from becoming explosive. Either natural or forced ventilation may be used, the latter being the better. There should be an outdoor discharge for the mixture of solvents and air removed from the oven.

To free armatures of moisture they are heated for ten or twelve hours before dipping. The usual practice is to put the armatures in the oven at night and dip in the morning. After they are dipped, drained and returned to the oven for the final bake, varnish will still run out when the armature heats up. For this reason the best practice is to set it in a vertical position with the pinion end downward; otherwise, with ventilated motors, the varnish may close the air ducts partially. Some of the old motors, such as GE-67, GE-73 and GE-80, bake better in a horizontal position because of a pocket between the commutator and core which does not empty with the armature in a vertical position. Armatures that are baked in a horizontal position should be given several quarter turns during the first few hours of baking to insure draining varnish pockets.

The General Electric Company's practice is to dip and bake railway armatures twice. After the first dip all armatures are baked twelve hours at an oven temperature of 230 deg. F. to 235 deg. F. After the second dip, the wire-wound ones are baked at least twelve hours and, if necessary, enough longer so they have an insulation resistance of at least ½ megohm while at oven temperature. The bar-wound ones are baked a minimum of 24 hours, or until the insulation resistance is 1 megohm while hot. The majority of railway companies bake armatures for a definite length of time. This is not a successful measure, however, as one discovers quickly when insulation resistance measurements are made.

The insulation resistance test is simple and can never harm a piece of apparatus as a high potential test might. A megger, measuring insulation resistance directly in megohms may be used; or a 750-volt switchboard-type voltmeter will give equally good results for about one-third the price of the megger. It is recommended in all cases that the two measures, minimum length of time and minimum insulation resistance, be used for baking armatures.

A minimum length of time is needed to solidify or "jell" any small pockets of varnish that have not drained. The time depends on oven ventilation, kind of varnish, oven temperature and size of armature. For these reasons it is best to determine it for each oven. A simple method is to put a cup in the oven with ½ in. varnish in it. The number of hours that it takes to "jell" should be determined so it will not run when cold. To this should be added the time it takes to heat the armature up

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to oven temperature after it comes out of the dip tank to determine the minimum baking time.

All dipping and baking of armatures should include temporary binding of the armature coils. Such a procedure pulls the coils into place and insures a tight final binding that cannot be accomplished in any other way. The tighter the coils are bound together the less movement there is between them. Reducing the movement between adjacent coils prevents their chafing and breaking the varnish seal on the surface.

The procedure followed in temporary binding is to heat the armature overnight in the armature oven to soften the coils and insulation so they are pliable and will not break. The armature is put in the banding lathe while hot, and the temporary binding put on. One-sixteenth inch pressboard, or similar cushion, is used between the wire and the coil ends. Along the slot portion wood or metal pieces, of the width and thickness of the armature coil and a little longer than the armature core, are used between the binding wire and the coils.

Usually the temporary binding is started at one end of the armature and continued to the other without break. On the wood sticks along the core it is spiraled, with a distance of about ½ in. between adjacent wires. Judgment must be used in applying the binding over the coil ends; too little binding does not pull the coils down properly, and too much with the cushioning material provides pockets that prevent the varnish draining properly. The final binding is put on with the armature cold and after the dipping is completed.

Binding wire tension should be measured with some indicating device to insure uniform results. The tensions used should depend on the wire size and whether the armature has been rewound or overhauled. As a general guide, binding wire 0.045 in. in diameter (No. 17 B. & S. size) is suitable for railway motor armatures of 65 hp. and smaller. The tension on this size wire for rewound armatures should be from 150 to 200 lb. This tension is too high for overhauled armatures and should be reduced to from 80 to 120 lb. For armatures larger than 65 hp. 0.057 in. diam. binding wire (No. 15 B. & S. size) may be used. The tension on this size wire for rewound armatures should be 250 to 300 lb. and for overhauled ones 175 to 225 lb. The tension should be the same for either temporary or final bindings.

Louisville Improves Its Safety Record

AFTER winning the Brady Safety Medal for Class "A" companies a year ago for its 1926 record, the Louisville Railway made an even better safety record in 1927. While it did not receive the Brady prize this year, it entered the contest, and its brief gives an instructive account of how this lower accident record was obtained, and what has been done for safety during the last year on a property which has given a great deal of attention to that subject for a long time.

Among the mechanical aids to safety added during 1927, the company gives first position to a steam railroad grade crossing elimination program, begun in 1927. Although, of course, it will be years before all the benefits can be secured, the city has authorized a bond issue of $5,500,000 to pay its proportion of the cost.

Two more new illuminated "car turn" signs have been installed at intersections where street cars make right-hand turns, and destination signs, with black letters 3 in. to 5 in. high on an aluminum painted background, have been prepared for all cars. It is thought they encourage waiting passengers to stay on the sidewalk out of danger until it is time for them to step forward to board a car. It is further believed that their installation has resulted in fewer passengers being struck by automobiles, when boarding or alighting from street cars.

Locking devices on electric switches, to prevent the split switch hazard when cars follow each other closely, are now in use on 31 of the 64 switches on the property. Shock absorbing springs and special lug rods have been added to all electric switches between the switch tongue and the electric device to reduce the impact of the armature of the switch magnet when operated and to improve the functioning of the switches. An order has been issued that motormen are not to use sand while passing over switches. Employees not on duty are not permitted to ride in the front vestibule of cars except when giving instructions to new men or when the cars are crowded.

A steam connection has been provided at the power house to melt the ice that accumulates in the cinder hopper in cold weather. A railing has been put around the hopper for workmen to hold on when cleaning the chute. Conductors, after giving the motorman the "go ahead" signal, are not allowed to open the car doors for more passengers even when their motormen are unable to proceed because of traffic conditions.

Monthly surprise inspections are now made to every piece of company property by a committee consisting of a power house man, a track man, a lineman, a motorman, a conductor, a shop man, an employee from the general office, the director of safety, and the secretary of the co-operative association. Machine guards and lighting conditions are examined, with the idea of making all property as nearly fool-proof as possible.

Several improved practices have been introduced for the improvement of conditions for the trainmen. One is in connection with street car hold-ups, of which there have been several in Louisville. Orders were issued that trainmen held up should do nothing to imperil themselves, and the company arranged for group hold-up insurance by which each man insured is protected to the amount of $50, no distinction being made between his personal property and that of the company. Every trainman who wishes it may obtain this insurance. It costs $2.50 a year, half of which is paid by the trainman and half by the company. Another plan, adopted largely for the same reason, is to pay wages by check rather than by currency.

Another change was the rearrangement of the electric heaters on one-man cars. When receiving fare or making change, operators of such cars cannot wear gloves, and as considerable cold air enters the doors when they are opened for boarding and leaving passengers, the operator's hands become chilled. This discomfort has been minimized without ill effect on the general car ventilating and heating problem by moving the electric heaters forward in all one-man cars.

Another improvement, which is in the direction of

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sanitation if not of safety, is the attachment of trash baskets to all cars. Prior to their installation, the regulations required that cars be swept out at the end of lines and the waste paper deposited in tins placed at loops for the purpose. In practice this worked out imperfectly. The trainmen would sweep their cars out, but instead of putting their trash in these receptacles it would often be swept on to the ground. Now a trash basket is placed under the floor of every car, and waste matter may be swept into it even more easily than through the door.

The extended attention which the company has given to the safety training of trainmen gives an especial value to its experience on this topic. It has found little difficulty in interesting its employees in safety or in persuading them in every way to co-operate for safe operation and that they retain this interest, when it has once been acquired. Unfortunately, it finds that this alone is not enough. It believes that the interest of trainmen in safety should be a part of their conscious, rather than their subconscious, lives. The motorman with the highest safety ideals may run over a pedestrian or smash an automobile if he momentarily relaxes his vigilance. The management, therefore, must keep the monotony of daily tasks from dulling the safety enthusiasm of the trainmen. This is the reason for the accident contests between the divisions which have been maintained in Louisville for years. Each month's contest is a new thing, and the position of different carhouses in the contest frequently changes from day to day. These ostensibly new factors naturally become topics of conversation around the carhouses and help to keep safety constantly in the minds of the men.

Two improvements, drafted on the original plan for safety contests, have done much to keep at a minimum the inevitable less-enthusiastic moments. The first of these is the election each month by every carhouse of a safety captain, who acts as leader during that month's contest. The employee elected naturally takes on these duties in addition to his other work. No extra wages are paid to any safety captain, but election to the position is esteemed an honor, and every safety captain gives generously of his own time in an effort to improve the record of his carhouse, so that it will be the winner in the contest.

The company also finds that by occasionally changing the manner of posting the standing of the several competing teams, it can increase the interest of its employees in the contest and in safety. Hence, the enthusiasm of any indifferent individual is revitalized. There is a great advantage also in having every employee at the carhouse acquainted with its standing. The most machine-like person is not wholly impervious to an *esprit de corps,* and, if his carhouse has a chance to win a monthly contest, he naturally will make just a little greater effort not to destroy that chance by having an accident.

Besides these carhouse contests, another element of competition is introduced through an award founded by a director of the company, consisting of an annual cash prize of $25 and a gold medal to the employee who during each calendar year renders in his individual capacity the most efficient or useful service to the company. To the winner of this prize, the company gives a trip to the A.E.R.A. convention. Three different men have received this award since it was established, and in each case safety of operation has been a very important factor in determining the prize winner.

Maintenance of Aluminum Cell Lightning Arresters

By F. J. Foote
Superintendent of Motive Power and Equipment Indiana, Columbus & Eastern Traction Company

MUCH trouble from lightning has been experienced by the Indiana, Columbus & Eastern Traction Company, Springfield, Ohio, particularly on one line. After considerable experimenting this line was completely equipped with aluminum cell arresters. The results were immediate and the trouble from lightning was entirely eliminated. This led to the eventual adoption of these arresters on all lines of this company and on all feeders, the feeder arresters being located inside the substation.

Arresters are not used on the trolley wire but partial protection is secured from a circuit of 25-watt incandescent lamps at each switch, one of which is in the switch lamp for signal purposes. These lamps are connected between the trolley and rail at all times. Occasionally, during an electric storm, some of these lamps are burned out.

Maintenance of these arresters is comparatively simple and consists of cleaning all parts and renewing the electrolyte every spring, with inspection every few days to see that the fuse is not burned out. Sometimes, when cleaning the cell, it is found that one or both of the aluminum plates are eaten away so that renewal is necessary. When cleaning the cells and renewing the electrolytes absolute cleanliness is important. It is equally important that suitable electrolyte be used. Since these precautions have been taken considerably fewer renewals of plates and a much better arrester performance has been noted. Electrolyte ready mixed at the factory has been found much superior to that which can be made up from electrolyte powder.

It has been found advisable to remove the cells from all arresters on the cars in the late fall, cleaning and repairing them and putting them in storage until early spring. In the cleaning process clean warm water and Ivory soap is used, rinsing thoroughly in clean distilled water. Care is taken that the plates are not touched with the fingers after rinsing. It facilitates matters greatly to have a sheet of glass kept clean, to set the plates on after rinsing. If the cells are cleaned in the fall they should be again rinsed in distilled water in the spring before filling with electrolyte. It has been found that all of these precautions are necessary if the best results are to be secured, and it is probable that where these arresters have not proved satisfactory, it is largely because of too little attention being given cleaning and repairing.

The feeder arresters in the substations are not removed in the winter. They are inspected for blown fuses frequently during the summer months and are cleaned and repaired every spring. During the last two years several of these arresters have been installed across the direct-current brushes of rotary converters, and it is believed that this has reduced the number of flashovers. All of these arresters are connected directly between the line and ground without air gap. Consequently, there is at all times a minute current passing through the arresters, making special charging unnecessary. These electrolytic condensers possess considerable electrostatic capacity and for this reason the elimination of radio interference, due to motor cars and rotary converters, is another advantage, as these arresters act as condensers across the line.

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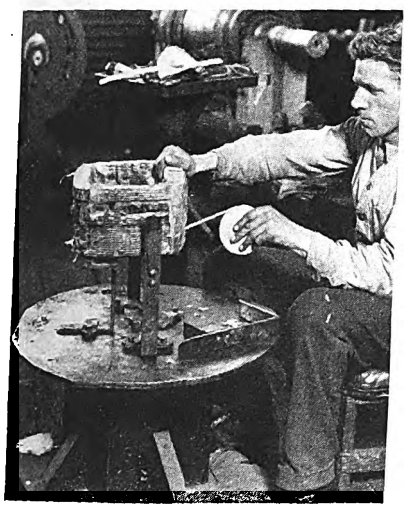
Ideas for Better Maintenance

Turntable for Heavy Field Coils

BECAUSE of their delicate construction heavy field coils are often damaged by handling in the shop. At the Deer Lodge shop of the Chicago, Milwaukee & St. Paul Railway, the handling and possible damaging of field coils weighing as much as 300 lb. is avoided by the use of a small turntable. This turntable



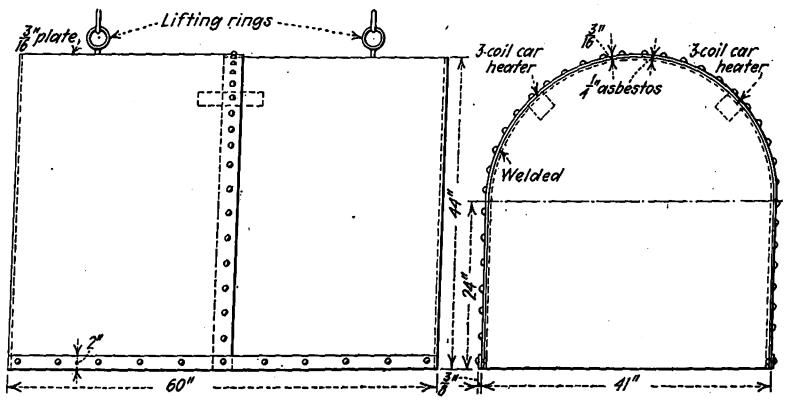
Turntable facilitates handling of heavy field coils

consists of a heavy wood base on which is mounted a circular disk cut from steel plate by means of a welding cutter. On this plate are mounted four iron brackets which may be placed in several positions to accommodate various sizes and shapes of coils. By the use of this device the position of the field coil may be altered to give the best working conditions at all times, at the same time movement can do no damage to the coil itself.

Portable Pit Oven for Limited Space

WHERE shop floor space is limited and ample pit space is available a portable baking oven designed for installation in a pit will be found advantageous. This condition existed in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y.

The oven shown in the accompanying sketch was designed and constructed in the shop for pit operation. It is 60 in. long, 44 in. high, 41 in. wide and made of $\frac{3}{16}$-in. plates. The top and sides are made from two semicircular plates overlapped and riveted at the center with $\frac{3}{8}$-in. rivets. The end plates are in one piece and are welded to the top and side plate of the oven.



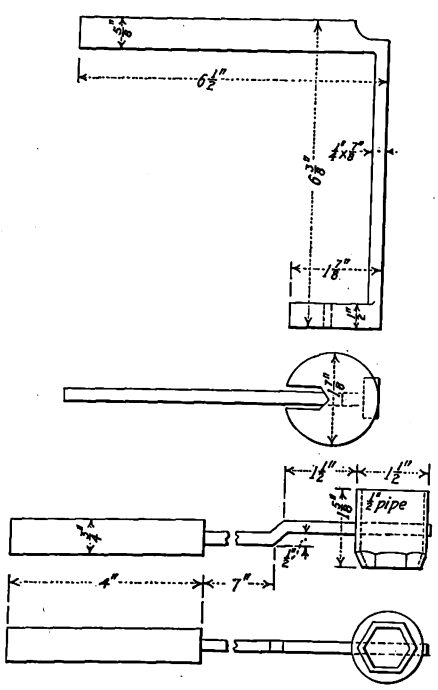
This oven is installed in one of the shop pits

Additional strength is obtained by a $\frac{3}{8}$x2-in. bar riveted to either side at the bottom. The entire oven is lined with $\frac{1}{4}$-in. asbestos. Thermostatically-controlled heat is obtained from two car heaters installed near the top. Two strong rings welded to the top provide for lifting. The armature to be baked is placed in the floor of the pit and the oven is placed over it.

Useful Air Equipment Tools

OFTEN it is impossible to purchase special wrenches for specific work and much time is lost in using standard tools. This condition existed in the air equipment maintenance organization of the Richmond Railways, Inc., Staten Island, N. Y. Trouble was experienced in removing the caps of the M-28 brake valves and foot valves. This increased the costs for maintenance of this equipment. The special wrenches shown in the accompanying sketches were designed by Air Equipment Inspector Nicksic to overcome this trouble. The upper illustration shows the construction of the wrench adopted for the removal of the holding bolts of the brake valve cap, and the lower one that of the wrench for the removal of the foot valve cap.

The handle of the brake valve wrench is $6\frac{1}{2}$ in. long and is made from $\frac{5}{8}$-in. round material. The vertical portion is flattened to a section of $\frac{7}{8}$x$\frac{1}{4}$ in. and is $6\frac{3}{8}$ in. long. The length of the jaw stock is $1\frac{7}{8}$ in., the width $1\frac{7}{8}$ in. and the thickness $\frac{1}{2}$ in. The handle is rotated over the valve stem so that a free circular movement is obtained irrespective of the manner in which the valve is mounted to the dash. The foot valve cap wrench socket is made from a piece of $1\frac{1}{2}$-in. pipe $1\frac{5}{8}$ in. long. Both walls of this are drilled with a $\frac{1}{2}$-in. hole and riveted to a $\frac{1}{2}$-in. round handle $10\frac{3}{8}$ in. long. This has a $\frac{1}{2}$-in. offset $3\frac{3}{8}$ in. in the end. The end of this rod is fitted with a round grip 4 in. long and $\frac{3}{4}$ in. in diameter.



These wrenches have provided a means for removing and installing caps quickly. Above, brake valve wrench. Below, wrench for foot valve

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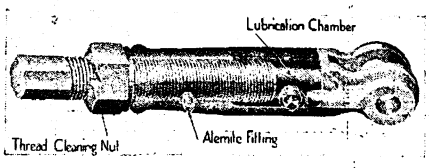
Improved Equipment Suggestions

Brake Rod Turnbuckle

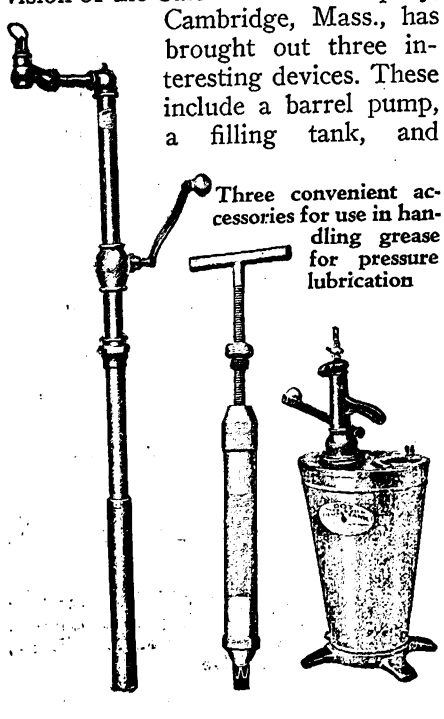
WITH the object of keeping threads clean and providing lubrication the J. G. Brill Company, Philadelphia, Pa., has designed an improved type of brake rod turnbuckle. The accompanying illustration shows the closed end which has a lubrication chamber with plug for filling. An Alemite fitting is arranged to supply lubricant to the threaded section. On the outside a nut is provided for cleaning the thread. With this in position the thread which is next to be used is kept clean, as it enters the turnbuckle.



Improved type of brake rod turnbuckle

Accessories for Pressure Lubrication

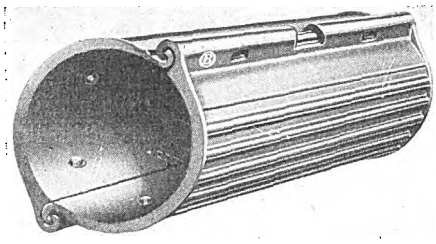
WITH the idea of providing convenient means for handling grease between the steel drum in which it is received and the bearings to which it is applied, and to keep grease clean while it is being removed and applied, the Dot Lubrication Division of the Carr Fastener Company, Cambridge, Mass., has brought out three interesting devices. These include a barrel pump, a filling tank, and a hand gun. By use of the barrel pump the greaser puts 25 lb. of lubricant into the hand filling tank. This latter is an airtight dustproof tank and is arranged to be carried conveniently about the shop. The hand gun is filled from the carrying tank and is used for forcing the lubricant into the pressure fittings. With these three pieces of equipment dirt is kept out of the lubricant and convenient handling is provided.



Three convenient accessories for use in handling grease for pressure lubrication

Sleeve for Reinforcing Poles

FOR repairing steel poles when they have become corroded at the ground line, the Ohio Brass Company, Mansfield, Ohio, is marketing a reinforcing sleeve. It consists of two ribbed segments of malleable iron, heavily japanned, tongued and grooved at the outer edges and long enough to project well above and below the ground line. The space between the pole and the sleeve, formed by a series of lugs on the inside of the sleeve, is filled with cement so as to give uniform bearing surface and make an airtight seal. The excavation outside the pole sleeve is usually cemented flush with the surface.



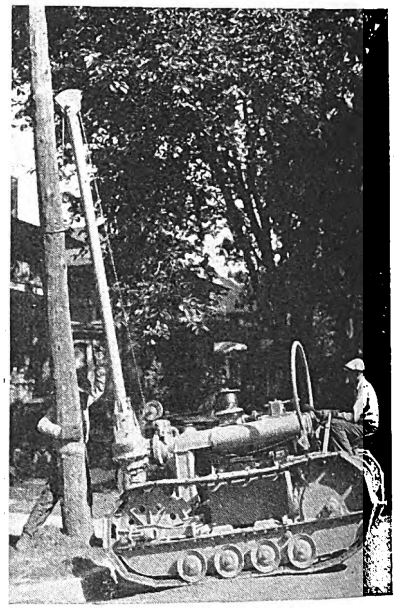
New type of sleeve for repairing corroded steel poles

Improved Welding Gloves

GAUNTLET gloves of a soft and pliable suede leather, specially treated to prevent heat from affecting them, have been added by the Oxweld Acetylene Company, New York, N. Y., to its line of accessories for welding and cutting. A leather strip on the thumb seam and a semicircular reinforcement on the inside seam, adjoining the palm, reinforce the glove. The left glove has a leather reinforcement covering the entire back for protecting the back of the left hand during work.

Earth Boring Machine and Pole Setter

A COMBINATION earth boring machine and pole setter has been placed on the market by the Highway Trailer Company, Edgerton, Wis. It will traverse and operate in thick underbrush where it would be impossible for man to go on foot, no skids being required. It operates in ditches, knolls, hollows, embankments, reaches and digs, and sets the pole in any kind of soil and all kinds of weather. In addition to digging straight holes it will dig at any angle, which is a time saver in digging anchor holes suitable for all types of anchors.



Setting a pole with the machine

The setting of poles at the time holes are dug, also the possibility of dragging poles to a position so they can be hoisted in position, is possible by using the cable supplied from the winch which is controlled from the driver's seat. The winch is driven from a power take-off, which is sturdy in construction, and is fully capable of taking full engine torque.

The pole derrick is 17 ft. in length, made of 3½-in. diameter 40-carbon seamless steel tubing, and is capable of setting poles 45 ft. in length.

The highway earth boring machine is largely used with a 20 ft. auger but is capable of handling augers from 8 in. to 24 in., the latter under favorable conditions.

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News of the Industry

Jitney Regulatory Measure Upheld in Detroit

Detroit's so-called jitney ordinance was again sustained on Feb. 2 when the Michigan State Supreme Court upheld Judge Merriam's decision in the Circuit Court that the city cannot be restrained from enforcing the jitney ordinance. The decision of the State Supreme Court bench was unanimous.

The matter at issue was the old ordinance prohibiting jitneys from operating on only certain stated streets, but jitney men hoped to establish a ruling which would have opened the way to crippling the proposed ordinance which is to be voted on at the April election. If adopted at the referendum this ordinance will ban jitneys from all city streets.

It has been pointed out by city officials that this latest court decision, together with the Supreme Court ruling in October last, holding that a municipality has the right to regulate the use of its streets, means that jitneys will never run again in Detroit unless by express wish and order of the people in an election.

Permanent Rate for St. Paul—Comment from Minneapolis

The Minnesota Railroad & Warehouse Commission made permanent on Feb. 7, the emergency rate of fare for the St. Paul City Railway as 10 cents cash and six tokens for 45 cents. This emergency rate was put in Jan. 25 at midnight at the same time a permanent rate of the same amount was made for the Minneapolis Street Railway. A hearing had been set for Feb. 11, which was automatically rescinded. The St. Paul company had asked for an increased rate at the same time that the Minneapolis company did, but stipulated with the city that the rate that would be declared for Minneapolis would be satisfactory without a hearing. The order, carrying free transfer privilege as heretofore, includes South St. Paul.

O. P. B. Jacobson, chairman of the commission, intimated that failure of the Minneapolis city attorney to submit "land depreciation" testimony resulted in a higher rate for Minneapolis than might have been necessary. He said the rate fixed was adequate for St. Paul, but it might be too high for Minneapolis. He had refused to sign the Minneapolis order on the ground that decreases in land values had not been reckoned with in reaching the approximate evaluation of the Minneapolis Street Railway property. He also said that depreciation of land values in the last five years should have been one of the most important features of the testimony.

Meanwhile the Minneapolis City Council had voted to study the feasibility of municipal ownership.

Fare Advance Sought in Louisville

Railway there sees rate revision necessary if company is to be permitted to refinance and rebuild

THE Louisville Railway, Louisville, Ky., has petitioned Mayor Harrison and the General Council for a 10-cent cash railway fare. The cash rate was asked for, the company's letter to the Mayor said, "with the understanding that we will experiment with reduced-rate tickets."

Directors of the company also sent to the General Council a formal notice of its proposal to change the present 7-cent street car fare and 10-cent bus fare "to a rate of not more than 10 cents for either bus or street car fare, with half fare for school children going to and from school and with general transfers." The notice was accompanied by a proposed ordinance, which, if passed by the General Council, would put the increased rate into effect next April.

Case Stated in Company's Letter

In the two-page letter to Mayor Harrison, signed by James P. Barnes, president of the company, it was set out that the earnings on capital invested in the utility during 1928 were 3.2 per cent and estimated that the increase asked would give company stockholders interest and dividends amounting to 5.4 per cent of the rate base value. In its letter the company said:

For a number of years the net income of the Louisville Railway, while sufficient to meet bond interest, has not been enough to yield a fair return to investors in its property, nor even to assure satisfactory refunding of its maturing obligations.

During 1928 the number of passengers we carried in Louisville by cars and buses was 66,997,370. Our total income in Louisville was $4,855,144. We spent, in cost of operating 13,180,299 miles of service, in taxes ($461,000, which was 9.5 per cent of all earnings), in interest ($641,750) and in depreciation on railway property ($175,000), $4,600,056, leaving a total for stockholders from operation of city street cars and buses of $255,088.

The fair value of our property for rate-making purposes as of Dec. 31, 1928, including $339,000 spent for improvement and betterment of the property during 1928, is more than $28,000,000. Interest and dividends earned during 1928 were at the rate of 3.2 per cent on this value.

The public of Louisville desires more rather than less service. With these desires we are in sympathy. To increase our service would require additional expenditure for operation. We also desire to improve our service by substitution of thoroughly modern cars for some of those now in use. To do these things we must first make satisfactory arrangements to refund our $6,000,000 mortgage which becomes due June 30, 1930. At the same time, we must arrange for additional capital to be used in desirable improvements. To refund this capital on reasonable terms we must show net earnings at least equal to twice the interest on all monies borrowed. This will require annual earnings for interest and dividends of at least $1,500,000.

We ask a rate of fare not in excess of 10 cents, with the understanding that we will experiment with reduced rate tickets. We estimate that this advance will increase our net earnings by approximately $600,000, giving a net yield under 5.4 per cent of the rate base value. We are not insisting upon the full exercise of our right to an 8 per cent return.

In order to make the arrangement for necessary capital for refunding and improvements, we must have a positive history of earnings of sufficient duration so that fairly dependable forecasts can be based upon actual operation. In order to get this history of earnings in time for negotiation and for arrangement of financial details, it is of extreme importance that the adjustment affecting our earnings be accomplished practically at once.

Wage Case of Buffalo & Erie Reviewed by Court

In a decision rendered on Feb. 13 by the Court of Appeals, that body overturned a unanimous verdict of the Appellate Division, Fourth Department, as well as a decision of a special term of Supreme Court in Erie County, that would have authorized a board of arbitration to determine whether the Buffalo & Erie Railway should be allowed to reduce wages of its union employees by 10 per cent under a new contract. Although the Appellate Division was unanimous in its decision, it agreed to pass the case on to the highest court on the ground that a question of law was involved that should be reviewed by the Court of Appeals.

Judge Frederick E. Crane, who wrote the majority opinion after reviewing the circumstances leading up to the litigation, hinging upon an announcement of the company that a falling off in business necessitated a reduction in wages, continued:

Attention is immediately directed to the fact that no dispute has arisen between the parties to the contract over terms of provision of the contract, or any difficulty arising thereunder. The men have been paid the wages agreed upon and they have worked for and accepted those wages.

The railroad desires to make a new contract. It desires to reduce wages 10 per cent and seeks compulsory arbitration under the arbitration law for the purpose of arriving at new terms and agreements as to the rate of wages.

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No power exists in the courts to make contracts for people. They must make their own contracts. The courts reach their limit of power when they enforce contracts parties have made.

A contract that requires the court to determine what an agreement shall be for the future is unenforcible, unless the lines of the agreement have been laid out by the parties.

Such is not the nature of the question that has been left open for decision here. The rate of wages to be fixed is not the fair or market value, the value measured by an objective standard, but such compromise values as may be chosen as a substitute.

The opinion goes on to point out that it is conceivable that the Legislature may enlarge the class of justiciable controversies, but that under the present law the negotiations involved do not fall within those now covered by law.

More Discussion of Underliers' Purchase in Philadelphia

Interest has been renewed in the plan for the city of Philadelphia to take over the underlying surface lines of the Philadelphia Rapid Transit Company, in consequence of legislative hearings now being held. It is the so-called Woodward bill which is now before the Legislature. That measure would permit the purchase of the underliers piecemeal instead of by the present plan of the Daix bill, which provides for all of them being taken over on the basis of the valuation of $139,000,000 fixed by the Public Service Commission for all of the properties.

Opponents of the Woodward bill feel that, as a measure toward unity of the transit lines, the Daix bill would be upheld as constitutional since it serves a broad general public purpose, but that the Woodward bill, contemplating only one purchase, would be declared illegal. It was on this basis that City Solicitor Ashton declared on Feb. 12 that, if the Woodward bill were passed, it would sound the death knell of the general condemnation proceeding. He said:

The Public Service Commission has fixed a valuation in the underliers matter. Court proceedings are pending, awaiting the certification of the controller to a petition seeking judicial determination whether the bond issue will be chargeable to the borrowing capacity. Because of the attitude of the comptroller, we have not yet reached a decision as to our course, which might call for mandamus proceedings.

In any event, I believe it is still possible to get the underliers' proposal before the people this spring. I don't believe there will be any extraordinary delays. Even if there is an appeal taken, the public interests are so considerable I feel we could get an instant hearing.

The Daix measure was intended to substitute the city as the new owner and leesor of the underlying lines for the present owners, who lease the roads to the Philadelphia Rapid Transit Company for operation on a fixed rental basis.

Traffic Problem Before U. S. Chamber

Study which it proposed expected to be great aid in applying regulatory policy

AS THE District of Columbia Public Utilities Commission is proceeding toward the enactment of definite regulation of street car speeds in Washington, the United States Chamber of Commerce has decided to make a study of the traffic problem in its entirety by embarking on a study of the transportation situation in the various cities. Concerning the matter of speed limits for street cars, traffic experts were surprised to find that the model traffic ordinance, approved by the National Chamber of Commerce, made no mention of street cars in connection with the speed of operation.

Although the speed question will not be taken up directly in this city transportation survey, it is expected that some of the fundamental factors relating to metropolitan traffic conditions will be considered for the first time to any extent. In this connection it is pointed out that, while the relative services performed by the different types of vehicles have been discussed, not much has been done toward the establishment of facts. When more is known as to the relative value of the various forms of transportation agencies, it is felt that the authorities will then be in a position to fit each vehicle into its proper place in the transportation scheme.

Those in charge of the work realize that in many cities the special function performed by the street cars and the buses is tacitly acknowledged. When more information is available, however, it is felt that in place of various types of understandings as to what features of existing codes shall be excepted from application to street cars and buses, it will be possible to adopt a separate series of rules for these vehicles. As the Chamber of Commerce always has championed the doctrine of allowing the business and industrial organizations to solve their problems with as little regulation as possible, it is believed that this traffic study will be a great aid in applying this policy to the traffic question. If some of the basic factors can be isolated and the facts established, it is believed that business and commercial interests will lose little time in seeing that some of the existing traffic abuses are corrected, irrespective of the formulation of new codes by governmental bodies.

Antiquated Cars of Key System Burned

TWENTY-ONE street cars of the Key System Transit Company, Oakland, Cal., representing an original investment of more than $250,000, recently declared unfit for service by President A. J. Lundberg, have been burned on the Key System pier fill on the Oakland estuary.

The funeral pyre of the old street cars was touched off by Joseph Gilman, veteran carpenter and shop employee of the Key System, who had built ten of the 21 cars destroyed. Of the 21 cars burned, ten were known as the Kelly type and were recently withdrawn from service when the Alameda-San Jose Avenue No. 9 line was discontinued. These cars, named after W. F. Kelly, who was general manager of the Oakland Traction Company in 1903, at the time they were built, created much comment for their novel construction. Their center entrances on the sides of the cars brought street railway experts from all parts of the country to view them. Newer equipment will replace the cars destroyed.

Subsidy Suggested in Twin Cities

Attention of the City Council has been officially directed to the subsidy plan for putting car fares back on the old nickel basis. The Council is asked to study this plan, which calls for the payment out of the city treasury of any deficit in the company's earnings from the standard 7½ per cent return on the investment.

There is something to be said for this plan, but there are objections to it that would probably cause it to be vetoed. Minneapolis could not do business without its railway. Real estate values and rentals are dependent upon it. One difficulty is that a subsidy taken out of tax income would rest not only on those who do not use the cars, but also on those who do. No practicable way has yet been devised, we believe, of taxing the non-user for his share and letting the user go free.

Another vital objection is that a subsidy would be an invitation to the company to let its service bog down into inadequacy, because its incentive to stimulate patronage by all possible means would be gone.

There is the further consideration that taxes are already too high in Minneapolis, and that the city is not in financial condition to take on an extra burden such as this might prove to be. Still there's no harm in a study of an interesting proposal.—*Minneapolis Journal.*

State Body Wants New York Lines Unified

Unification of all subways, surface lines and buses in one gigantic system under municipal ownership was proposed for New York City on Feb. 7, at a meeting of the Chamber of Commerce of the State of New York. The resolution, offered by Jacob H. Haffner, chairman of the committee on public service for the metropolitan district, was passed without a dissenting vote.

Under this plan the city would purchase all the rights and property now

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owned by the Interborough Rapid Transit Company and the Brooklyn-Manhattan Transit Company. The independent railways and bus companies, too, would be bought up.

Some of the surface lines would be scrapped, and others would be replaced by buses.

The resolution says:

The Chamber has advocated complete municipal ownership of all transit lines because the city already is committed to this principle through its ownership of the subways; but the Chamber has repeatedly opposed any plan that contemplates municipal operation of our transit lines.

The resolution of the Chamber's committee was presented at a regular meeting of the state body. In presenting the resolution Mr. Haffner said:

During the Hylan administration the new municipal subway was begun, which was intended to compete with the system then, as now, owned by the city. It was known in transit circles as a "spite" system. C. E. Smith, a transit expert, who made a complete study of the transit situation, in his report advocated the unification of subways, street cars and buses. Controller Berry has made similar recommendations.

Springfield Work Commended

In his midterm message to the City Council of Springfield, Mass., Mayor Parker referred to the accomplishments of the Springfield Street Railway and to some of its needs for 1929. A sum approximating $500,000 had been spent for new cars, equipment, motor coaches and improvements in line with the New York, New Haven & Hartford Railroad's program based on a gentleman's agreement with the city for such rehabilitation. During 1927 and 1928 the Springfield company had expended approximately $1,800,000 for equipment, extensions and general rebuilding work. Citing Clark V. Wood, president of the Springfield Street Railway, he remarked that he had steadfastly kept every promise made to the city. He said that Springfield was fortunate and should feel grateful for all the costly improvements.

St. Louis Merchants Want Parking Restricted

A bill to prohibit all parking on Grand Boulevard between Laclede Avenue and Page Boulevard was presented to the Board of Aldermen, St. Louis, Mo., on Feb. 1 by Alderman Thomas Watts of the seventeenth ward. At present one-hour parking is permitted in this stretch except during the rush hours. A similar bill was repealed two years ago after merchants along Grand Boulevard protested the measure deprived them of business. The same merchants are now seeking relief from the traffic congestion caused by the parking of automobiles. Parking by patrons of theatres and by visitors to office buildings in this district prevent patrons in automobiles from reaching the stores.

Pick-Up Rides Hurt Massachusetts Lines

Representatives of electric railways and bus lines have been recorded in favor of a bill, pending before the legislative committee on street railways in Massachusetts, which would prohibit private automobile owners from operating their machines for hire over routes on which vehicles duly licensed by the state are now run. The bill is aimed chiefly at car owners who transport fellow workers to places of employment for nominal fees and taxi cab owners who carry on a regular business between municipalities.

Henry C. Attwill, chairman of the Public Utilities Department, has offered the opinion that the bill will not remedy existing conditions. He suggests an amendment to the present vehicle laws if anything is to be done. Day Baker, representing the Motor Coach & Bus Association of New England, says unfair competition of the kind the bill is intended to correct exists throughout the state. He referred to the absence of insurance against accidents where private owners transport passengers. The competition is doing much, he says, to injure the bus lines, which maintain expensive equipment and carry heavy insurance under the state law. H. Ware Barrum, of the Boston Elevated Railway, has asked that the bill be amended to make such competition against electric railways illegal.

More Facts Disclosed in Cleveland Plans

Negotiations between the Cleveland Railway, Cleveland, Ohio, and the street railway committee of the City Council, in regard to a two-zone fare system, have developed the fact that the zone plan is part of the proposed rapid transit development being worked out by the Cleveland Railway and the Van Sweringen interests. Joseph H. Alexander, railway president, told the committee that it was his idea that the boundary of the inner zone would coincide with the point between which the central terminal rapid transit trains would operate on limited schedules.

The committee accused the company of attempting to force approval of one phase of rapid transit without the entire picture being disclosed. Mr. Alexander replied that the complete proposal would be submitted to the Council as soon as legal and engineering details are worked out and before the Council is asked to take any final action on a zone system.

Various zone plans in effect in American cities have been explained to the committee by H. M. Brinkerhoff, of the engineering firm of Parsons, Klapp, Brinkerhoff & Douglas, which was retained by the Cleveland Railway more than a year ago to make rapid transit studies.

In connection with the proposed financial set-up of the rapid transit and surface car merger, it has been disclosed that control of the Cleveland Railway is in the hands of three Cleveland banks. The largest individual stockholder is reputed to be Cyrus S. Eaton, utility operator.

New Exchange Ticket Arrangement in Philadelphia

Three-cent exchange tickets will be issued at City Hall station of the Broad Street subway in Philadelphia to surface lines operating east and west in the central district. The Philadelphia Rapid Transit Company has agreed to plan for a trial period commencing March 1.

Regulatory Measure Introduced in Texas

A comprehensive attempt to bring regulation of all public utilities under one central body is contained in a joint resolution introduced in the Texas House. It calls for a constitutional amendment to change the name of the Railroad Commission to the Railroad and Public Utilies Commission and provide a membership of five instead of three, as the Railroad Commission is now constituted. Within its permit giving and rate making jurisdiction would come not only the railroads of the state, but such large state utilities as the hydro-electric power companies and companies operating transmission lines, gas distributing and pipe line companies, oil pipe lines, bus and truck lines. Telephone and telegraph lines also would come under its jurisdiction. A bill with a similar purpose has been prepared for introduction in the Senate. This measure would obviate the necessity of a constitutional amendment by simply increasing the powers of the presently constituted Railroad Commission.

Unification Bill Introduced in New York

After long delay the Board of Transit control bill, sponsored by the New York City administration as a vehicle for the unification of transit facilities within the city, was introduced in the Legislature on Feb. 14.

The bill is the draft perfected by Samuel Untermyer, special counsel for the State Transit Commission, after public hearings relating to the transit situation within the city. It contained none of the changes expected after the Mayor's recent visit to the Capitol.

The Republican leaders of the Legislature fear that if it should prove impossible for the Legislature to act on the city legislation, owing to the city's tardiness in producing the bills, they may be blamed this year as they were last year for the failure to pass the legislation demanded by the city.

The bill is an amendment to the transit commission law and is permissive, so that the city can effect unification under its provisions or without applying the proposed new law, as it sees fit.

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Further Studies by Taxation Committee

Organized efforts to lighten the burden of taxation on the electric railway industry were begun at a meeting of the committee on taxation held at association headquarters on Jan. 18. It was brought out in the discussion at this meeting that the problem has a national aspect as well as a local aspect in every community where electric railways operate. Successful efforts have been made in some localities to lighten the burden. As a preliminary step in the committee's activities it was decided to study the nature of these efforts and the results attained. After this has been done the committee will be in a position to recommend methods by which the industry may hope to obtain some measure of relief from its present burden of taxation.

The members present at this meeting were: H. L. Geisse, chairman, G. G. Brownell, John L. Swope, Edmund W. Wakelee, W. J. Flickinger, L. D. Pellissier, J. P. Ingle, Charles Wygand (representing L. J. DeLamarter), Arthur W. Brady, H. B. Cobban, F. W. Doolittle and Leslie Vickers.

Oklahoma Utilities Will Discuss Finance and Operation

Two of the outstanding features of the eleventh annual convention of the Oklahoma Utilities Association, to be held at Oklahoma City on March 12-14 inclusive, will be addresses by two national leaders in public utility operations. Martin J. Insull, president Middle West Utilities Company, Chicago, Ill., will speak on "Financing Public Utilities." Halford Erickson, vice-president in charge of operation Byllesby Engineering and Management Corporation, Chicago, Ill., will talk on "Facts Relating to Group Operation of Public Utilities." Great interest in the convention is being shown by public utility people throughout the state, and by manufacturers and suppliers of electrical, gas and telephone equipment. All available exhibit rooms have been engaged.

Skip-Stop Revival Suggested in Newport News

City Manager J. C. Biggins of Newport News has suggested to Council a drastic change in the present traffic system on the main thoroughfare, including the appointment of four more traffic officers and the revival of the "skip-stop" system used during the war. The officials of the Virginia Public Service Company have agreed to co-operate and have their cars stop only at the even-numbered intersections. The survey which the city manager presented showed that during the first nine months of 1928 there were 308 traffic accidents, 55 of which resulted in personal injuries, which kept the victims under medical care for periods ranging from several days to several weeks. The plan now fostered would have traffic officers on duty at designated streets from 11 a.m. until 8 p.m., and until 9:30 p.m., on Saturday.

Wage Renewal on Georgia Power

The renewal of the annual wage and working agreements between the managements of the Georgia Power Company, the South Carolina Power Company and representatives of the union employees in Augusta and Aiken was effected recently. Although similar to the old one, the new arrangement carried two specific provisions different from the old ones. First, the companies grant a flat increase of 2½ cents an hour to all street car operators, making the new rate 55 cents an hour, and, second, the basic work day provides for eight hours with the usual allowance for overtime pay according to the respective "runs" of the car schedules. Heretofore, the basic work day was nine hours. The new contract was effective Jan. 1.

The company has granted a 3-cent an hour increase to street railway employees of Rome, Ga. This contract will run for two years.

COMING MEETINGS OF *Electric Railway and Allied Associations*

March 1—Metropolitan Section, American Electric Railway Association, 33 W. 39th St., New York, N. Y.

March 12-14—Oklahoma Utilities Association, annual meeting, Oklahoma City, Okla.

May 1-3—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.

May 13-15—National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.

May 15—Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.

June 5-7—Canadian Electric Railway Association, annual convention, Montreal, Quebec.

June 21-22—New York Electric Railway Association, Bluff Point, N. Y.

June 27-28—Central Electric Railway Association, Michigan City, Ind.

Aug. 15-16—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.

Sept. 28-Oct. 4—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.

Ten Cents in Kansas City

Application for a straight 10-cent fare with universal transfer has been made by the Kansas City Public Service Company, Kansas City, Mo. The application has gone to the Missouri Public Service Commission in the form of a new schedule of rates which sets up a one-fare area over Greater Kansas City, and applies a straight 10-cent fare to all street cars and feeder buses, with common transfers. March 14 is named as the effective date.

Present street car tickets, now sold fifteen for a dollar, and street car tokens now two for 15 cents would disappear. The trunk line bus tokens, two for 25 cents would remain. The trunk line buses have a chance to survive, at least where there is a better showing in earnings. A hearing on the merit of the higher fare will probably be ordered.

No Higher Fares Expected in Columbus

No raise in the 6-cent fare is being considered, according to a statement by C. C. Slater, president and general manager of the Columbus Railway, Power & Light Company, Columbus, Ohio. It had been charged that the decrease in light and power rates, which took effect recently, was a "feeler," so that at some future date an increase in car fares could be sought. Councilman Zimpfer, chairman of the Council Utilities Committee, denying any connection, said a higher car fare would have to be approved by the Council and voters.

It is said the Council favors running the two divisions separately, making up a deficiency in any one by raising the rates of that one.

Taxi Development Being Watched in Cincinnati

The Cincinnati Street Railway, Cincinnati, Ohio, will proceed conservatively but decisively in determining what form the future public transportation shall assume. It will proceed only in the best interests of the people as it did in operating buses as soon as their use by the company was legalized. President Draper is reported to have said:

Many people doubtless prefer an exclusive service if it can be provided at reasonable rate of fare. If the taxicab service should be developed to the point that it would make inroads into the business now done by the street cars, it might be necessary to develop a taxicab service as a branch of the system, so that the efficiency of the street car, bus or other essential urban transportation can be maintained. The situation is being carefully watched in Cincinnati and in the other cities in which taxicab service has been taken over by the mass transportation companies.

Revenue of the Cincinnati Street Railway in 1928 was larger by about $119,000 than in the preceding year, due to a greater number of passengers being carried on both coaches and cars, although the average fare was slightly

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less than in 1927. The decrease in average fare resulted from an increased use of the Sunday pass, which is sold for 25 cents and entitles the holder to as many rides as he wishes on the day for which it is issued.

There has come up for consideration of the city and the company the extension of service to several new districts and these will be dealt with and provided as soon as the district justifies the move. Mr. Draper mentioned extension of the Warsaw line to Western Hills High School; the district near the intersection of Baltimore Pike and McHenry Road which has been provided with bus service to connect with the Westwood line on Harrison Avenue, and Bond Hill, to which bus service has been provided. Fernbank and Sayler Park, he said, have asked for through service to the city. The district is now served by the Cincinnati, Lawrenceburg & Aurora Railroad. Taking over this service would result disastrously for the railroad, he said, and a plan is now being considered which will give satisfactory service and still enable the interurban line to operate. Several other districts are being considered as fields for the extension of service.

More Safety Records on Penn-Ohio System

Cars and buses were run for three months with only three accidents charged against them by New Castle operators of the Penn-Ohio, who won the fourth and final accident prevention contest of 1928 on the system and the system's safety trophy.

In this period the New Castle men operated 353,045 miles, an average of 117,683 miles to the accident. Final reports for the year come within a few days of the announcement of the award to the Penn-Ohio system as a whole of the highest national safety honor, the Brady Medal.

In the twelve-month contest just closed, the New Castle operators were pitted against those of the Sharon division and the Trumbull division in a triangular race. Each of the divisions had fewer accidents in 1928 than in 1927 when their record won them the Brady Medal. The same thing was true of the Youngstown car and bus divisions and the interurban coach divisions which were not competing in the contest won by New Castle.

Resumption on Branch of Southern Ohio Public Service

The Lima-Toledo Railroad, the Toledo connection of the Southern Ohio Public Service Company, which operated an electric railway between Columbus and Zanesville, until Jan. 15, plans to resume operations to the points formerly served by the Southern Ohio Public Service Company about Feb. 15, by use of rail to Columbus and motor truck beyond. This route will serve about 60 communities in the Newark-Zanesville territory.

Recent Bus Developments

Would Furnish New Service in Buffalo

Bernard J. Yungbluth, president of the International Railway, Buffalo, N. Y., has submitted a proposal to the City Council for the establishment of bus service between the downtown business district of the city and the new passenger terminal of the New York Central Railroad in Curtiss Street, which will be opened in April. The new terminal is 3 miles from the present New York Central Station and is 2,000 ft. from the nearest car line.

Mr. Yungbluth says it is desirable that the Broadway car line be connected with the new terminal through the construction of a loop from Broadway to Curtiss Street to the station. He says provision for such service was made in the design of the terminal and the area to be occupied by the proposed tracks is not being used for street purposes.

Under the city charter, however, no franchise for street railway extensions can be granted without a referendum by the voters. Because of the short time intervening before the opening of the station in April, Mr. Yungbluth says it would be impossible to hold a referendum and construct the tracks so he proposes the establishment of a bus service until such time as the referendum can be held. He asks immediate action on the bus line proposal.

Newly Developed Districts in Birmingham Demand Transit

Petitions are being circulated all over Birmingham, Ala., requesting the City Commission to pass an ordinance authorizing the operation of buses or jitneys throughout the city. It states that the service furnished by the Birmingham Electric Company is inadequate, and that many sections of the city are not reached by the cars. During the past few years many new suburbs have grown up in the Birmingham district and these are not reached by street cars or public transportation of any kind. Due to this fact many property owners of these suburbs say that the land is not worth so much as it should be, because it cannot be reached by public conveyance.

A few years ago many buses and jitneys of various kinds were operated in all sections of the city, but later they were voted out by the people at a special election called to secure an expression of popular opinion.

In the event new petitions are signed by the number of people required under the law, an election will be called by the City Commission and the people will be afforded a chance at the polls to say whether or not they desire the buses and the jitneys to be operated within the city again. One argument used against the buses and the jitneys, in the campaign preceding the last election on the question, was that these buses and jitneys congested traffic too greatly in the business section of the city.

Extended Service in Jamestown

Extension of the facilities of the Jamestown Motor Bus Transportation Company, subsidiary of the Jamestown Street Railway, Jamestown, N. Y., was recently effected with the establishment of a line between Jamestown and Greenhurst, a one-way distance of 5 miles. The fare charged between the two points is 20 cents and an hourly service is maintained in each direction during the day and early evening hours.

Wild-Cat Operation at Camden Hurtful

As a result of wild-cat competition at Camden, N. J., there has been unnecessary duplication of service and great waste in certain sections of the territory, while other sections have suffered from lack of service. The operating companies have met with large losses since it has been impossible to work out any comprehensive plan designed to provide a co-ordinated system of transport such as the community in and around Camden requires.

In the correction of this situation the officers of the Public Service Co-ordinated Transport have been badly hampered by the failure of Congress to provide for the regulation of interstate traffic. While such regulation may be provided at this session of Congress, the company proposes irrespective of whether this is done to take such steps as are possible to remedy the existing conditions. These conditions as set forth by M. R. Boylan, vice-president in charge of operation, follow:

1. That practically all transportation lines operate in one or more municipalities and many of them in two states.
2. That so far as interstate operation is concerned it is without effective regulation.
3. That responsibility for both the character and extent of the service is divided among a number of operators, no one of whom is in a position to control the situation.

It is the opinion of the officers of the Public Service Co-ordinated Transport that transit in New Jersey can best be handled by a New Jersey organization, and with that end in view they have been conducting negotiations with the Philadelphia Rapid Transit Company for the control of the Penn-Jersey operations. They believe that transportation facilities will be of greater service to the public when more efficiently operated, and they are for that reason combining independent operations with those of Public Service wherever this

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is possible. They believe that the waste that invariably follows unregulated competition is an economic crime against the users of the service, and that the public can be depended upon to discourage it.

The company has pledged itself, so far as its own organization is concerned, to make every effort to straighten out the present difficulties so that it will be in a position to meet the requirements of the community in and around Camden in full.

Additional Rights Sought in Albany

There was a hearing on Jan. 14 before Public Service Commissioner Lunn on the petition of the Albany Transit Company, Albany, N. Y., for a certificate for the operation of additional bus routes in the city of Albany, serving the New Scotland Avenue and Westland Hills section.

Several witnesses called by Andrew V. Clement, attorney for the Westland Hills Improvement Association, opposed the granting of the certificate covering a line by the company in that section of the city.

R. B. Hayes, president of the Albany Transit Company, stated that if the certificate is granted, twenty buses will be put into operation, eighteen buses of 29-passenger capacity and two of 40-passenger capacity, and that transfer points for transferring to existing lines would be established in different sections of the city.

N. F. Towner represented the Albany Transit Company and John E. McLean, the United Traction Company. There will be another hearing before Commissioner Lunn on Jan. 28. The Capitol District Transportation Company is the subsidiary of the United Traction, while the lines of the Albany Transit Company are operated independently.

To Expand Sacramento Northern Service

Application has been made by the Sacramento Northern Railway to the California Railroad Commission for a certificate of public convenience and necessity to operate auto passenger, baggage and express service between Marysville and Chico and all intermediate points; also between Marysville and Colusa and all intermediate points.

Experiments in San Leandro Proved Too Costly

Permission has been granted by the California Railroad Commission to A. J. Lundberg and other officials of the Key System Transit Company, to abandon operation of an experimental motor coach line in San Leandro, Alameda County, which has been in service for a six months' trial. It was found that the revenues of the line did not warrant its continuance.

Expansions Seen in Lexington Deal

J. P. Pope, vice-president and general manager, Kentucky Traction & Terminal Company, Lexington, Ky., has announced the completion of a deal whereby the Kentucky Security Corporation, Philadelphia, which controls the Kentucky Traction & Terminal Company, plans to take over the Consolidated Coach Corporation, with headquarters in Lexington, and operate a large net work of bus lines over the state and into several adjoining states.

Mr. Pope stated that an investigation of the bus company operations had been underway for several weeks. Nothing has been divulged regarding plans of the buyers for the bus line after the transfer.

The Consolidated Coach is capitalized at 6,300 shares of $100 par value common, which, it is understood, is to be purchased at par.

Agreement on Southbridge Fares

An agreement has been reached with officials of Southbridge, Mass., and the Worcester Consolidated Street Railway to the effect that round trip tickets on buses between that town and Worcester will be $1.25 with 75 cents as single fares. These rates will go into effect as soon as they are approved by the State Department of Public Utilities.

Assembly Flooded With Railway and Bus Bills

Legislative proposals, ranging from bills which would remove municipally-owned utilities from jurisdiction of the public service commission to measures designed to regulate the width and length of buses and to place taxicabs under utility commission control, are included in the vast flood of regulatory suggestions put before the 1929 Indiana General Assembly. Matters concerning public utility regulation have held a prominent place on the docket ever since the two houses convened at Indianapolis in January.

A renewed effort to amend the present public service commission law so as to incorporate in it different methods of determining utility valuations for rate-making purposes and issuance of securities is involved in House Bill No. 230. This bill, known as the Kistler-Knepper bill, would make the original or "actual" cost of public utility properties the basis of fixing valuations instead of the present "true value" or reproduction cost new theory generally insisted upon by the utility companies. It would also prohibit utilities from manufacturing and selling appliances designed to consume the service supplied.

A minority report of the cities and towns committee favoring indefinite postponement of consideration of House Bill 16, which would remove city-owned utilities from the jurisdiction of the public service commission and establish methods for municipalities to build or acquire public utilities either co-operatively or independently, was rejected by the House early this month and finally killed.

Buses Supplant Cars on Rock Island Line

The Tri-City Railway has secured consent from the Council of Rock Island, Ill., to abandon its track south of 21st Avenue on Eleventh Street, to Watch Tower Park, a distance of nearly 30 blocks, and its Milan line, extending a mile farther. Buses, operating on a fifteen-minute schedule, with a 15-cent fare, will be substituted.

Bus Lines Essential in San Francisco but Operate at Loss

M. M. O'Shaughnessy, city engineer of San Francisco, Cal., has submitted a report to the public utilities committee of the Board of Supervisors, showing that in the first ten months of 1928 every bus line operated by the Municipal Railway was a financial liability to the city. A deficit of $97,176 was piled up, with the Marina bus line leading all others in financial losses. The engineer recommends that the Marina line be discontinued at once, stating that a saving of $9,000 yearly will be made by such action.

The discontinuance of the Marina bus service was recommended some months ago by Fred Boeken, superintendent of the Municipal Railway, and the Board of Public Works agreed. Later the Board of Supervisors authorized continuation of the line when residents of the district protested. Although other bus lines are operating at a loss, Mr. O'Shaughnessy points out that they are serving approximately 3,000,000 passengers a year and therefore must be considered as a valuable part of the municipally-owned transportation system. The deficit incurred by operation of the Embarcadero bus line will be covered by a subsidy granted to the city by the State Board of Harbor Commissioners, the report states.

Putting Teeth into Bus Law in Minnesota

A bill has been introduced in the Legislature which proposes to authorize the Minnesota Railroad & Warehouse Commission to employ a maximum of three inspectors, with powers to arrest and take into custody violators of the bus act of 1925, largely persons operating bus or truck lines without permits. Such offenses will constitute a misdemeanor in addition to the present fine of $50 a day for each day's operation without permit. In the past the courts have been hesitant about assessing this fine. This bill meets the objection that the bus law has no teeth.

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Financial *and* Corporate

Detroit Revenue Report

Private auditing firm finds net revenue $1,265,180 less than amount actually required

PRICE, WATERHOUSE & COMPANY have released their annual report covering the affairs of the Department of Street Railways, operating the municipal railway system at Detroit, Mich. The findings indicate that the net revenue derived from operation of the municipal lines during the last fiscal year was $1,265,180 less than was actually required. There is, however, the usual variation in the figures presented by the independent auditing firm and the auditors of the railway, due to the fact that each proceeds in a separate manner in arriving at the amount which should be listed as fixed charges.

After quoting from the city charter provision calling for a fare adequate to meet operating expenses of the system, taxes on the physical property, fixed charges, and sinking fund requirements sufficient to pay the principal of the issued mortgage bonds at their maturity, the Price, Waterhouse report says:

TERM "FIXED CHARGES" NOT SPECIFIC

In this connection we have previously stated that it is to be regretted a more specific statement as to what was intended to be contained in the expression "fixed charges" was not set forth in the charter, especially with regard to the element of depreciation as, from an accounting standpoint, depreciation is generally considered a fixed charge, so that from such standpoint the city charter requires the rate of fare to be sufficient to cover both the elements of debt retirement and depreciation.

Accepting that basis and also accepting the depreciation provisions made in the attached accounts, the net income for the year under review was insufficient to the extent of $1,265,180 plus the indeterminable amount properly chargeable to operations. Further, $407,367 expended on certain construction and replacement jobs during the year was wholly charged to capital charges by the department, while it is intimated some should have been charged to operation.

Railway passenger revenue fell off $1,063,782, bus passenger revenue increased $289,793.

The sinking fund requirements for the year, amounting to $2,600,377, exceeded the $1,335,047 net income after depreciation by $1,265,180, as compared with a deficiency of $687,329 for the year ended June 30, 1927.

On account of the fact that the accounts have been kept on the same basis as in former years we would point out, as we have in previous reports, that the figures above stated are properly subject to adjustment due to the fact that certain items have been charged in the accounts of the department as capital expenditures which, in our opinion and in accordance with the accounting regulations promulgated by the interstate commerce commission, should at least in part be charged to operating expenses. These items are expenditures for:

1. Reconstruction of lines resulting in a partial addition or betterment of the property.
2. Shifting the location of lines resulting only in a partial betterment.
3. Replacement of abandoned property, no adjustment of the property account having been made in respect of the abandonments.

Expenditures of this character made during the year under review, all of which have been capitalized, amounted to $407,367 as compared with $879,455 during the preceding year. On account of the lack of basic data we are unable to state how much of the above expenditures should be charged against income as being in the nature of replacements as distinguished from additions and betterments.

Mayor Lodge, seeking to reconcile the department's figures with those presented by the private auditing firm, has ordered John H. Morgan, new auditor for the system, to prepare a report reconciling the two audits.

Consolidation in Brooklyn

Surface lines of Brooklyn-Manhattan Transit Corporation and routes of Brooklyn City Railroad to be merged. Personnel of new company not yet determined

W. S. MENDEN, president Brooklyn-Manhattan Transit Corporation, and H. Hobart Porter, president Brooklyn City Railroad, announce that the boards of directors of the two companies at special meetings held on Feb. 13, authorized an agreement for the consolidation of the street surface railroads of the B.-M.T. system and the Brooklyn City Railroad. The consolidation will require approval of the Transit Commission and favorable action by the stockholders.

The consolidated company will have a capitalization consisting of 283,250 shares of preferred stock, 820,000 shares of common stock, and the funded debt of the existing companies outstanding in the hands of the public, aggregating approximately $31,105,528. Both the preferred stock and the common stock are to be shares without nominal or par value. The preferred stock is to be entitled to cumulative dividends at the rate of $4 per share for the first year, $5 for the second year and $6 thereafter. It is to be redeemable at $110 per share and accrued dividends, and is to be entitled on voluntary liquidation to $110 per share and accrued dividends before any distribution on the common stock.

This capitalization of the consolidated company compares with the existing combined capitalization and indebtedness of the companies to be consolidated, aggregating approximately $36,000,000 par value of capital stocks and $58,000,000 principal amount of indebtedness. Existing indebtedness of more than $27,600,000 is to be cancelled or turned in to the treasury of the consolidated company.

The holders of the outstanding $10 par value stock of the Brooklyn City Railroad, aggregating $16,000,000, are to receive in exchange for their stock 160,000 shares of the preferred stock and 400,000 shares of the common stock of the consolidated company, which is at the rate of one share of the preferred stock and 2½ shares of common stock for each ten shares of the outstanding stock. The B.-M.T. is to receive 123,250 shares of the preferred stock and 400,000 shares of the common stock of the consolidated company in exchange for or cancellation of approximately $20,000,000 par value of stocks and $27,000,000 principal amount of debts of the B.-M.T. surface companies, and in settlement and cancellation of the $13,000,000 construction account claim of the B.-M.T. against the Brooklyn City Railroad, now in litigation.

The surface railroads of the B.-M.T. system and the Brooklyn City Railroad between them operate practically all the surface railroads in the Borough of Brooklyn and a substantial part of the surface railroads in the Borough of Queens. The two systems embrace approximately 500 miles of single track and for the fiscal year 1928 carried more than 500,000,000 passengers. Consolidation of these properties under one company will simplify the relations with the public authorities, and enable the consolidated company to deal more directly and authoritatively with the city in connection with plans for the readjustment and improvement of transit.

The name of the consolidated company and the personnel of its directors and officers have not been determined, but its directorate will be representative of the Boroughs of Brooklyn and Queens. It is expected that the consolidated company with its simplified organization and improved financial structure, due to the large reduction of existing debt, will be able with the cooperation of the public authorities to furnish improved service.

Under the agreement 20,000 shares of the common stock are to be reserved in the treasury of the consolidated company. This is the maximum number of shares that may be issued by the consolidated company in connection with the existing agreement between the B.-M.T. and the Equitable Coach Company. This maximum number is subject to reduction as provided in such agreement and the issue of any part thereof is conditional upon the Equitable Company now seeking approval of bus rights granted to it, obtaining the terminable permit and the Transit Commission's approval as required by such agreement, and upon the consummation of the consolidation.

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Three-Cent Line to Continue Another Thirty Days

The Van Brunt Street & Erie Basin Railroad, operating a line a little more than a mile in length in the Erie Basin district of Brooklyn and charging a 3-cent fare, has been ordered to continue operation for 30 days by State Transit Commissioner Fullen. It had been proposed to discontinue the line at once, Edward Kelly, the receiver, having informed the transit commissioner that the road was being operated at a loss. Commissioner Fullen, however, ordered the service continued so that some arrangements to provide a substitute bus service or some other method of transportation could be made.

Ottawa Earnings Insufficient

In its fifteenth annual report for the year ended Dec. 31, 1928, T. Ahearn, president of the Ottawa Traction Company, Ltd., states that earnings of the Ottawa Electric Railway, Ottawa, Ont., for the year did not warrant the payment of dividends; consequently, no dividend was received from the Ottawa Electric Railway and no dividend was paid by the Ottawa Traction Company during the year. Some track was rehabilitated and the plant and equipment maintained in an efficient condition.

I.C.C.—No Jurisdiction on Security Issuance

Effort of minority stockholders of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., to obtain a ruling from the Interstate Commerce Commission on its jurisdiction over the issuance of securities of that railroad were defeated recently when the commission dismissed their petition on the ground that it had no authority to enter an order on the question presented. The petition, which was filed more than a year ago by representatives of a protective committee of security holders, charged that the North Shore Line since 1920 had issued various stocks and bonds without seeking the commission's approval. The company's defense was that, as an electric interurban line, it should not be classified as a common carrier and was, therefore, exempt from the security provisions of the transportation act of 1920.

The commission dimissed the petition on the ground that the complaint asked no positive relief but merely sought an expression of opinion as to whether a provision of the act had been violated. Under the law, the commission declared, it had to act on petitions of carriers for authority to issue securities, and had no authority to award damages sustained by holders of void securities or to punish the carrier issuing them.

At the present time the interstate rates and service of the North Shore Line are within the jurisdiction of the Interstate Commerce Commission, but securities and intrastate rates and service are subject to regulation by the Illinois Commerce Commission and the Wisconsin Public Utilities Commission.

Traffic Fares and Wage Figures

The total number of revenue passengers reported by 234 companies to the American Electric Railway Association for the month of December, 1928, compared with December, 1927, is as follows:

December, 1928	968,006,459
December, 1927	1,006,730,944
Decrease	3.85 per cent

This decrease in December was due to a combination of factors believed to be only temporary in their effect and it is expected that January and later months will see normal conditions restored.

There was one extra Sunday in the month of December, 1928, compared with December, 1927. The two holidays, Christmas and New Year's, fell on Tuesday and very many places of business closed down the Friday before Christmas and did not reopen until the following Wednesday and the same thing was done before the New Year's week-end. Another factor, the prevalence of a mild epidemic of influenza, kept a considerable number of people away from their ordinary occupations. Finally, the mild weather conditions prevailing throughout the month encouraged automobile owners to use their cars freely and to keep them out of winter storage longer than they ordinarily would.

Average cash fare in cents in cities of 25,000 population is:

Dec. 31, 1928	8.2981
Nov. 30, 1928	8.2553
Dec. 31, 1927	8.1113

The rise in the average is due to fare increases occurring during the month of December in the following cities: Baltimore, Md., from 9 cents cash with three tokens for 25 cents to 10 cents cash with four tokens for 35 cents; Bloomington, Ill., from 7 cents cash with four tokens for 25 cents to 10 cents cash with three tokens for 25 cents; Danville, Ill., from 7 cents cash with five tokens for 30 cents to 10 cents cash with three tokens for 25 cents, and Decatur, Ill., from 6 cents cash with nine tokens for 50 cents to 10 cents cash with three tokens for 25 cents.

The above changes produced four additional 10-cent cities, bringing the total number of 10-cent cities up to 248, of which 130 have a population of 25,000 or more.

The average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:—

	Average Hourly Rate, Cents	Index Number 1913=100 Per Cent
Dec. 31, 1928	57.52	211.08
Nov. 30, 1928	57.52	211.08
Dec. 31, 1927	57.29	210.24

Financing by New Jersey Corporation Authorized

The State Board of Public Utility Commissioners, of New Jersey, on Feb. 8 approved the application of the Public Service Co-ordinated Transport, Newark, for issuance of 125,000 shares of no par common stock. The company also was authorized to issue ten notes of a face value of $650,000 to reimburse its treasury for expenditures for new equipment. The stock issue is to reimburse the treasury for extensions to its plant.

Net in Buffalo $733,744

The accompanying table gives the results of operation by the International Railway, Buffalo, N. Y., in 1928 compared with 1927.

CONSOLIDATED INCOME ACCOUNT OF THE INTERNATIONAL RAILWAY YEAR ENDED DEC. 31

	1928	1927
Operating revenue	$11,116,652	$11,192,907
Operation and taxes	9,086,822	9,733,796
Operating income	$2,029,829	$1,459,110
Non-operating	56,912	50,138
	$2,086,742	$1,509,249
Fixed charges	1,352,998	1,440,340
Net income	$733,744	$68,908

Note—The net income for 1927 is after deducting $340,171 for amortization of intangible capital. No such deduction was made in 1928. The net income for 1927 before deducting amortization was $409,080 which is the amount that should be compared with $733,744 for 1928.

Proposes to Lease Gary & Southern

A proposal that the Gary Railways lease and operate the Gary & Southern Traction Company was submitted recently to the Public Service Commission of Indiana. In this petition, which was filed jointly by the two companies, the Gary Railways proposes to lease the line for ten years and if this lease is approved, it states, operating economies can be effected and service to the public improved.

The Gary & Southern Traction Company operates a 12-mile interurban railway between Gary and Crown Point. The road was purchased last October by the Midland Utilities Company, which also controls the Gary Railways. Since that time it has been operated as an independent property under the direction of Charles W. Chase, president of the Gary Railways.

An extensive rehabilitation program, involving expenditures of approximately $120,000 for new cars, electric substations and track and roadway improvements, has been under way for several months. Stringing of 10 miles of 500,000-circ.mil feeder cable has been completed between the 37th Avenue substation in Gary and the Crown Point city limits and delivery of two new light-weight, one-man interurban cars is expected to be made within the next ten days.

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A. W. Robertson—the Man

An intimate study of the newly-appointed chairman of the board of the Westinghouse Electric & Manufacturing Company. What he stands for and what his leadership promises to the electrical industry

By Earl Whitehorne

INTENSE interest among electrical men was aroused when the newspapers announced that A. W. Robertson had been elected chairman of the board of directors of the Westinghouse Electric & Manufacturing Company. It has been nearly two years since the death of General Tripp, and it is known that a diligent search for the right man has been in process. The qualifications were exacting. Here is one of America's outstanding industrial institutions, with a name standing for the highest merit and a fine tradition, seeking aggressive, constructive, creative leadership. The entire electrical industry is concerned because the policies, practices and the prosperity of the great Westinghouse Company profoundly influence electrical progress. The mantle has now fallen upon Robertson of Pittsburgh. And many are asking—"What manner of man is he? What has he done? What will he do to the Westinghouse organization? What will this mean to the electrical industry?"

A. W. Robertson is not generally known in the electrical world. He has not been particularly active in affairs of the industry. He has not been conspicuous at national conventions. But he has made a record for himself in Pittsburgh, as head of the local electric power, railway and gas utilities that is worth studying. And the story of how it came about is interesting.

Sixteen years ago, the superintendent of equipment of the Pittsburgh Railways went to the president one day about a contract that involved considerable money. There was a legal point in doubt. "We ought to have a lawyer right here in the organization," he said. "It would be worth a lot to us." The president agreed and said he would do something about it. He did. A week later he led into the superintendent's office a tall, loose-jointed individual and introduced him. "Here's your lawyer," he said. It was Robertson.

A Master of Public Relations

He was brought in to be useful to the railway and to the light company. He was. The public relations of the railway right then were bad. The situation culminated in the famous Pittsburgh Railways case, of which we needn't talk. Robertson was in charge and by his masterful handling of the matter made a name for himself. He seemed to have an uncanny sense for extracting the truth from a tangled problem. He demonstrated the rare gift of human understanding that wins the confidence of other men and is the greatest single attribute of leadership. He gradually took over the entire legal work of the two utilities, including the claim department. Then he was made responsible for the work of the advertising department, then the service department. Next he became vice-president and general counsel of the Philadelphia Company, which operates the Duquesne Light, the Pittsburgh Railways and the Equitable Gas companies. Seven years after his start with the companies he was elected president. That was two years ago. Under his executive leadership this organization has developed into one of the finest of its kind the industry has seen.

A. W. Robertson

I shall not go into the details. The record is available for closer study. Suffice it to say that the splendid progress of the company is shown in net revenue, in operating efficiency, in the reduction of rates, in the development of the system, in the refinement of the organization, in successful financing and in the improvement of public relations. Among other achievements, the railway has been taken out of a receivership and restored to prosperity.

First, let's get a picture of the man. He was born in the little town of Panama, N. Y., in 1880, one of a family of nine children of Scotch stock. His father died when he was three. He went to the public school. At eleven he began to contribute to the family funds as a wage earner, according to the Scotch tradition. The first job was shoveling snow. He worked after school and in vacations. He was deck hand on a lake steamboat. He sold aluminum pots and pans from door to door. He worked in a saw mill. He kept books. He ran a bath house. He wrote for the local newspaper.

When he finished school he taught two years in the schoolhouse where he had studied. Then he was principal of the high school in Charleroi, Pa., for another two years. At 22 years of age, with $65 total capital, he entered Allegheny College at Meadville. There he paid his way by running a boarding house, winning prizes, writing and doing such other jobs as he could find. From Meadville he went to Pittsburgh, entered law school and on the side started a private school for boys where he taught in the mornings. Afternoons and evenings he studied law.

Made His Start As a Lawyer

He was admitted to the bar in 1910 and joined a Pittsburgh law firm. Next he became title officer of the Guarantee Title & Trust Company, then trust officer. From that position he went into public utility work.

Industry, thrift, and finding ways to make money, all came with the Scotch blood and training, but out of his study of human beings, an idea of his own, has grown a philosophy of management that seeks to accomplish objectives by the development of men to take responsibility. It is undoubtedly the kernel of his present proficiency as an executive.

Naturally Mr. Robertson does not know what he is going to do in the Westinghouse company, and he is not the kind to indulge in any predictions. But the men with whom he has been working in the Pittsburgh utilities know how he will go about the job and what he will accomplish. And what they say is worth considering. There seemed to be no conflict among them as to just what it was that he had done as head of the Philadelphia Company.

The method of the man seems to be—

First, to put responsibility upon individuals and then to provide them with an equivalent authority.

Second, to establish policies by calling in those most interested in the problem and, by the co-ordination of the constructive ideas, chart the course.

Third, having provided men with a policy and a budget, to take the fetters off and set them free to develop their own abilities and apply their own ideas.

He has the patience and tolerance to watch and help men grow and to encourage responsibility by prompting them to make decisions for themselves. Yet, apparently, he does not carry this indulgence to excess. He is a hard worker and a conscientious student of his work. As a lawyer he has learned to do his own thinking. He is an exacting superior only in the sense that he will not accept an obvious explanation, or a conclusion that will not stand the light of logic. He is punctilious in the study of facts. He analyzes all reports closely. He exercises a strong guidance, but he expects a high standard of ability. He takes upon himself no specialized responsibilities. Others in the organization must head up everything. But he will help whenever necessary.

I have never heard men so stress the

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helpfulness of a superior. When things go wrong, they go to Robertson because of his sound judgment. There is no anxiety, rather relief, when he comes into it. And that's as fine a testimonial as one could ask.

In an emergency they say he keeps his head with a balanced judgment, free of prejudice and superstition. He habitually tests his judgment by asking two questions—What is the right thing to do? What is the generous thing to do? And when he has the answers, he knows how to proceed.

He is dignified and deliberate and confident in his judgment once his mind is made up, but with it all he is informal, approachable and frank. He has always maintained a close and intimate contact with his organization, riding on the street cars, talking to the linemen as he chances to meet them on the job, visiting the departments and discussing details of the work.

He is deeply interested in civic work and much in demand as a speaker, but he has never been attracted by politics. Yet he has captured the confidence of politicians. As one member of the Pittsburgh City Council expressed it—"When he comes over here and tells us something, we believe it. We don't have to check him up."

Weighing him, then, by the record of his past work, by the measure which those who know him best have given him and by the qualities of mind and character reflected in his personality, I should say that Mr. Robertson will approach the leadership of the great Westinghouse organization with a very simple and clear cut philosophy. He will frankly accept the fact that he has no intimate knowledge of either the personnel or the products of the company and consider it an advantage. He will proceed patiently, methodically and persistently to educate himself.

Perhaps I can best express it in his own words—"My idea," he said to me, "is not to make myself a manufacturer in the sense of having expert knowledge of engineering, of production, or of sales, but rather to understand what the men who have mastered these specialties in the company are doing, and what their problems are and what they need. I am not going to New York and sit in a big front office. I am going to East Pittsburgh, to Mansfield, to Philadelphia and to the other plants and live with this job awhile. I want to talk across a desk with the men and women who make Westinghouse what it is today until I know them as individuals and understand their elements of personal strength and find out how I can help them to develop along the line of their own talent, interest and capacity. Then I will get the real picture, and only then can I attempt some of the things that a chairman ought to do."

There is the keynote of the man's attitude toward management. "Every business as an economic structure" he continued, "must be successful before all else. But every business is the product of the human beings who compose it—and it cannot be greater than they. Few business institutions succeed in making full use of the brains that lie latent within the organization, and it seems to me that this is the test of executive leadership. For, after all, the sole use of management is so to organize the business that a spirit will be created within the personnel which will make its full resources of knowledge, ability and judgment readily available. Then there will be a happy balance of the system—order, invention, initiative and progress—so essential to modern industry."

Confident of the Outlook for the Future

I asked Mr. Robertson if he knew any definite formula for accomplishing this vitalizing process. And of course he said "No." "Naturally," he continued, "there are as many methods as there are people. But there is one simple secret that is ever helpful. There is an unconscious tendency in business not only to fail to give credit to junior members of the organization for their personal contribution of constructive thought and effort, but actually to take it away from them. I have found that there is an unbelievable magic in credit and praise when frankly tendered.

"Our mounting population, our growing cities, the rising standards of modern life, all place a steadily increasing dependence upon electrical equipment of all descriptions for the comforts, conveniences, utilities and the very necessities around which our present scheme of living is organized. Any company engaged in the electrical business has only to do a reasonably fair job under these conditions to have an assured market and provide a satisfactory employment for its personnel and an income for the investor. If, by the exercise of vision, judgment and sagacity, it is able to render a superior service in many of the little ways that mark the relationships between modern industry and the public, it can be certain of a fair measure of prosperity. It is the responsibility of industrial leadership so to encourage, develop and apply the native initiative, ingenuity and resourcefulness of the American engineer, the American mechanic and the American salesman, that organization becomes a creative force for the production of wealth and the increase of human happiness."

I know of no other man who has impressed me more deeply with his human understanding and his maturity of business judgment than Andrew Wells Robertson. The Westinghouse Company and the electrical industry are fortunate that a man of this type comes to the leadership of this great institution. The years immediately ahead will present pre-eminently a period of market development, involving mass education, the selling to all America of the idea of complete electrical equipment in the home, in business and in industry, a full dependence upon electric service for all that it can do within economic limits. For this is needed above all a man who knows people. Mr. Robertson is such a man.

A. J. Boardman Succeeds R. B. Stearns on Eastern Massachusetts

Albert J. Boardman, Brockton, Mass., has been promoted by the Board of Public Trustees to the positions of vice-president and acting general manager of the Eastern Massachusetts Street Railway, Boston. In both positions he succeeds to the duties of R. B. Stearns, who recently resigned. The position of treasurer, also held by Mr. Stearns, has not yet been filled.

Officers Elected in Wisconsin

The following officers were elected at the annual meeting of the Wisconsin Motor Coach Association, on Jan. 22, at the Hotel Loraine, Madison, Wis.: President, F. L. Neilson, general manager La Crosse & Southeastern Transportation Company, La Crosse; vice-president, N. C. Rasmussen, Wisconsin Valley Electric Company, Wausau; treasurer, T. J. Floan, Gray Transportation Company, Green Bay.

The men elected to serve with these officers on the executive committee are: B. W. Arnold, Metropolitan Motor Coach Company, Milwaukee; M. H. Frank, Wisconsin Power & Light Company, Fon du Lac; W. J. Kay, Northland Transportation Company, Minneapolis; H. G. Monger, Wisconsin Motor Bus Lines, Milwaukee.

Messrs. Markham and Brown of Brill Advanced

Fred L. Markham has been appointed acting sales manager of the American Car Company, succeeding Wirt L. Haymond, who died recently. Mr. Markham was for ten years Southern sales representative for the J. G. Brill Company with headquarters in Atlanta, Ga., and was transferred to the American Car Company as sales representative in 1918. He is well known in the electric railway industry, both in the South and Middle West, and is well fitted by experience to assume his new duties.

William Laird Brown, who joined the Brill sales department in April, 1926, has been appointed assistant to the general sales manager, effective at once.

R. S. Soule Assumes Broader Duties With Monongahela

Robert S. Soule has been transferred to the Fairmont, W. Va., offices of the Monongahela-West Penn Public Service Company where he assumed the duties on Jan. 1 of educational director. After successfully conducting a comprehensive program of educational activities in 1927 on the Parkersburg and Marietta divisions, he now has complete charge of all educational activities throughout the entire system. In addition, Mr. Soule will organize and conduct a number of classes in public speaking and dramatics.

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Mr. Soule is a graduate of Ohio University at Athens and went with the Monongahela company after three years as instructor in public speaking in the Parkersburg high school and one year with the Mountain State business college.

New Appointments in Vancouver

Creation of an industrial research bureau, with Percy Lewis, former purchasing agent, in charge, and other appointments in the head office organization were announced recently by W. G. Murrin, president of the British Columbia Electric Railway, Vancouver, B. C.

E. W. Arnott is transportation assistant, and A. C. W. Gage fills the office of purchasing agent in succession to Mr. Lewis.

In announcing the establishment of the industrial bureau, Mr. Murrin said it was the purpose of the company to go out actively canvassing for new industries which could, with profit, be established in this territory. Mr. Lewis' department will compile data on all subjects connected with industry. It will be a clearing-house of information and free advice, available to all persons who desire to open new enterprises.

High Honor for B. J. Arnold

Col. Bion J. Arnold, chairman of the board of supervising engineers of Chicago, which exercises control over the Chicago Surface Lines operation, has been selected as the recipient of the Western Society of Engineers' Washington Award for 1929. The award, a bronze plaque, is presented annually to an engineer who has given "pre-eminent service in promoting human welfare through engineering." In past years such prominent engineers as Herbert Hoover, Michael Pupin and Orville Wright have received this award.

Colonel Arnold has been voted the Washington award, according to John A. Garcia, president of the Society, for "pioneering work in engineering and economics of electric transportation." He first gained distinction for his famous intramural railroad at the Chicago World's Fair in 1893. Since then he has been engaged in electrification projects of several railroads and, until recently, was president of the Elgin & Belvidere Railway. He is now president of his own consulting engineering firm with offices in Chicago.

HUGO LUND has resigned as office engineer of the Kansas City Public Service Company, Kansas City, Mo., after a continuous service of 27 years. He desires to give more time to his business interests. Mr. Lund was born in Fort Wayne, Ind., in 1877, of Danish parentage. He was graduated from the University of Illinois in 1902 in mechanical engineering. Mr. Lund entered the service of the railway as draftsman.

OBITUARY

Anthony R. Kuser

Member of group that founded Public Service Corporation of New Jersey. A financier and a philanthropist

COL. ANTHONY R. KUSER died at his ocean estate, Los Incas, Fla., on Feb. 8. He had been ill for several months. Along with Thomas N. McCarter and others, Colonel Kuser was one of the group that founded the Public Service Corporation of New Jersey, supplying transportation services, electricity and gas in that State and one of the largest corporations of its kind in the world. It took a great deal of hard work to bring the Public Service Corporation to its present size and operating efficiency and, while Colonel Kuser as an officer of the company was never much in the public eye, he contributed materially to the advancement of the corporation.

He was a director from the company's inception until last December. He continued as second vice-president from the date of the corporation's foundation in 1903 until 1923 when he resigned as an officer. His business interests were multifarious. Until about 1914 he was a director of the Prudential Insurance Company and at the time of his death was an officer and director in many banking and trust companies. He was one of the participants last June in the dinner to President Thomas N. McCarter, of the Public Service, culminating the celebration of the 25th anniversary of the company's founding. His public benefactions were many, but there was nothing ostentatious about Colonel Kuser.

Governor Edge in 1917 appointed Colonel Kuser as a member of the State Highway Commission. He also served under Governor Fort as a member of the Interstate Bridge Commission, and was chairman of the New Jersey part of that body for a term of three years.

Colonel Kuser was a native of Newark, N. J., where he was born on May 12, 1862. The family moved to the capital, Trenton, when Anthony was about five years old, and in that city he received his early education in the public schools.

Jack Beall

Jack Beall, since 1921 president of the Texas Electric Railway, Dallas, Tex., died suddenly on Feb. 12 of a heart attack. He has been inextricably identified with the life of the Lone Star State. In Texas he was born, educated, practiced law, elected to the Texas Legislature and served as president of a utility covering 246 miles of line and reaching out of Dallas to Corsicana, Denison, Ennis, Ferris, Hillsboro, Sherman and Waco.

It was in 1915 that Jack Beall became one of the general attorneys of the Texas Electric Railway. He had practiced law at Waxahachie and had been elected to the Texas Legislature in 1892 and to the State Senate in 1894. He was elected to Congress in 1902 and served as representative of the Dallas district until he became counsel for the Texas Electric Railway.

In 1921 he was elected president of that company and announced upon assuming his new duties that he would continue the efforts of the late Col J. F. Strickland, notably the building of the interurban line to Terrell. He sought the co-operation of the employees to carry out the same general policy as that of Colonel Strickland.

Mr. Beall was born near Waxahachie on Oct. 25, 1866. He was educated in the country schools of that district and later taught school for several years before he entered the University of Texas in 1886. He was graduated from the university in 1890.

W. L. Haymond

Wirt L. Haymond, sales manager of the American Car Company, died on Jan. 28 in St. Louis. Practically all his business career he was with the Brill organization, which he joined in 1897. His early activities were devoted to the accounting division of the Brill plant in Philadelphia.

On Oct. 1 last, as announced in the Nov. 17 issue of ELECTRIC RAILWAY JOURNAL, Mr. Haymond was appointed to the position he held at the time of his death. Mr. Haymond was born Aug. 31, 1881, at Grafton, W. Va.

Elmer E. Edwards, Sr.

With the death on Feb. 2 of Elmer E. Edwards, Sr., a link between the first horse car days in Minneapolis, Minn., and the present efficient electric railway system disappears. His demise recalls the rapid growth of the Twin Cities, in that their span of life as railway cities is within the life of men active today. Elmer Edwards began to drive a horse car in 1876. When he retired recently he was the oldest employee of the Twin City Rapid Transit Company in service. He drove the first cable car up the Selby Hill in St. Paul and handled the first suburban electric car between St. Paul and Stillwater, Minn. He began with the company when thirteen years of age, July 4, 1876, and the first horse cars began in Minneapolis on Sept. 2, 1875. He drove the car, watched the fares and at the end of perhaps a sixteen-hour day had to wash his car.

ALBERT W. LUCE, formerly auditor for the Hartford & Springfield Street Railway, and later for the Hartford & Springfield Coach Company, died in Springfield, Mass., on Feb. 12. He entered the employ of the Hartford & Springfield fifteen years ago as a clerk, and remained with it up to a year or two ago. He was 46 years old.

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Market Activity Continues

One hundred new cars recommended for Cleveland. Improvement planned in Akron. Construction contemplated by Pacific Electric Railway

RECENT announcements of improvement programs, to be executed during the coming year, indicate an active equipment and material market for the next few months. Outstanding among the improvements announced this week is the expenditure of $1,800,000 recommended by Joseph H. Alexander, president of the Cleveland Railway, Cleveland, Ohio, for the purchase of 100 new street cars for that company.

This recommendation was made to the City Council of Cleveland, which, under the Tayler grant, must give its approval before the company acts. At the same time, Mr. Alexander asks authority to scrap 259 old cars, ranging in age from 19 to 29 years. The decision of the railway to recommend the purchase of these new cars followed a three months' survey, which disclosed that it would be impracticable to rebuild the old equipment.

These new cars will be of the same type as the 50 cars put in service last year. These cars, which were described in the JOURNAL of July 21, 1928 are of the single-end, double-truck, motor-driven Peter Witt type for one-man or two-man operation. The cars are 53 ft. 6½ in. long, 8 ft. 6 in. wide, weigh 44,800 lb. and seat 55 passengers. The bodies are of semi-steel construction with arch roofs, sliding center doors and folding end doors. The trucks have a wheel-base of 6 ft. and are equipped with two inside hung motors, roller bearings, and 26-in. steel wheels.

No additional articulated units are contemplated at this time, as the railway already has 25 of these trains, and authority to purchase three more. This is a sufficient number of this type to operate on the Euclid Avenue line, which is the only line in the city on which articulated operation is practical in the non-rush hour periods.

IMPROVEMENTS IN AKRON

The City Council of Akron, Ohio, has asked the Northern Ohio Power & Light Company to carry out an improvement plan which would require the expenditure of more than $2,000,000 during the next four years. To extend and improve the system, this plan calls for the purchase of 90 new buses at a cost of $1,275,000, and railway development to cost in excess of $1,000,000. Much of this railway expenditure is in connection with the city's street improvement plan and the extension of the Arlington Street line. The Arlington installation alone will cost approximately $195,500.

The city plans also call for the widening of East Exchange Street, which would necessitate changes costing the railway more than $250,000. Another improvement is the widening of East Market Street from College Street to Carrol Street, involving the expenditure of $105,700 by the railway. Other improvements are planned, ranging from $3,700 up to $34,900.

More than $2,500,000 was added to the capital account of the Kansas City Public Service Company, Kansas City, Mo., through deductions for improvements and maintenance last year. The exact amount added to capital as shown in the report was $2,591,377.71. The total cost of the improvements was $4,679,186.28, out of which more than $2,000,000 was charged to deferred maintenance. A large portion of the amount was spent on rebuilding and renewing track.

The Illinois Terminal Railroad System has put into service 100 new box cars manufactured by the Mount Vernon Car Company, Mount Vernon, Ill. A feature of these new cars is that the roofs are covered with canvas. They are also heavily lined and equipped to handle any kind of merchandise, including grains and perishable products.

The United Electric Railways, Providence, R. I., has recently purchased 2 miles of No. 00 hard drawn trolley wire, 500 12-in. trolley ears, 500 ft. of 1,000,000 circ.mil rubber-covered waterproof cable, 200 insulators, 500 caps and cones, and 100 feeder ears. This company has also ordered 100 lb. of welding wire, 25 bales of waste, 300 yd. of 36-in. shade cloth, 24 34-in. steel car wheels, 1,400 cast grids, 50 5½-in. trolley wheels and 100 phosphor bronze axle bearings.

Exhibitograph No. 4

A.E.R.A.
EXHIBIT COMMITTEE

Held its first meeting on Feb. 5 and completed plans for the

BIG SHOW

in

NEW
ATLANTIC CITY
AUDITORIUM

SEPT. 28 TO OCT. 4

Plan now to exhibit

NEW YORK SUBWAY PROGRESS

Contracts will soon be let for 300 new steel cars for the main line of the municipal subway from 212th Street to Chambers Street, New York, N. Y., and contracts for a ten-year power supply will soon be advertised. Already $176,000,000 in contracts have been let in Brooklyn, Queens, Manhattan and the Bronx, providing for 21 miles of four-track road, with at least $100,000,000 more to be let this year.

The 53rd Street crosstown line of the city's subway system, is said to be a year ahead of the schedule, which calls for a line from Eighth Avenue, Manhattan, to Long Island City by 1931. Bids for the Houston Street crosstown line on the lower east side have already been received and bids will soon be asked for part of the Sixth Avenue line. Work on the Sixth Avenue extension, and lines along Church Street and Fulton Street, and under the East River to Brooklyn, is described as being prosecuted with all possible speed, while rapid progress is being made on the Bronx Concourse line, which will join the Manhattan line at 148th Street and St. Nicholas Avenue. Five contracts have been awarded on the Bronx line, totaling $28,000,000. It is expected that the entire route will be under contract by the end of this year. Substantial progress is reported on construction of the new subway lines in the Greenpoint section of Brooklyn and $15,000,000 worth of contracts have been let for sections in Long Island City, Queens.

Six cars of poles, two cars of cables, and one car of weatherproof wire have recently been purchased by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. This company is planning to construct a new terminal at 27th and Hopkins Streets.

The Twin City Rapid Transit Company, Minneapolis, Minn., has purchased 15,000 white oak ties and 10,000 cedar ties, 14,000 ft. of 3-in. bridge plank, and 10,000 4½-in. standard granite paving blocks. This company has also purchased 30,000 lb. of Viscaline lubricant.

PACIFIC ELECTRIC CONSTRUCTION

The Pacific Electric Railway, Los Angeles, Cal., plans a power substation at Los Nietos, Cal., to cost $45,000. This company also plans to lower its tracks to grade at five crossings on the Long Beach and Wilmington line. As in the case of grade separations, the city has made it a practice heretofore to con-

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tribute toward the cost of reducing tracks to grades at crossings where they were above the grade. In this case, however, the city is objecting to this cost, as it is claimed the railroad's franchise provides that its track should be constructed at the street level.

The United Railways & Electric Company, Baltimore, Md., plans a power substation to cost $40,000. The Pacific Gas & Electric Company, San Francisco, Cal., will make additions to its local power plant, and the Great Northern Railway, Seattle, Wash., plans a power plant to cost approximately $30,000. The Southern Pacific Motor Transport Company, San Francisco, Cal., which is controlled by the Southern Pacific Company, has placed orders for nine six-cylinder parlor type 25-passenger Fageol coaches, and three six-cylinder 31-passenger coaches. The city of Seattle has purchased 125,000 lb. of copper wire, 5,000 insulators, 10,000 ft. of signal cable, and called for bids for 1,200 ft. of 5,000-volt lead covered cable.

Brooklyn Subway Tests Roller Bearings

Five of the triplex subway cars, operated on the rapid transit lines of the Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y., have been equipped with Timken roller axle bearings and have been placed in operation on the Sea Beach line for tests and observation as to the degree to which they increase the smooth-riding qualities of the cars. Three of the cars have also been equipped with roller armature bearings.

These five triplex cars are the first subway cars to be equipped with roller bearings, and the results of their operation on the B.-M. T. lines will be followed with interest by rapid transit operators. During the past two years cars equipped with roller bearings have been operated on steam railroads and surface cars and their adaptation to the intensive service of the city subway lines is the latest step in the development of this branch of transportation equipment.

Twin Coaches Reviews Year

At the annual meeting of the Twin Coach Company held recently, the present board of directors was re-elected. In his review of operations of the company for the past year, the president, F. R. Fageol, stated that since the delivery of the first Twin Coach in July, 1927, the company has attained second position in sales volume to electric railway operators and has attained first position in its sales volume of 40 passenger-capacity coaches for 1928. Total sales volume for the year 1928 was in excess of $4,300,000, with Twin Coach products now in use by 58 transportation and utility companies.

The treasurer's annual report discloses net operating profit for 1928, before deduction of federal taxes, of $529,264.64, as compared with a net operating loss for 1927 of $176,065.55. After absorbing $100,000 of 1927 operating loss, providing for federal income taxes and other surplus charges, but before providing for preferred dividends, the company's balance sheet shows a surplus of $328,429.59. The balance sheet discloses current assets of $1,815,541.23, with current liabilities of $949,951.91 or a net current asset position of $865,589.33.

The board of directors, at their meeting immediately following the annual meeting of the shareholders, re-elected the present officers and declared all the accumulated dividends on the preferred stock to Dec. 31, 1928, payable in four equal payments, the first of which is to be paid Feb. 20, 1929, and the balance at the discretion of the directors, but before June 30, 1929.

Industrial Truck Association Formed

Formation of the Industrial Truck Association, composed of manufacturers of electric industrial trucks, tractors, storage batteries and accessory equipment, has been announced. The association is a development of the co-operative sales promotion activity which these manufacturers have conducted for the past three years through The Society for Electric Development.

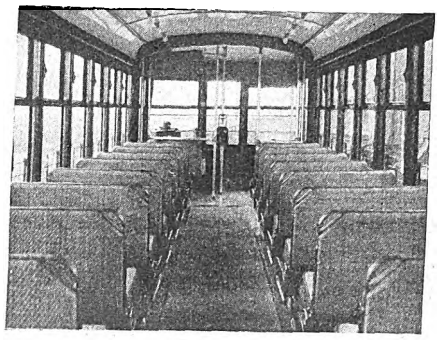
The new association headquarters are located at 52 Vanderbilt Avenue, New York City. C. B. Crockett has been retained as secretary in charge of the staff operations.

Supported by initial membership from fourteen companies producing over 90 per cent of the products of the industry, the Industrial Truck Association, organized in the interest of co-operative sales promotion, has for its purpose the broadening of present markets, education of the public and the solution of materials handling problems by the use of mechanical equipment.

The board of directors is comprised of the following: President, M. S. Towson, president Elwell-Parker Electric Company, Cleveland, Ohio; vice-president, E. J. Bartlett, president Baker-Raulang Company, Cleveland, Ohio; vice-president, W. C. Allen, president Yale & Towne Manufacturing Company, Stamford, Conn.; treasurer, G. A. Freeman, president Automatic Transportation Company, Inc., Buffalo, N. Y.

Phoenix Cars Delivered

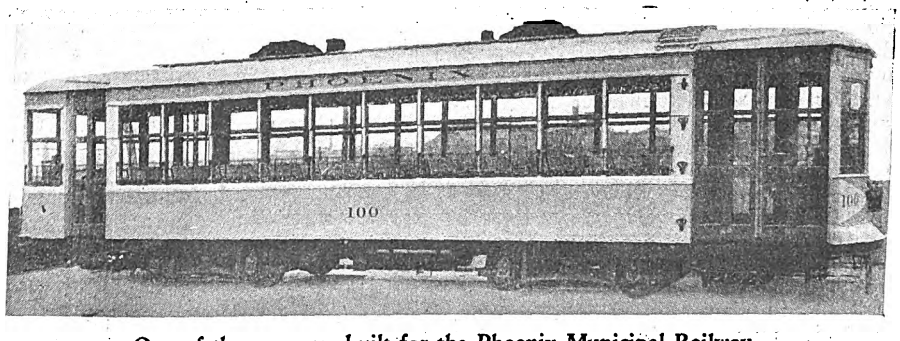
Installation of eighteen new 40-passenger, one-man, two-man street cars on the system of the Phoenix Municipal Railway, marks the completion of the $750,000 rehabilitation program which has been carried out by the city of Phoenix, Ariz. This city, the capital of the state, is one of the most rapidly developing cities of the Southwest. In 1925 when the railway was purchased by the city, the entire system was in need of rehabilitation. A $750,000 bond issue was passed and the city initiated an extensive rebuilding and equipment renewing program.



Deep type spring cushions were made possible on the rattan covered seats by means of leather edges

The cars are of the city, double-end, double-truck type, each seating 40 passengers. They are 39 ft. 1 in. long, 8 ft. 5 in. wide and weigh 30,000 lb. The bodies are of semi-steel construction with arch roof and folding end doors. The car exteriors are painted an orange and ivory color and the interior trim is finished in mahogany. The seats are unique in construction in that they are covered with a combination of rattan and leather. The rattan gives a very durable wearing surface while the leather around the edge of the cushion provides sufficient flexibility to permit the use of the more comfortable type of deep spring cushions.

The trucks of these cars are spaced 16 ft. 10 in. on bolster centers and have a wheelbase of 5 ft. 1½ in. Each truck is equipped with two 25-hp. inside hung motors and 26 in. steel wheels. Plain type journal bearings are used. Detailed specifications and plans were published in the Oct. 6 issue of ELECTRIC RAILWAY JOURNAL.



One of the new cars built for the Phoenix Municipal Railway by the American Car Company

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Milan Orders Tool Steel Gears

The Tool Steel Gear & Pinion Company, Cincinnati, Ohio, reports that it has just received a cabled order from Milan, Italy, for 1,200 additional sets of quiet type Tool Steel gears to complete the rebuilding program being conducted in that city. This order follows one for 830 sets of Tool Steel gears placed last year, when the present remodeling program was initiated. These orders resulted from a number of tests on this type of gear started in Milan several years ago.

DeVilbiss Reorganizes

The reorganization of The DeVilbiss Company, Toledo, Ohio, following the death of the founder and president, Thomas A. DeVilbiss, has placed Allen D. Gutchess, a nephew of Mr. DeVilbiss, in charge of this company.

Other new officers are William M. Booker, chairman of the board; Frank A. Bailey, vice-president and general manager; William F. Gradolph, general sales manager; Frank C. Penoyar, secretary; Walter W. Conklin, treasurer; and Howard DeVilbiss, son of the founder, assistant secretary.

ELECTRIC RAILWAY MATERIAL PRICES—FEB. 13, 1929

Metals—New York

Copper, electrolytic, cents per lb.	17.775
Lead, cents per lb.	6.85
Nickel, cents per lb., ingot	35.
Zinc, cents per lb.	6.35
Tin, Straits, cents per lb.	49.625
Aluminum, 98 to 99 per cent, cents per lb.	23.90
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	53.00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago	1.425
Central, Ill., screenings, Chicago	1.025
Kansas screenings, Kansas City	1.70

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅝ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.90
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.70
Sheet iron (24 gage), cents per lb.	2.85
Sheet iron, galvanized (24 gage), cents per lb.	3.6
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	3.15

Waste—New York

Waste, wool, cents per lb.	18.
Waste, cotton (100 lb. bale), cents per lb.:	
White	17.25
Colored	13.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	10.6
White lead in oil (100 lb. keg), cents per lb.	13.7
Turpentine (bbl. lots), per gal.	$0.63
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	5.90
Weatherproof wire base, cents per lb.	20.875

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	$2.70
Paving brick 3½ x 8½ x 4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.375
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, ¾-in., cu.yd., delivered	3.375
Sand, cu.yd., delivered	2.125

Old Metals—New York and Chicago

Heavy copper, cents per lb.	15.125
Light copper, cents per lb.	12.875
Heavy yellow brass, cents per lb.	8.875
Zinc, old scrap, cents per lb.	3.375
Lead, cents per lb. (heavy)	5.25
Steel car axles, Chicago, net ton	$17.75
Cast iron car wheels, Chicago, gross ton	14.75
Rails (short), Chicago, gross ton	19.25
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	10.25

TRADE NOTES

NORTHERN EQUIPMENT COMPANY, Erie, Pa., has appointed Bradshaw & Company, 530 Fourth Avenue, Pittsburgh, to represent the Copes System of Boiler Feed Control in the Pittsburgh district. Grant D. Bradshaw is president of this newly orgagnized firm, which is to specialize in power plant equipment. Mr. Bradshaw was formerly president of Andrews-Bradshaw Company from its organization in 1915 until its consolidation with Blaw-Knox Company on Jan. 1, 1928.

LINCOLN ELECTRIC COMPANY, Cleveland, Ohio, announces the recent appointment of new district sales representatives. J. E. Durstine has been advanced to district sales representative for the Southeast with headquarters at Birmingham, Ala. A promotion places H. P. Egan as district sales representative for central Ohio with headquarters at Columbus, Ohio.

WIGHTMAN-HICKS, New York, N. Y., announces that C. J. C. Clarke has become a vice-president of its organization. Mr. Clarke has had wide experience in the industrial field, as sales manager and advertising manager for various companies. For the past three years he has been with the McGraw-Hill Publishing Company, and for the four years preceding with the Periodical Publishing company.

FITZJOHN MANUFACTURING COMPANY, Muskegon, Mich., has recently opened offices at Detroit. The office will be in charge of F. W. Feeney, Detroit manager, located at 5-208 General Motors Building.

GENERAL ELECTRIC COMPANY, Schenectady, N. Y., has announced the election of William J. Hanley, manager of the East Central district with headquarters in Cleveland, and Charles K. West, manager of the Atlantic District with headquarters in Philadelphia, as vice-presidents in charge of the commercial activities of the company in their respective districts.

C. F. PEASE COMPANY, Chicago, has established a new Pacific Coast sales office at 501 South Spring Street, Los Angeles, Cal., under the direction of Ralph S. Gibson, Western sales manager, who will devote his entire attention to the Western Coast.

ADVERTISING LITERATURE

WAGNER ELECTRIC CORPORATION, St. Louis, Mo., has issued bulletin No. 138 entitled "Manual of Electric Testing." This manual gives detailed descriptions and diagrams of methods of making resistance measurements and methods of connecting ammeters, voltmeters and wattmeters for the measurement of power, and motor testing. The various motor tests described include single-phase motor tests; the three-phase motor test, the voltmeter and ammeter method; three-phase motor test by two wattmeter method; three-phase motor test, polyphase wattmeter method; three-phase motor test, one wattmeter method; three-phase motor, one wattmeter and Y-box method; three-phase motor with neutral brought out, single-wattmeter method; temperature test, three-phase induction motor; alternating current generator excitation or magnetization curve test; three-phase alternating current generator, synchronous impedance test; three-phase, alternating current generator, load test; three-phase generator or synchronous mator temperature test; and direct current motor or generator magnetization test. Other tests described and illustrated include a direct current shunt motor temperature test; and direct current generator external characteristics; direct current shunt motor or generator, temperature test, loading back method; direct current generator (compound), external characteristic, adjustable load; transformer testing; insulation tests; core loss test; copper loss test; insulation resistance test; polarity test; winding and ratio test; temperature rise test, and efficiency.

CARNEGIE STEEL COMPANY, Pittsburgh, Pa., has issued a booklet entitled "Carnegie Beam Sections." This booklet thoroughly covers with illustrations and tables the profiles, properties and safe loads for additions to the new series of structural steel beams and column construction.

OHIO BRASS COMPANY, Mansfield, Ohio, has issued supplement No. 2 to catalog No. 20, which supersedes and replaces supplement No. 1, dated March, 1928. This supplement gives illustrations and detailed descriptions of all products announced since the issuance of catalog No. 20.

NORTH EAST ELECTRIC COMPANY, Rochester, N. Y., has just issued a new edition of its Bus Catalog, 100-B. This catalog lists its complete line of heavy-duty generators, starting motors, ignition, control units, horns and speedometers. It is available on request.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL,
Publishing Director

Volume 73 New York, Saturday, February 23, 1929 *Number 8*

The New Civic Malady—Creeping Sickness

NO MALADY that has affected American cities has been more insidious than the so-called creeping sickness. Cities large and small are its victims, says *Collier's,* in its issue of Feb. 16. While the possible range of human activity awheel has been greatly increased, the actual range has been constantly decreasing.

Readers of the JOURNAL know how true all this is, but it is significant when publications like *Saturday Evening Post, Liberty, Mercury* and *Collier's* begin to give it serious attention. Reiterating that highways have become garages, and that the very density of automobiles is a barrier to travel by that vehicle, *Collier's* reminds its readers that most of this is unnecessary. Streets are closed and traffic drowns in a sea of vehicles because of neglect. Motor cars won't drive themselves and the problem of congestion won't solve itself.

To the automobile users among its readers *Collier's* says that if they want to get the full value out of their automobile they will have to insist upon sensible traffic regulations. The same commentator says that each city and village presents a separate problem due to topography and the habits of the people, but it reminds its readers that while details of sensible regulations vary, the fundamentals are the same. Merchants are scored who protest against any remedy that seems to affect their immediate advantage.

But *Collier's* does more than fulminate. Like other commentators who have given the matter serious thought, that publication reiterates that the important thing is to get the idea of the general welfare uppermost, and to insist upon traffic regulations that will serve the interests of the entire community. Its appeal is personal, for it says that "given that generous and courageous spirit and your city, wherever it is, can soon find the expert wisdom sufficient to open its highways to public travel." There is a deadly thrust in the wording "wisdom sufficient to open its highways to public travel." It is a challenge to everybody everywhere to lend his aid in putting public interest above that of special groups, to the end of relieving the new civic malady, "the creeping sickness."

Louisville Public Will Profit More Than Company

FEW railway rate appeals have been stated more succintly than that of the Louisville Railway. The company not only makes plain just what it deems to be desirable in the new rate structure, but at the same time it conveys to the people of Louisville a lesson in elementary economics. It is another case of the starved horse being unable to pull a full load. The disposition to do so may be there, but the strength is lacking owing to denial of the proper sustenance. The company hopes under the revised rates to achieve an increase in net earnings of approximately $600,000, giving a net yield under 5.4 per cent of the rate base value. It is not insisting upon the full exercise of its right to an 8 per cent return.

The company wants to put new money into cars and other improvements. To do this it must find a way to refund $6,000,000 of mortgages which become due on June 30, 1930. To refund this capital on reasonable terms the company must show net earnings at least equal to twice the interest on all of its fixed indebtedness. Men of affairs know what all this means. They know that a sustained record of earnings is absolutely essential to borrowing on terms that are not onerous. And onerous terms to a utility penalize not only the utility but the public which patronizes the utility. These are things given little heed by the public.

The Louisville Railway is not asking its public to be generous. In a strict sense, it is not even insisting that it be fair. Second in importance, of course, to the financing is the proposed rate structure. In suggesting a cash fare of 10 cents, the company is seeking a rate which has come generally to be accepted as the fee that the occasional rider should pay. The problem after that is to fix a so-called bulk rate tariff that shall keep the service attractive to the public and return the largest possible income. That is not so easy. The company recognizes this by frankly saying that we "will experiment with reduced-rate tickets." Rate making, like other pricing, is not only a science but an art. The whole plan at Louisville is designed to afford the public more service rather than less. Approval of the application for an increased fare will be in the public interest. Denial will be against public interest even though the latter action may be popular with uninformed and unthinking people.

Big Business Becoming Interested in Bus Operation

DURING the past few months there have been several indications of a tendency by steam railroads and a number of holding companies prominently identified with electric railway operations to enter the field of interstate bus operation on a large scale. This has been characterized by a number of developments of more than ordinary significance. Of the steam railroads, the Missouri Pacific and the St. Louis Southwestern have recently launched extensive programs of motor bus operation. The Pennsylvania Railroad is said to have acquired a substantial interest in the long-distance lines operated by a subsidiary of the Philadelphia Rapid Transit, and is even rumored to have an interest in a large transcontinental bus holding organization, while the Reading company is seeking to strengthen its position by the acquisition of competing routes. Among the electric railways the Kentucky Securities Corporation, controlling the Kentucky Traction & Terminal property, has announced plans for taking over an independent bus company with the view to extending service into several adjoining states. The unification of disconnected, independently operated bus routes into sys-

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tems extending from coast to coast has for some time been an established fact, and appears to be but the forerunner of other large scale consolidations.

It is significant to note that the more important of these proposed developments contemplate interstate service, a type of operation which has been looked upon with disfavor in the past due to the lack of that restraint and regulation which is considered essential. As any hope for stability and financial success of interstate operation appears to be predicated upon proper regulation, it is only fair to assume that those responsible for these consolidations and extensions of service are proceeding in the belief that regulation, long withheld, is at last about to assume form. Just when and to what extent this hope will be realized, depending as it does upon Congressional action, is a matter of conjecture. The Parker bill, now before the committee of foreign and domestic commerce, is scheduled for action at an early date. Its passage in acceptable form would undoubtedly strengthen the status of those lines already well established in interstate operation. For the first time since its inception the motor coach industry, as regards the operation of interstate lines, would be in position to attract capital and responsible management on a large scale. Conceivably, the recent announcements may presage developments of an important nature.

Steam railroads, taxicabs, trolleys—all are subject to the same economic laws, and the extent of their prosperity and stability is invariably measured by the extent of their freedom from unregulated competition.

Cars That Increase Subway Capacity

BESIDES many features embodied in recent rapid transit rolling stock, a number of distinctly novel developments are found in the design of the cars for the new Philadelphia subway. When the Broad Street subway was designed the width was made great enough so that cars with a width slightly greater than 10 ft. would have clearance. While car capacities ordinarily are figured in terms of length, the gain in going from the ordinary width of approximately 8 ft. 6 in. to 10 ft. is approximately 20 per cent in available inside floor area. In other words, the four-track subway that is being constructed will have a capacity almost as great as a five-track subway with ordinary cars. To obtain such an addition to capacity involved only a minor increase in cost of the subway, principally for excavation and concrete work.

In their dimensions the cars follow closely those of the New York Rapid Transit Corporation, the Boston Elevated Railway and the New York, Westchester & Boston. The features that have been tried and proved out on these cars have been incorporated in the Philadelphia design, and a number of refinements have been added, as told in an article published elsewhere in this issue. In particular, attention has been paid to the location of the doors and the seats, so that the arrangement of the several sections is similar and the distances to the doors are alike. This will make for rapid loading and unloading. The seating plan gives a large open space adjacent to each door, thus preventing crowding. While there are transverse seats they are so arranged as to produce a minimum interference with movements of standing passengers.

Among the innovations is a control station for the conductor or guard in each motorman's compartment. The man in charge of the doors thus does not have to be exposed between two cars, or in the doorway where he is in the direct line of passenger movement, as in some other designs. This arrangement also makes it possible to simplify the door control circuits and provide an auxiliary door control in the hands of the motorman, so that he can hold the doors closed if the train has overrun the station platform.

It is interesting that the single car of 67 ft. 6 in. length was adopted instead of the articulated unit such as used on some of the Brooklyn lines. At present the loading in Philadelphia is comparatively light, and the single units give more flexibility in train make-up. Since the weight, the passenger capacity, and the motor rating are approximately half those of the articulated unit there is comparatively little to choose from the standpoint of system capacity or operating cost.

The acceleration of the trains, 1.9 m.p.h.p.s., is the highest as yet used in rapid transit service. This not only makes higher schedule speeds possible but also makes for greater track capacity, particularly where stops are close together, as in local service.

Adaptability the Price of Survival

ACTING apparently upon the belief that adaptability is the price of survival and that to stand still is to invite retrogression, a committee of the C.E.R.A., after a study covering several years, has recently brought in a report in which it is recommended that all member companies proceed to inaugurate concurrently a freight pick-up and delivery service, local and interline, absorbing the costs where necessary. The recommendation is unequivocal, it has the support of some of the most influential operators in the group, and it is backed by a statement of facts that admits of no argument as to the soundness of its conclusions.

Despite the tremendous industrial development of the region served by these central interurban companies, the committee finds that their volume of freight business is and for several years has been practically at a standstill. The cause is not far to seek. The motor truck, the committee concedes, is getting the business, and will continue to do so unless the trolley lines bring their service more into accord with the requirements of the shippers. How best to accomplish this end the committee packs into the few terse recommendations cited above.

Perhaps no one of the many questions that have arisen in recent years to plague the common carriers, steam railroads and trolley lines alike, has been so much discussed as has this one having to do with freight pick-up and delivery. Every angle from which it has been approached has been beset with difficulties, but nowhere has any clear-cut solution been proposed

Consequently, the recommendation of the committee is one of far reaching significance and one which will challenge the skill and resourcefulness of those upon whom devolves the responsibility of carrying it out.

Modern business has imposed upon common carriers a demand for speed, economy and convenience in the handling of merchandise. The trolley lines have met the first two requirements to an eminently satisfactory degree but it is only fair to admit that in the third particular, involving pick-up at the door of the shipper and delivery at the door of the consignee, the motor truck is superior.

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To overcome this handicap the committee proposes that the trolley companies shall arrange, wherever necessary, to complete the entire transaction by means of agencies under their own control.

But if the problem in its general aspects is a simple one, in its particulars it is most complex. Having decided to provide a supplementary service as called for in the committee's recommendation, the companies must make further decision as to where and to what extent they will perform the service themselves or delegate it to other agencies. The question of the proper charge for this service, as well as its allocation, must be worked out and approved by the local regulatory authorities. Concessions must be made to the shipper who prefers to make his own delivery to the carrier's warehouse, and to the merchant who is prepared to handle his own pick-ups from the warehouse platform. These and other problems that will arise have proven vexatious in the past; they will be no less so in the future. But they are capable of solution if approached with a united front and backed by the proper determination and spirit.

A Short Life and a Merry One!

SIGNIFICANT as representing the changing viewpoint of railway men was the recent meeting of the Electric Railway Association of Equipment Men, Southern Properties. Much of the time of the meeting was devoted to a discussion of the methods of bus maintenance, the members considering various elements of the problem at length. In particular, complete rebuilding of buses was considered. The opinion brought out was that while complete rebuilding is desirable if the bus is worth it, a long life should not be sought, on the ground that obsolescence is an important factor to be considered and new equipment is needed to hold riders.

When equipment men, who ordinarily have to make their vehicles presentable for as many years as they can, will take this viewpoint it is an indication that a radical change is taking place from the old attitude of transportation men. Maintenance men in particular have been long schooled in economy. Their object in life is to get as much as possible out of every dollar they spend, so that they would be reluctant to advocate retirement of vehicles unless they believed it to be in the best interests of economy. The successful records made on their properties by the members of this particular association show that they understand thoroughly the principles of getting full value for every dollar invested.

The remarks regarding the life of the bus are applicable as well to the street car, as will be seen from the work of these same men. In no section of the country has there been greater attention to the modernization of rolling stock. That is one of the principal reasons why the properties in the Southern territory have been able to keep down maintenance costs to a low level. To mention the roads in the South where new equipment has been of benefit would be practically to recite the companies which belong to this association. Many of these properties have been strong contenders for the Charles A. Coffin Award. Two of them have won it in the face of strong competition. The attitude toward equipment life expressed by the Southern equipment men is based upon experience, not theory. They recognize not only an economic limit in the life of passenger-carrying rolling stock, but a merchandising limit as well.

Agitation for Direct Legislation

VERY timely indeed was the paper "Regulation Must Be Related to Economic Law," presented before the Central Electric Railway Association by R. N. Van Doren and published in ELECTRIC RAILWAY JOURNAL of Feb. 2, 1929. Governors are memorializing their legislatures with proposals affecting the regulation of the utilities and bills are being presented in a flood. These measures range from the one advocated in New York for an investigation of utility regulation under the terms of the Moreland act to the three bills in Wisconsin intended among other things to repeal the indeterminate permit law and revoke the statute pertaining to the issuance of certificates of convenience and necessity.

Led by the New York *World,* the malcontents range in the degree of their vehemence from the outpourings of that champion of the public to the plea of the Dayton *News,* to the effect that there is some reason for thinking that regulation of public utilities by public service commissions is inherently doomed to failure. These, of course, are among the views of the extremists. But all is not so bad among the newspapers and the governors. Here and there a commentator appears to have retained some sense of proportion and not to have lost sight entirely of the facts which Mr. Van Doren emphasized in his paper. Thus, almost like a voice in the wilderness, the Governor of Illinois in his inaugural address reminded his hearers that while the purpose of public utility regulation is to provide ample protection for the public from the imposition of exorbitant rates or insufficient or unsatisfactory service, this purpose is not served by hampering development of utility companies and by preventing their earning a fair return on their investment.

Mr. Van Doren and others are cognizant of the fact that there are defects in commission regulation, particularly railroad regulation, but there is no question that with all its shortcomings regulation is a decided improvement over the former plan of direct action by legislatures. It was out of the recognition of the futility of direct legislation that the commission idea grew. As a matter of fact, a *reductio ad absurdum* is implied in the growing tendency to override acts of commissions by direct legislation that would give the commissions arbitrary directions not founded upon well-considered economic study. Mr. Van Doren had in mind more particularly the Interstate Commerce Commission when he reminded his hearers that the commission, being an arm of the legislative body, is, of course, within its legitimate province in prescribing the jurisdiction and organization of its agents, but far more important was his reminder that having once decided upon the policy of scientific regulation, divorced as far as possible from political interference, the development of the regulatory idea should be intrusted to those designated by the state as best qualified for the task. On the whole, the work of the regulatory bodies has been constructive. As they have become more and more judicial in character, the commissions have served to protect the interest of the public while at the same time they have safeguarded the capital invested in the utilities from the legislative tampering of politicians philandering for public popularity. The present onslaught of bills intended to modify the regulatory laws of the state and the nation tend to destroy judicial procedure in dealing with the problems of the utilities, since they would again impose the old objectionable method of direct legislative meddling.

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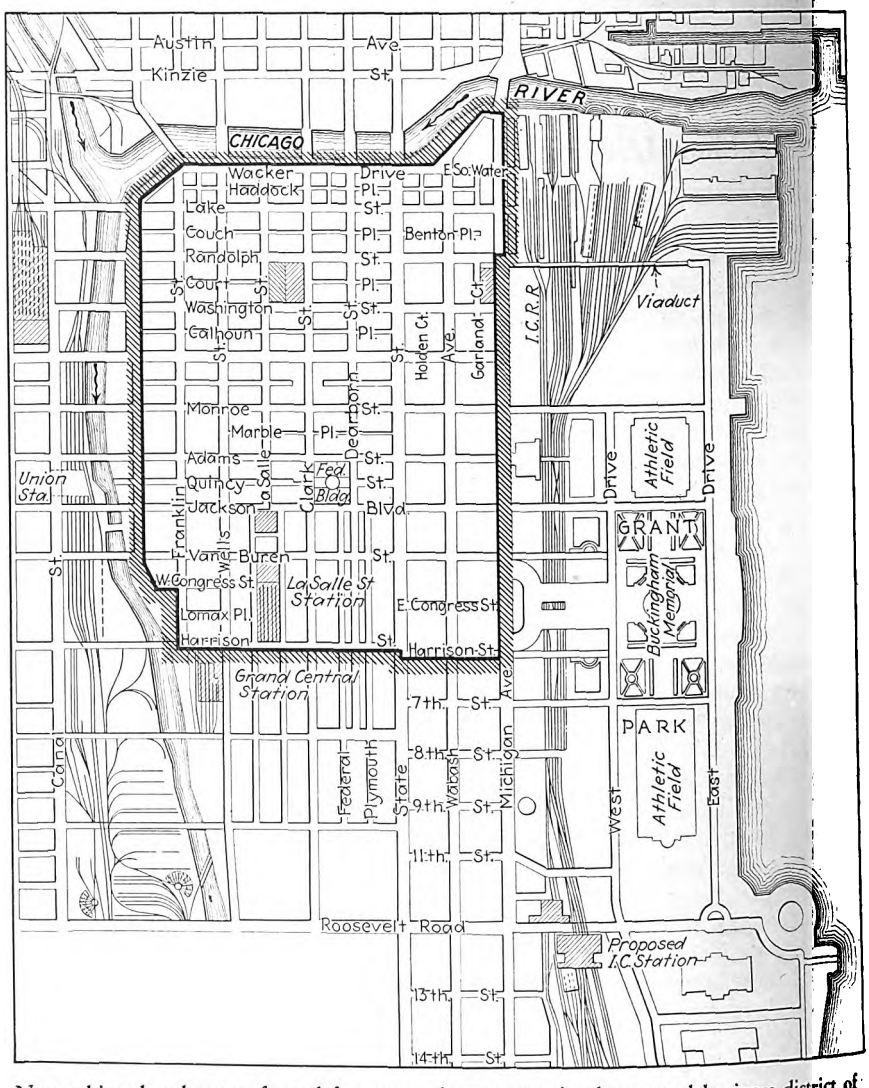
Elimination of Parking

Proves Successful

in Chicago Loop District

Total prohibition of parking in the central business area of the Western metropolis resulted in increasing the speed of all traffic 15 to 40 per cent. More vehicles and people than ever enter the district, but the streets are free of congestion. Accidents have been reduced 10 per cent and, after a year of experience, merchants report business improved

By Charles Gordon



No-parking has been enforced for more than a year in the central business district of Chicago. Within the area indicated by shaded boundary lines parking is banned from 7 a.m. to 6 p.m. on all week days except holidays, and on Saturdays from 7 a.m. to 3 p.m.

ON JAN. 10, 1928, Chicago took a notable step in the relief of congestion in its central business area ordinarily known as the Loop District. On that day a no-parking ordinance, sponsored by the Chicago Association of Commerce and passed by the City Council, took effect. The regulations which were put in force attracted attention throughout the country—and incidentally aroused a considerable protest by a few small merchants and several owners of second-class office buildings who maintained that prohibition of parking from Michigan Avenue on the east to Market Street on the west, and Wacker Drive on the north to Harrison Street on the south would injure their business. This step was taken, however, only after careful study of existing traffic condition, with a view toward determining the justification for parking prohibition as a measure for relieving congestion, accompanied by a careful survey to determine its probable effects upon retail business. After a year of experience the results accomplished are indicated by the effect upon the speed of vehicular movement within the congested business district, by the volume of traffic and the number of people entering the district, by accident statistics, and by the general comparison of business conditions before and after parking prohibition.

Surveys made in May of 1928, after the new regulations had been in effect for approximately five months, show that the total number of vehicles of all classes entering the no-parking area on a typical business day in May, 1928, in comparison with May, 1926, increased from 132,915 to 150,189, or an increase of 13 per cent. Passenger automobile traffic increased 18.33 per cent.

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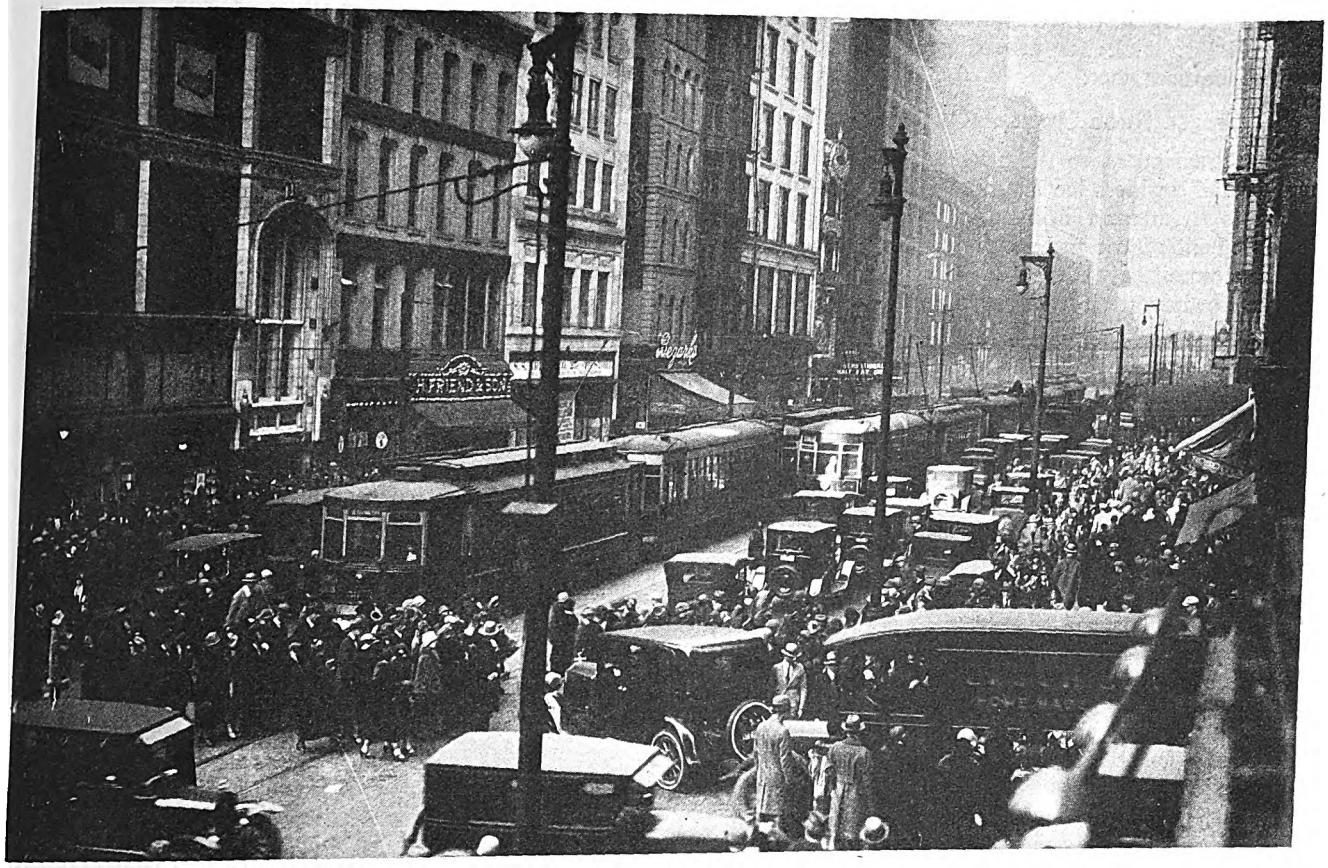
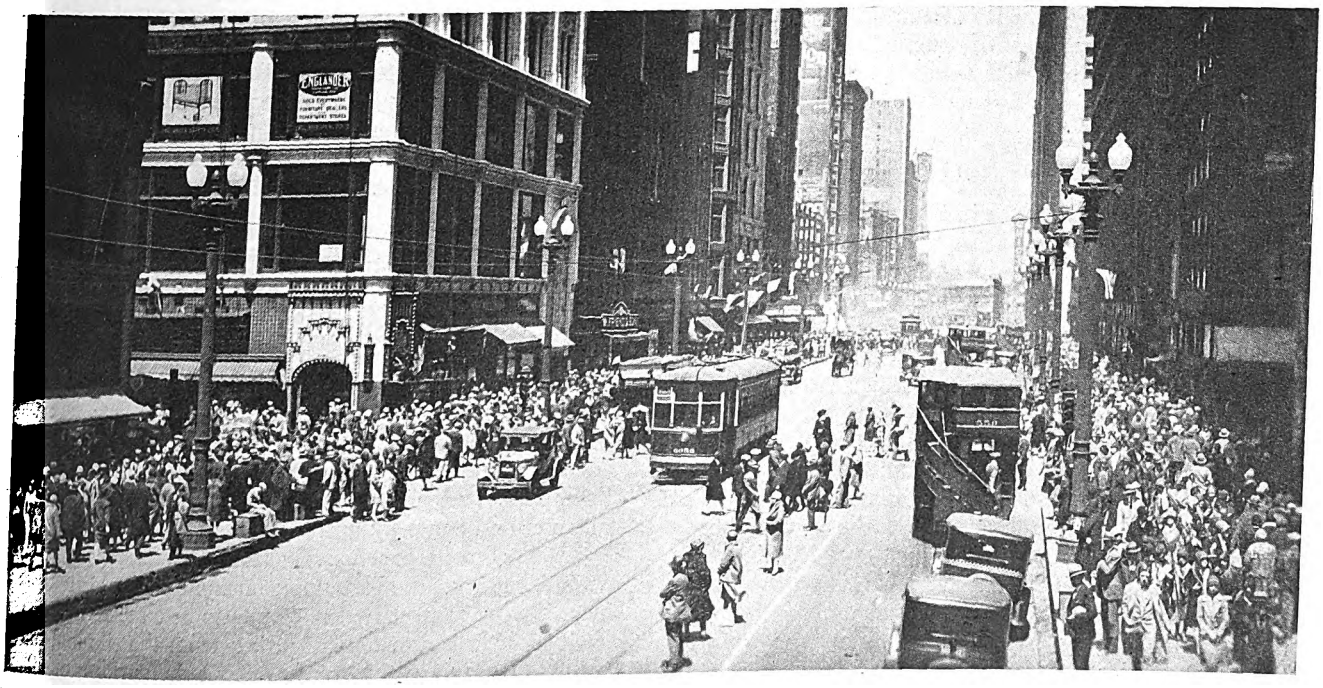


State Street, Chicago, looking north from Monroe, showing traffic conditions as they existed in 1925

This increase is greater than the increase in the registration of motor vehicles during the period from May, 1926, to May, 1928, which was 11.47 per cent. Concurrently, with the increase in motor vehicles entering the Loop District, the running time of street cars in this area was increased from 18 to 33 per cent, and the speed of all traffic moving on the streets was increased from 15 to 40 per cent. Finally, the traffic accidents in the district were 10 per cent lower during the first five months of 1928 than for the corresponding period in 1927, before the adoption of the no-parking regulations.

Little difficulty has been experienced in the enforcement of no-parking, and the number of traffic policemen in the district was not increased except for the first few days following the date the new regulations became effective. According to a report to the Chicago Association of Commerce by J. T. Redmond, chairman of that body's street traffic committee in 1928, the elimina-



Same location as the above, taken in 1928 with parking eliminated. More vehicles per hour were counted passing along State Street than in 1925, but were moving freely instead of being delayed to make congestion. More street cars were also passing in 1928 than in 1925

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tion of parking in the central business district, after its first year of trial, has proved generally beneficial and easy of enforcement.

Small Shop Owners Opposed Measure

Apprehension as to the effect of parking restrictions upon retail business led a group representing very minor interests to attempt injunction proceedings against the enforcement of the ordinance. The effort of the street traffic committee of the Chicago Association of Commerce to have the new regulation given a fair 90-day trial finally prevailed, however, with the result that Chicago has now gone more than a year under the new traffic regulation, and most of those who previously opposed no-parking have withdrawn their opposition.

Since the subject of traffic congestion relief is occupying the serious attention of transportation men and public-minded citizens throughout the country, a general review of Chicago's experience is of particular interest after a full year of trial. Under the present regulations parking is prohibited in the central business district on all week days except holidays from 7 o'clock a.m. to 6 o'clock p.m. Passenger vehicles are prohibited from standing for a period of time longer than is necessary for the reasonably expeditious loading or unloading of passengers, with a maximum permissible period of three minutes for this purpose. Commercial vehicles are permitted to stand only for the period of time necessary for the reasonably expeditious loading, unloading, and delivery or pick-up of material, with a maximum permissible period for this purpose of 30 minutes. On Saturdays the restrictions are enforced from 7 o'clock a.m. to 3 o'clock p.m. Exceptions are made for licensed taxicabs when standing at certain designated cab stands. Further exceptions are made for ambulances and emergency vehicles of the city or federal government and the vehicles of public utility companies, while the operator of such vehicles is engaged in the necessary performance of emergency duty.

Parking Ban Followed Other Traffic Relief Measures

The no-parking ordinance in Chicago followed a series of progressive steps taken for the relief of traffic congestion in the central business area. Previous to the passage of this measure a considerable improvement in traffic conditions was made on Sept. 13, 1924, through a major rerouting of street cars entering the Loop area, and the prohibition of left-hand turns for all vehicles within the central district, about a month later, as described in the May 3, 1924, and Nov. 15, 1924, issues of Electric Railway Journal. Another major improvement consisted in the design and installation of a "progressive" signal system throughout the central business district, which became effective on Feb. 8, 1926, and was described in detail in March 27, 1926, issue of Electric Railway Journal. This latter development has been indorsed by leading traffic engineers of the country as the most efficient system of traffic signals yet devised for moving street traffic with a minimum of delay and interference. Subsequent to the design and installation of the system in Chicago it has been adopted in other cities, and progressive signals are rapidly replacing the older form of synchronous signal light control originally applied on Fifth Avenue in New York, and subsequently adopted by many other communities.

The no-parking ordinance in Chicago grew out of a metropolitan street traffic survey made under the direction of the Chicago Association of Commerce by Miller McClintock of the Alfred Russel Erskine Bureau of Street Traffic Research of Harvard University, in 1926. Subsequent to the passage of the ordinance additional studies were made in May of 1928 to determine the effect of the no-parking regulation upon the movement of people and vehicles within the affected business district. Perhaps the most outstanding fact developed by the original traffic survey in 1926 was the almost negligible proportion of patrons of downtown business establishments who depended upon the use of automobiles parked at the curb for transportation in the conduct of their business. Extensive investigations were made of the methods of transportation used by the patrons of various classes of retail establishments through the cooperation of the managements of these stores. The survey covered department stores, office buildings, banks, musical instrument stores, furniture stores, shoe stores, restaurants and book stores. Only 8 per cent of the total patrons arriving at these establishments came by automobile. Of these, only 1.57 per cent utilized curb parking space. A complete summary of the results of this study, as made by the street traffic survey in 1926, is given in Table I on this page.

TABLE I—PATRONS ARRIVING BY VARIOUS MEANS OF TRANSPORTATION, FROM REPORT OF CHICAGO METROPOLITAN STREET TRAFFIC SURVEY

Establishments	Total Patrons	Suburban Trains	Elevated Trains	Street Cars	Motor Coach	Taxicabs	Automobiles — Total	Automobiles — Parking at Curb
Department stores	62,621	12,875 18.5%	23,176 33.3%	19,370 27.8%	8,881 12.7%	709 1.0%	4,610 6.70%	1,013 1.47%
Office building	9,432	2,334 24.7%	3,404 36.0%	1,906 20.2%	505 5.5%	85 0.9%	1,198 12.70%	167 1.77%
Banks	8,421	1,900 22.6%	2,884 34.3%	2,308 27.4%	405 5.3%	79 0.9%	800 9.50%	144 1.71%
Musical instrument stores	2,649	499 18.8%	1,016 38.4%	567 21.4%	315 11.9%	42 1.6%	210 7.90%	61 2.29%
Furniture stores	2,378	449 18.8%	855 36.0%	498 21.0%	291 12.3%	22 0.9%	263 11. 0%	45 1.88%
Shoe stores	1,064	158 14.9%	311 29.2%	169 15.8%	211 19.8%	33 3.1%	182 17. 2%	32 3.02%
Restaurants	2,405	507 21.0%	748 31.1%	343 14.3%	307 12.8%	122 5.1%	378 15.70%	41 1.69%
Book stores	112	20 17.2%	25 21.6%	30 25.8%	20 17.2%	.....	21 18.20%	2 1.74%
Grand total	96,082	18,742 19.5%	32,419 33.8%	25,191 26.2%	10,980 11.4%	1,092 1.1%	7,662 8.00%	1,505 1.57%

Survey Figures Predicted Success

The favorable results that have followed the elimination of parking were anticipated before the ordinance became effective, from the surveys which had been conducted to determine the importance of the part played by parked cars in the transportation of people into the Loop for the conduct of business. The very fact that the surveys conducted by the merchants themselves, among more than 96,000 customers of their own establishments, had shown that only 1.57 per cent of their patrons had come by automobiles that used curb parking space, indicated conclusively that prohibition of parking would have little effect upon business in the district and would be far offset by the results to be expected from the reduction in congestion resulting from the elimination of vehicle storage in the streets. That the parking privilege in congested areas is a practice which has grown up by custom until its value as a public convenience, and as a factor in the conduct of business, is far outweighed by

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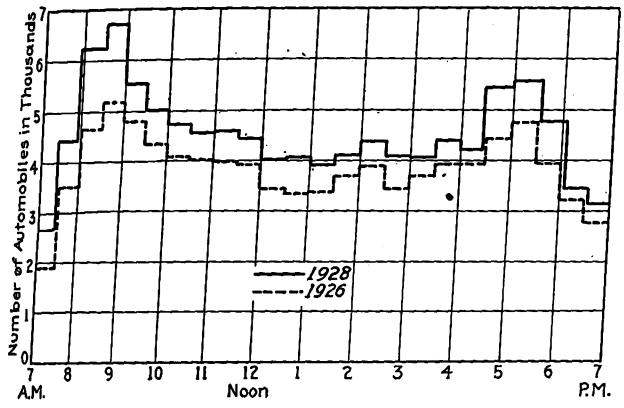

Chart 1—Record by half-hour periods, of passenger automobiles entering the central business district of Chicago on a typical business day in May, 1926, when parking was permitted, and in May, 1928, after parking had been prohibited

its harmful effects in slowing down traffic movement and increasing congestion, was definitely shown by this study of the economic importance of the parked car in the conduct of business.

Although automobile traffic represents a large proportion of the total number of vehicles using the streets in modern American cities, only a relatively small proportion of the people entering the district by various agencies of transportation depend upon the private vehicle. In the Chicago surveys the relatively small part played by the individual car in the conduct of business was brought out by various classes of data. Of the total number of people in the central business district at the time when the maximum number was reached, excluding those who walked in, only 7 per cent arrived by passenger automobile. Previous to the enactment of the no-parking regulations, a half-hour parking rule had been in effect. Under these conditions it was found that a total of 19,447 vehicles used the available parking spaces on a typical week day during the period from 10 a.m. to 6 p.m. This represented about 15 per cent of the vehicles that entered the district during the period; in other words, 85 per cent of the vehicles which entered according to the cordon count, did not use parking space either because they passed through the district en route to some other part of the city, or used off-street parking facilities.

The relative economic unimportance of the parking privilege—far out of proportion to its physical importance as a factor in producing street congestion and traffic delay—is indicated by the comparatively small increase in garage space and parking lots after a full year of rigid enforcement of a total street parking ban. From May, 1926, to May, 1928, the total off-street storage facilities for automobiles increased from 8,732 car capacity to 14,571 car capacity. During the remainder of 1928 there has been only a nominal increase in garage space bringing the total of space available on Jan. 1, 1929, to 17,481 cars. Obviously, therefore, no phenomenal demand for automobile storage facilities resulted from the total abolition of curb parking.

AUTOMOBILE STORAGE CAPACITY IN THE CENTRAL BUSINESS DISTRICT OF CHICAGO, JAN. 1, 1929

Garages	8,781 cars
Parking lots	3,000 cars
Grant Park (pay space)	3,200 cars
Grant Park (free space)	500 cars
Wacker Drive (both levels)	2,000 cars
Total	17,481 cars

Increases in the speed of vehicular movement in the central district following the adoption of the no-parking ordinance, decreases in traffic accidents and increase in the number of vehicles entering the district were cited above as indicative of the effects of the new ordinance. To the casual observer, the streets in Chicago's Loop seem quite free of traffic in comparison with the condition that existed before the enforcement of the new ordinance. Nevertheless actual traffic checks indicate that the numbers of vehicles and people in the district have increased since the new law went into effect, but the traffic moves so much smoother and faster, that the streets, free for the first time from lines of standing automobiles occupying valuable street space along the curbs, seem by comparison to be quite deserted. Actual figures, however, tell a strikingly different story.

More Automobiles Enter District than Formerly

In Chart 1 there is shown a graphical record of the number of passenger automobiles entering the central business district by half-hour periods from 7 a.m. to 7 p.m. on a typical business day in May, 1926, before parking was prohibited, and in May, 1928, after the new law had been in force for several months. It will be noted that more automobiles entered the district after parking prohibition than before, and this condition existed for every half-hour period from 7 o'clock in the morning to 7 at night. The greatest increase occurred between 8 a.m. and 9 a.m. and between 4:30 p.m. and 6 p.m. This increase in the morning was approximately 30 per cent.

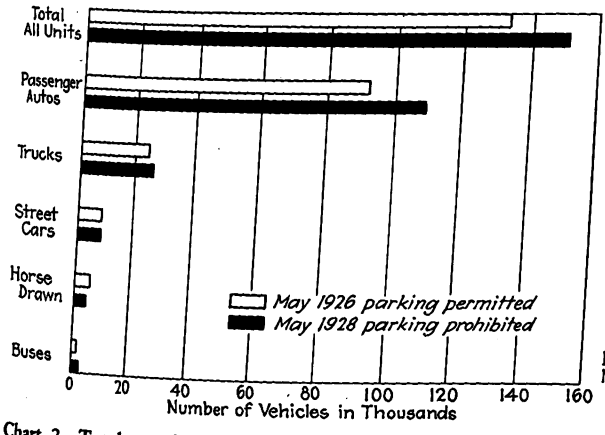

Chart 2—Total number of vehicles of all classes entering the central business district between the hours of 7 a.m. and 7 p.m. on a typical business day in May, 1926, and May, 1928, before and after parking prohibition

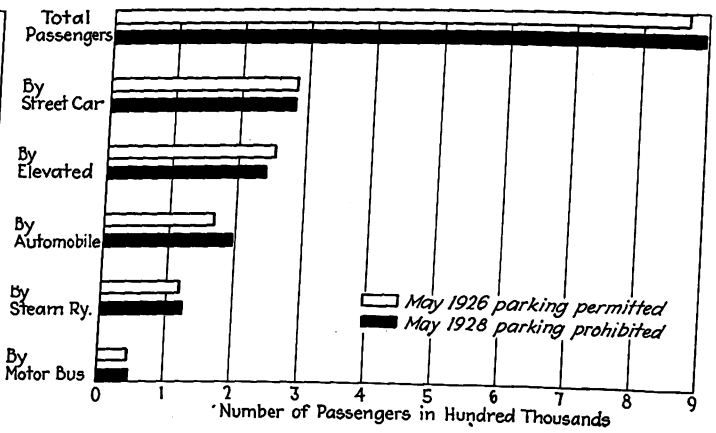

Chart 3—Total number of passengers entering the central business district between 7 a.m. and 7 p.m. by all agencies. Chart gives comparison for typical business day in May, 1926, and May 1928, before and after parking prohibition

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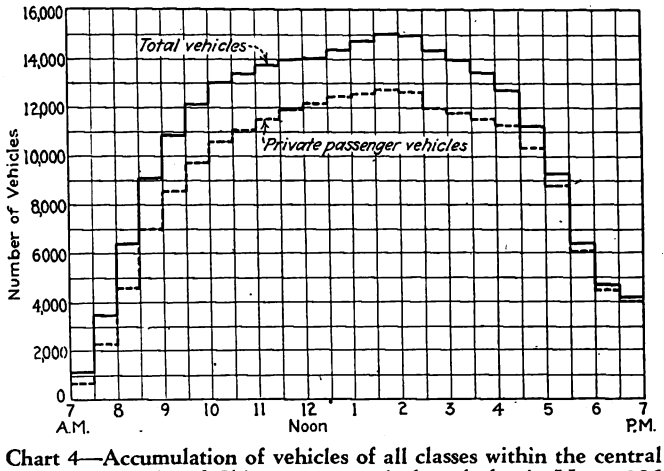

Chart 4—Accumulation of vehicles of all classes within the central business district of Chicago on a typical week day in May, 1926

The effects of parking prohibition upon the total number of vehicles entering the central business district between the hours of 7 a.m. and 7 p.m. and upon the number of passengers arriving by various means of transportation between these hours are shown in the accompanying tabulations and in Charts 2 and 3.

TABLE II—NUMBER OF VEHICLES ENTERING THE CENTRAL BUSINESS DISTRICT OF CHICAGO BETWEEN 7 A.M. AND 7 P.M. ON TYPICAL BUSINESS DAYS WITH AND WITHOUT PARKING

Vehicles	May, 1926 Parking Permitted	May, 1928 No Parking	Increase or Decrease	Per Cent Increase or Decrease
Automobiles....	92,425	109,374	16,949 Increase	18.33 Increase
Trucks.....	24,399	25,665	1,266 Increase	5.18 Increase
Street cars.....	8,432	8,380	52 Decrease	0.62 Decrease
Horse drawn....	5,825	4,283	1,542 Decrease	36.00 Decrease
Buses.....	1,832	2,487	655 Increase	35.75 Increase
Total.....	132,913	150,189	17,276 Increase	13.00 Increase

TABLE III—NUMBER OF PASSENGERS ENTERING THE CENTRAL BUSINESS DISTRICT OF CHICAGO BETWEEN 7 A.M. AND 7 P.M. ON TYPICAL BUSINESS DAYS WITH AND WITHOUT PARKING

Means of Transportation	May, 1926 Parking Permitted	May, 1928 No Parking	Increase or Decrease	Per Cent Increase or Decrease
Street car.....	284,958	282,013	2,945 Decrease	1.03 Decrease
Elevated lines...	256,286	243,594	12,692 Decrease	4.95 Decrease
Automobile.....	166,367	196,873	30,506 Increase	18.33 Increase
Steam railroad..	118,857	124,107	5,250 Increase	4.41 Increase
Motor bus.....	44,391	47,472	3,081 Increase	6.94 Increase
Total.....	870,859	894,059	23,200 Increase	2.66 Increase

It will be noted from these figures that the total number of automobiles that entered the district during this twelve-hour period increased 18.33 per cent, the total number of vehicles increased 13 per cent, and the total number of passengers entering the district increased 2.66 per cent following the prohibition of parking. Obviously, therefore, the elimination of parking had no effect which would be detrimental to the volume of business conducted in the district, and through the reduction of congestion and the speeding of traffic acually increased the number of automobiles and the number of passengers entering the Loop.

Automobiles Carry Small Part of Total Traffic

Although private automobiles amounted to 92,425 out of 132,913 vehicles, or 69.5 per cent, using the streets of the central business area during twelve business hours in 1926, they carried only 166,367 passengers, or 19.1 per cent of the total of 870,859 passengers arriving by various forms of transportation. This relatively large percentage of the total demand for street space represented by the private car is shown graphically in Chart 4, in which the total number of vehicles of all types within the district and the number of private automobiles are plotted for half-hour periods from 7 a.m. to 7 p.m.

Since the no-parking regulations went into effect the appearance of the streets to a casual observer would lead to the opinion that there are a considerably smaller number of vehicles within the central business district than when parking was permitted. Opponents of parking prohibition have actually seized upon this condition as indicative of the fact that the new regulations are keeping automobiles out of the business area, which is held to be detrimental to business, particularly that of retail stores. But actual counts of the number of automobiles in the district before and after parking prohibition indicate how misleading may be casual observations of traffic conditions as a guide in determining policies with respect to regulation.

By cordon counts of the number of automobiles entering and leaving the central business district during each half hour from 7 a.m. to 7 p.m. it was possible to determine the total number of vehicles within the district during each half-hour period of the business day. These counts were made on typical business days in May, 1926, and also in 1928 after the no-parking ordinance had been in effect for several months. The results are shown graphically in Chart 5. Here there is shown in a striking way the fact that though the streets have a relatively deserted appearance following the prohibition of parking there are actually more vehicles within the district than when parking was permitted. Obviously, therefore, the greater ease and freedom of movement resulting from making available for moving traffic all of the existing street space, instead of devoting a large part of the streets to the storage of automobiles, has more than offset whatever inconvenience may have been caused by the parking ban, and has actually resulted in an increase in the number of private cars venturing into the district.

More People in District than Ever

The primary objection to parking prohibition arises from fear on the part of merchants of a possible harmful effect upon business. But the factor of most importance is not the number of vehicles, but the number of people that enter the business district: A complete graphical picture of this phase of the situation existing in the Chicago central area before and after parking prohibition is shown in chart 6. This represents the results of cordon counts of the number of people entering and leaving the district by various means of transportation for half-hour periods throughout the business day. The number of people shown on the chart for each period represents the average number of people actually within the district. This, however, is exclusive of those who walked to and from the area under observation. The chart shows not only that there was an increase in the total number of people within the district, but also that the number who came by private automobile was slightly higher during most of the day than before the enforcement of no-parking. Obviously, there is no indication of any effect that would be harmful to business in the area. By showing graphically a comparison of the number of people coming by automobile and by all forms of transportation, Chart 6 also illustrates clearly the comparatively small part played by automobiles in the transportation of passengers for the conduct of business.

In discussions of proposed traffic regulations for the reduction of congestion, the individual merchant is far more interested in the specific conditions existing at his own establishment than in the general traffic figures of

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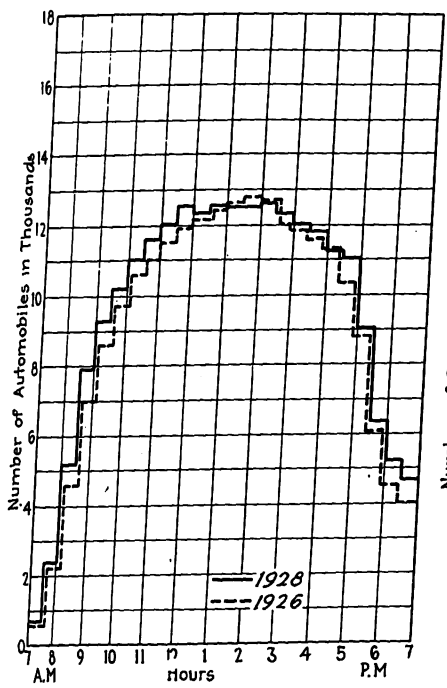

Chart 5—Accumulation of passenger automobiles within the central business district on a typical business day of May, 1926, and May, 1928, before and after parking prohibition. Chart is plotted for half-hour intervals from 7 a.m. to 7 p.m. to show that parking ban made room for increased number of autos in the district

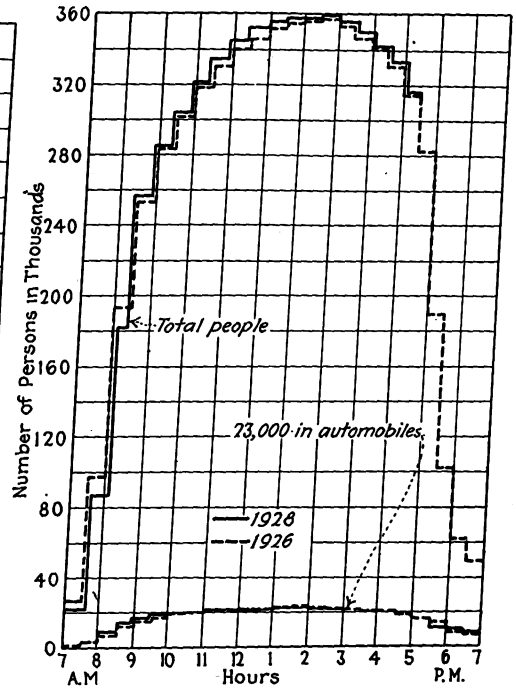

Chart 6—Graphic record of total number of people within central business district who arrived by various means of transportation, plotted by half-hour periods from 7 a.m. to 7 p.m. for typical week day in May, 1926, and May, 1928. This does not include persons who walked to and from the district

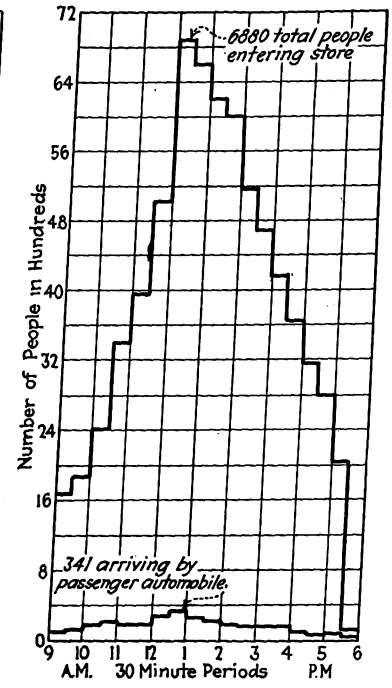

Chart 7—Number of people entering a high-grade State Street department store. Chart is plotted by half-hour periods to show comparison of total people entering store and those arriving by automobile on a typical week day in May, 1928

an entire business district. It is the convenience of the customers who enter his own store that occupies his primary interest. For this reason, the higher-grade establishment catering to an exclusive clientele, or what was at one time known as a "carriage trade," is usually most concerned regarding proposals for the regulation of private automobiles. It is particularly interesting, therefore, to note the data presented by Chart 7, which gives a complete record of the number of people entering a nationally-known, high-grade State Street department store in Chicago during a typical business day.

Checking Results at Individual Stores

For a study of the actual importance of the trade arriving by automobile the number of people entering the store who arrived by that means is plotted on the same chart for each half hour during the business day. It will be noted that the maximum number of people entering in any single half-hour period was from 12 o'clock noon to 12:30 p. m., and amounted to 6,880 persons. The maximum number arriving by automobile in any half-hour period was from 12:30 p.m. to 1 p.m., and amounted to 341 persons. The automobile customers at the maximum half hour amounted to approximately 5 per cent of the total.

There is little doubt left in the minds of any of those who have studied the results as to the beneficial effects of the no-parking regulation on the reduction of congestion, speeding up of traffic and reduction of accidents. On Feb. 15 and Feb. 18 a committee of the City Council had a public hearing on the ordinance. No objectors appeared to make complaints. A change strengthening the ordinance was submitted to the Council and passed first hearing on the 18th.

But this alone does not suffice to prove that this restriction on the right to store automobiles in public streets has not been harmful to business. The statement has been made by those opposing parking restriction in other cities that retail business in Chicago's Loop has suffered from the abolition of street automobile storage.

Published Statements Divulge Business Conditions

In addition to all of the above factual evidence, therefore, it seems worth while to examine the actual record of representative business establishments in the affected district, regarding business experienced during the past year, as disclosed by published statements. In evaluating the significance of these statements by retail merchants in the central district, it is worthy to note that a survey in Chicago indicated that for the first nine months of the year 1928 industrial wage payments to employees were 7 per cent less than for the corresponding period of 1927. Normally, in view of this reduction in industrial wage payments, it would seem logical to expect a slight recession in the volume of retail business done in 1928 in comparison with 1927. But despite this condition, published statements by executives of Loop stores, reviewing the year's experience, are worth examining, since no-parking had been in effect all the year.

In its issue of Feb. 12 the Chicago *Herald and Examiner* carried the following article: Fair Sales at New High Record.—Sales of The Fair in the fiscal year ended Jan. 31 were the largest in the history of the State Street department store and net profits were substantially above the previous year, D. F. Kelly, president, asserted yesterday. The Fair delivered 35 per cent more parcels than in 1920, which heretofore was our largest year, showing that prices are lower today by a substantial sum than they were then, Mr. Kelly said.

In its issue of March 8, 1928, the Chicago *Herald and Examiner* carried the following statement:

"Mandel Brothers sales are showing a substantial increase over last year, it was officially stated yesterday."

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In its issue of Dec. 15, 1928, Chicago *Commerce,* published by the Chicago Association of Commerce, presents a review of business conditions in the city during the Christmas buying season, in which are contained statements by executives of a number of important retail establishments in the central business district. These are all optimistic in tone, following a year of parking prohibition, and fail to reflect the slightest evidence of any harmful influence upon retail business of the parking restrictions.

David M. Yates, vice-president Marshall Field & Company, nationally-known high-grade department store: ". . . Our sales have been in excess of any previous year. . . . The crowds are at least as great as in former years. . . . We are set to handle a record-breaking business during the remainder of the month and feel confident that our expectations will be realized."

Arthur Davis, president The Davis Company, popular price department store: "Gaged by our sales to date we confidently expect our Christmas business this year to be much larger than any Christmas business in our history."

John H. Wood, general manager Carson, Pirie, Scott & Company, high-grade department store: "A forecast of our Christmas business based upon the shopping up to the moment would be easily and quickly summed up in the following words, 'the greatest in the history of Carson, Pirie, Scott & Company.' There is a steady and sustained buying throughout the entire store, the results of which are highly gratifying."

H. M. Florsheim, vice-president the Florsheim Shoe Company: "While our particular type of business does not lend itself to Christmas shopping, we nevertheless feel the favorable effect of the Christmas spirit and believe that this year our volume of sales will be far in excess of what it has been in the past."

Raymond E. Durham, president Lyon & Healy, Inc., large musical instrument establishment: "General business during the first eight months of this year showed a little improvement over the corresponding period of 1927, indicating a healthy condition."

W. C. Peacock of C. D. Peacock, high-grade jewelers: "I can honestly say that we have done a better business this year than ever before. And from all indications our Christmas business will also set a new record."

These statements seem enough to indicate the trend of business in Chicago's "Loop" establishments. For the purposes of this article on the experience resulting during the past year of no-parking, they indicate at least that the conversion of valuable street space from a storage area for private cars to the purpose for which it was intended, namely, the movement of traffic, has had no harmful effect upon retail business in the central business area, and gives many evidences of having provided major relief of traffic congestion.

Special Trackwork Specifications Approved

FORMAL approval of the specifications for materials for use in the manufacture of special trackwork recently submitted by the American Electric Railway Association, which acted as sponsor for the project, was announced by the American Standards Association on Jan. 29. These specifications already have been through the standardizing procedure of the American Electric Railway Engineering Association and adopted as recommended specifications for inclusion in the Engineering Manual in place of the earlier specifications W 104-26. The new specifications, adopted as a tentative American standard, are given the American Standards Association designation F 10-1929.

With these actions of approval, the industry now has a complete line of up-to-date specifications covering the field of special trackwork, including not only the materials used therein but also the several distinct types of special trackwork construction now current. The specifications for materials are separate and distinct from those covering the various special types of special trackwork and must be used in conjunction therewith if the full value of the specifications is to be obtained. In other words, they supplement one another. The specifications for materials do not attempt to cover special trackwork as a finished product of any type, but they do control the many different materials used in the assembly of any particular type. There are five kinds of rails, six of castings, six of rolled or forged steel, one of springs and five of fastenings covered by the materials specifications. One item of fastenings is subdivided into five different kinds, making 28 kinds in all.

It will thus be seen why it is necessary to have a materials specification separate from those covering distinct types of special trackwork. The new specifications cover the different materials principally by reference to accepted standards of the various national standardizing bodies for such materials, and the specifications become, to some extent, a sort of directory of specifications for rails, castings, forgings and the like.

All of the specifications of national bodies thus referred to in the materials specifications may be obtained from the several associations and should be included in the files of engineers and purchasing agents, so that prompt reference may be made thereto in connection with details of purchase and inspection, because each of the specifications covering the several types of special trackwork construction refers to the materials specification under the head of "Materials" in the text.

Since the sectional committee which prepared the new specifications comprised representatives of the American Railway Engineering Association, American Society of Civil Engineers, American Electric Railway Association, American Society of Mechanical Engineers, Association of American Steel Manufacturers, American Short Line Railway Association and the Manganese Track Society, it will be apparent that all important user and manufacturer interests having to do with special trackwork materials have joined in the work of preparation of the new specifications and have assented in their adoption as an American tentative standard. In view of this there is every good reason why the new specifications should be taken up promptly and put into use by those having to do with the purchase of special trackwork. Furthermore, the new specifications are, in effect, an amplification and combination in somewhat expanded form of the materials portion of the existing A.R.E.A. specifications for switches, frogs, crossings and guard rails adopted in March, 1921, with March, 1922, supplement and of A.E.R.E.A. specifications for special trackwork materials W 104-26.

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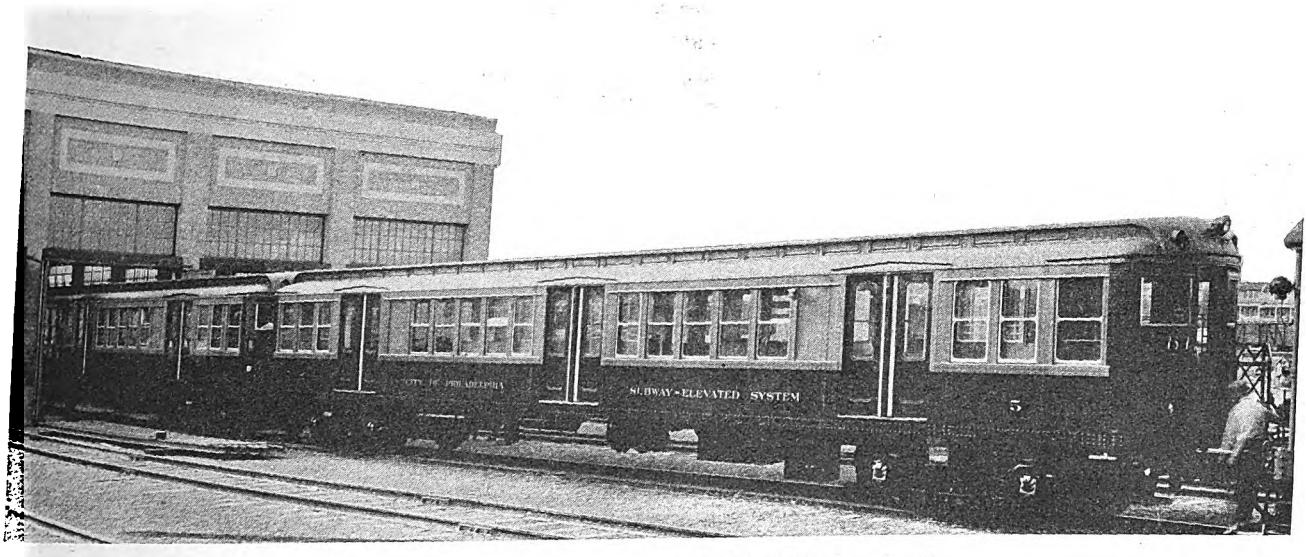
Philadelphia Subway Cars Designed for

Speed, Safety and Convenience

Two 210-hp. motors per car give free running speed of 47 m.p.h. Cars are all-steel construction and weigh 110,000 lb. They will seat 75 and carry 212 passengers. A total of 150 cars built at a cost of $40,000 each



150 cars of this type were built at the J. G. Brill plant for the Broad Street subway in Philadelphia

In the Feb. 9 issue an article was published showing the relation of the Broad Street subway to the existing and future transit facilities of the city, giving operating details and describing the general construction. In future articles the Fern Rock shops and terminal, the distribution equipment and the signal system will be discussed.—EDITOR.

PLANNED to combine ample capacity and a maximum of passenger comfort, the 150 passenger cars built for the city of Philadelphia's new Broad Street subway by The J. G. Brill Company embody many unusual features of design. Prior to their construction an extended investigation was made by the Department of City Transit of the local requirements and of car practice and experience on other subway or elevated systems, railroads and street railways. Among the factors given careful consideration were seating capacity and arrangement, speed of unloading and loading, ease of movement between station platforms and seats, safety of passengers and crew, utilization of track capacity, etc. This study led to the decision to use large cars, giving greater flexibility in seating arrangement and lower costs per passenger carried for crew, power and maintenance, because of the smaller number of units.

The car is 67 ft. 6 in. long over the anti-climbers, 10 ft. wide over all and 12 ft. 4 in. high from top of rail to top of roof. The completed car, including all equipment, weighs 110,000 lb. The cost of each was a little less than $40,000.

The general plan of the car is so arranged that it is divided into three sections, giving ample space near the doors for the egress and ingress of passengers. Seventy-five seats are provided in each car, of which 50 are cross-seats, arranged with ample knee room, wide aisles and with a 17-in. seat space. The total capacity of the car, on the basis of 2 sq.ft. of free floor space per standee, is 212. Seats are the stationary spring-cushion type, covered with rattan. For the convenience of standees, there are grab handles on the ends of the cross-seats, hand-straps suspended from the roof in front of longitudinal seats and stanchions located conveniently in front of the side door openings. Advertising card racks are provided in the lower deck of the roof and at other conspicuous places in the car.

Each car has three large double-leaf doors on each side, spaced equidistantly from each other and from the ends of the car. Operating cabs are placed in diagonally opposite corners and at the back of one cab is located a switch cabinet. Communication between cars is by means of wide end doors, there being no platforms. All doors are constructed of aluminum, except those for the switch cabinets. The end door is provided with a drop sash and the door lock is of the Howard friction type, which

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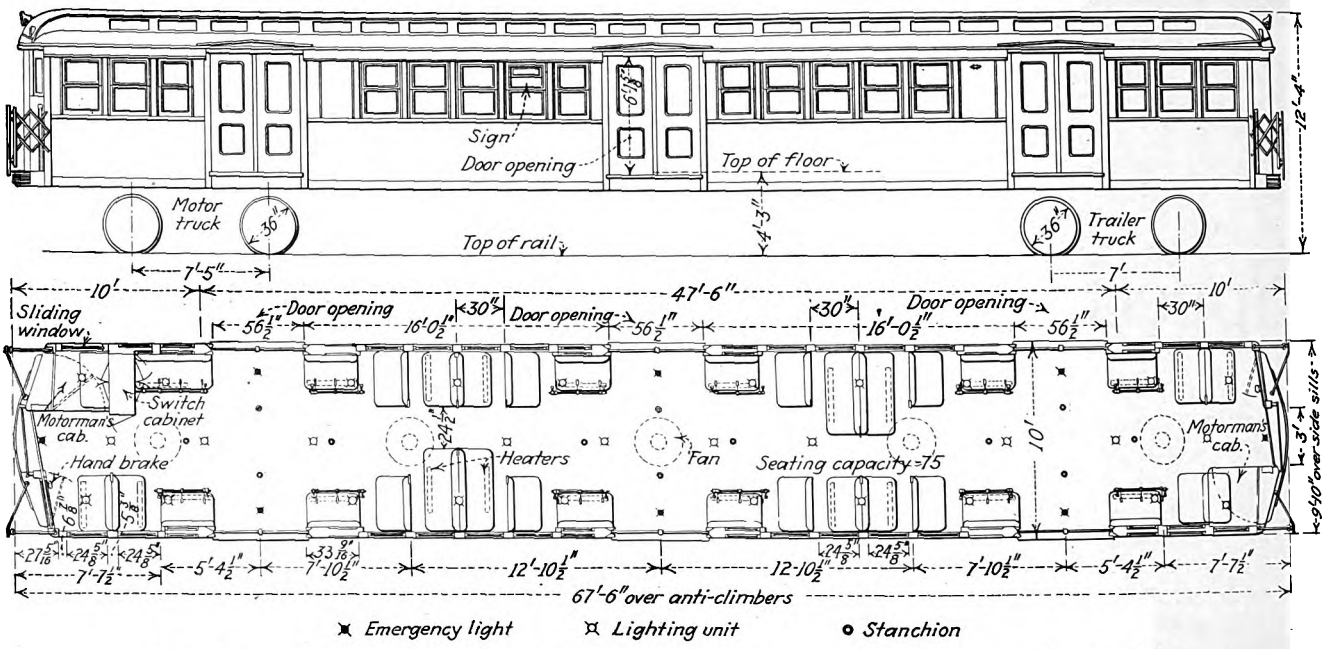


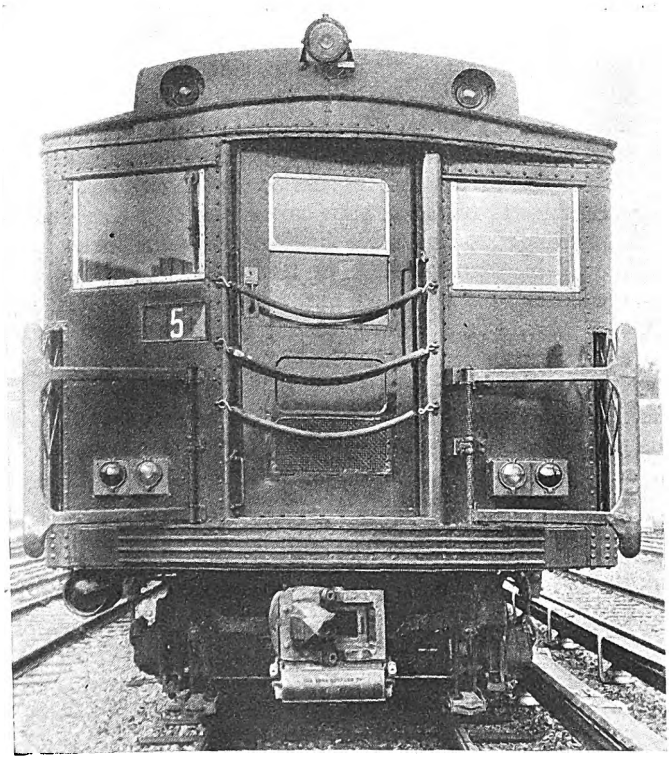
Floor plan and side elevation, showing the principal dimensions and the arrangement of seats and doors. Each car seats 75 passengers, 50 of that number on crossseats

prevents the door from slamming when being closed.

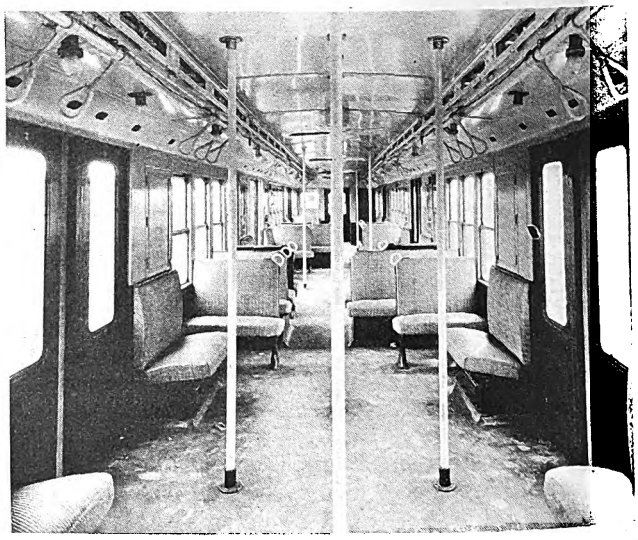
Pantograph safety gates are attached to each corner of the car, which automatically meet to prevent passengers boarding the trains or falling between cars at stations. Three safety chains covered with rubber are provided between cars on each side of end doors.

Door Mechanism Has Single or Multiple Control

The side doors are opened and closed by pneumatic equipment, electrically controlled. The guards operate the doors from the cabs, which are equipped with special windows, grab handles, etc. An arrangement has been developed permitting control of all doors of the train, or separate control on individual cars, depending on the setting of a master switch in each cab. From an operating position in any one of the cabs, the doors on the same side of that car and of other cars in front or in back can be opened and closed by manipulating two tumbler switches. Red lights on the exterior of the car body are lighted if any door on that car is open, and a green signal lamp in the motorman's cab lights only when all doors on the train have been closed. An auxiliary buzzer signal system is installed for use in case the light signal system fails. Another special device enables the motorman, in case of overrunning a station platform, to nullify the door-operating circuits, preventing the guards from opening the doors, or if they have already been opened, closing them automatically. Push buttons on the outside of the car enable platform men to close individual doors, and key switches on the center doors enable the operating force to pass in or out easily when done. In case of failure of air or electric supply, certain of the doors can be opened mechanically from the inside, and one of them from the roadbed.



The car front is equipped with marker lights, a panel for the route number, a headlight and two automatic safety gates



Ample illumination, a white ceiling and relatively light-colored side walls give the interior a cheerful appearance

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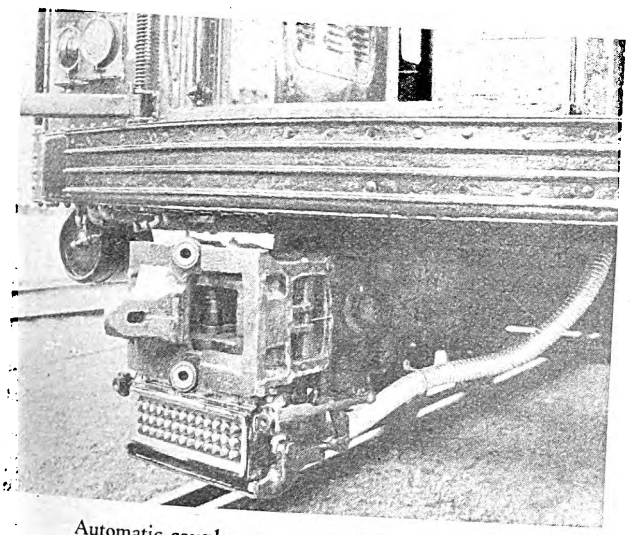
An emergency bell placed in each cab can be energized from a push button located on the inside of the car at the center door. These buttons are in cases with glass covers, which can be broken by the passengers, using a small hammer hung near the cases. The current necessary for operating the various relays, magnet valves, etc., is supplied by the same 32-volt storage battery that supplies emergency lights, tail lights, and other control circuits. All circuits, except those to the main motors, are fused and controlled at two switchboard panels built into the cab walls.

Cars Well Ventilated and Heated

Ventilation is provided for by adjustable shutters in the monitor roof, drop sash in the upper half of the windows, panels in the end doors and five 38-in. electric ceiling fans. All sash is of extruded aluminum. The upper sash of the side window is arranged to drop. The windows are glazed with double thick American AA glass and the doors with $\frac{3}{16}$-in. crystal plate glass.



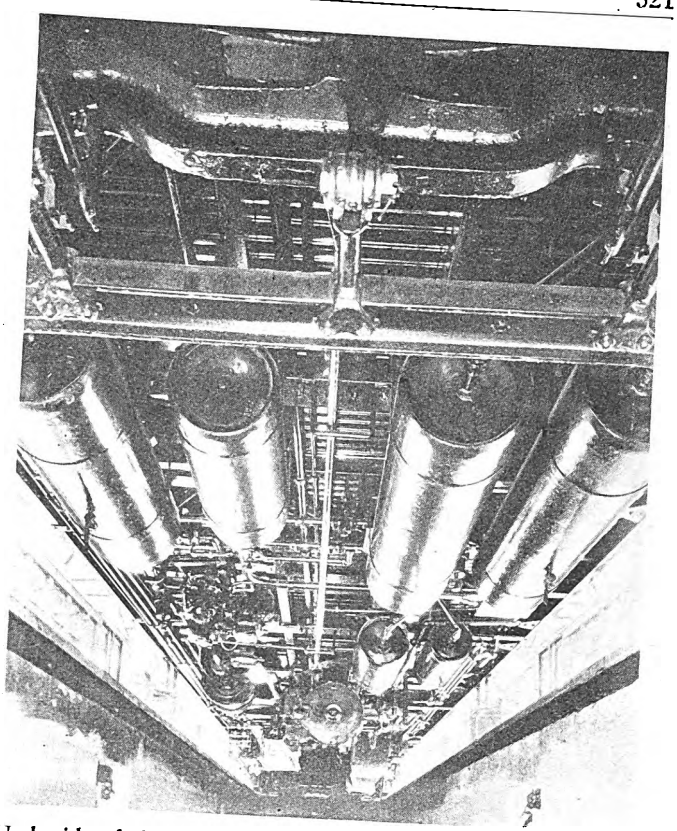
Automatic couplers are part of the equipment

Twenty-four electric heaters are located under the car seats. They are thermostatically controlled. A new feature incorporated in the control of the heaters is a relay which opens the heater circuit while the train is accelerating, thereby reducing the peak loads and resulting in substantial economy, because the rates charged for energy depend upon the maximum demand.

The regular lighting system consists of 22 series lights of 45 watts each, arranged in three rows along the center and each side of the car. These lights are mounted in compensating fixtures arranged so that when one lamp burns out the others continue to burn. Low-voltage emergency lighting units are placed over each of the doors. Ample illumination, a white ceiling, and relatively light-colored side walls contribute to a cheerful looking interior.

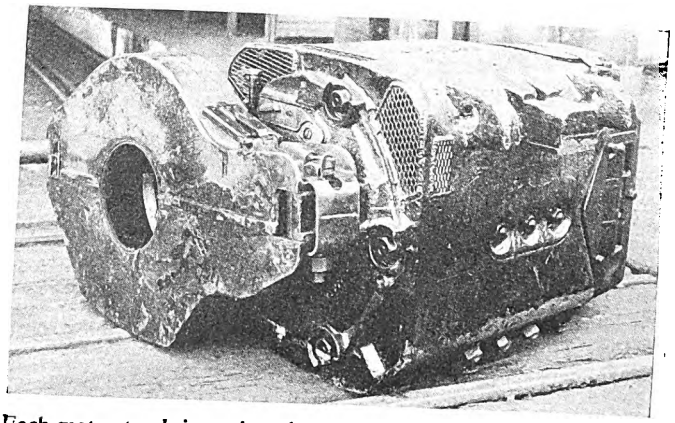
High speed electric railway practice was followed closely in the design and construction of the cars. Steel structural shapes are used for side and center sills, pressings and castings for the other members of the frame. The side and center sills of channel shapes extend in one piece from buffer sill to buffer sill. The car flooring is fastened to special pressed steel Z shapes secured to the side and center sills. The flooring is of Chan-arch and the wearing surface of $\frac{3}{8}$-in. Tucolith.

The body bolsters are built up of two pressed steel pans placed back to back and reinforced on the top and bottom with cover plates. Between the center sills are steel castings. The cross bearers are built up of steel pans with top and bottom cover plates. The frame is stiffened with end cross plates and diagonal braces of pressed steel. Hedley anti-climbers are secured to the buffer sills.



Underside of the car showing air reservoirs, compressor and, in the extreme back, the grid resistors and control equipment boxes

The side frames were designed as girders to carry the entire load of the body and passengers, with the cross bearers delivering loads to the side frame. The side frame, in turn, delivers the load to the bolsters and thence to the trucks at the center plates. The side frame is of pressed steel construction; the top plate is formed of a special type of U pressing, extending in one piece from end to end of car. The intermediate posts are of a special flange U pressing. The side girder plate is $\frac{1}{8}$ in. thick and above the windows is a $\frac{1}{8}$-in. steel letter board. Special attention was given to the design of the posts at the end side doors because of the heavy stresses concentrated at these points. The roof is the monitor type carried on continuous flanged U shaped steel car-



Each motor truck is equipped with two 210-hp., 600-volt, commutating pole, field control, dual ventilated, direct-current motors

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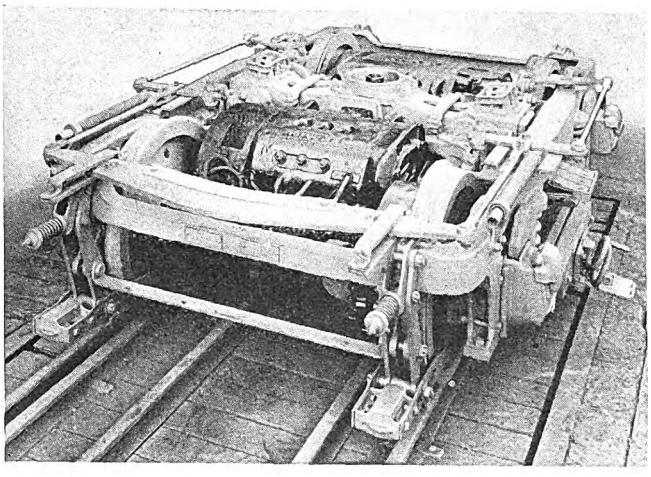
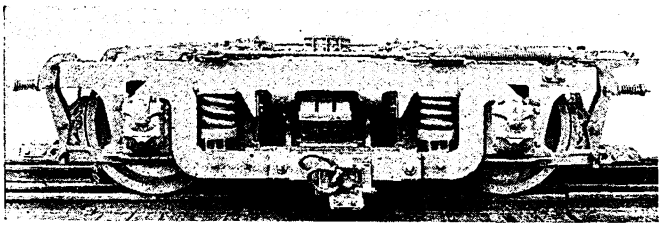


A motor truck and a trailer truck, spaced on 47 ft. 6 in. centers, support each car



Trucks are of the M.C.B. equalizing type with one-piece cast steel frames

lines, which extend from side plate to side plate. All steel throughout the car is copper bearing, conforming to A.S.T.M. specifications.

The couplers are the Van Dorn car, air and electric type, designed especially for subway service. They are of the tight lock type, so arranged that when coupled all connections are made up automatically. Uncoupling can be done from the ground or from the cab of either car. A feature incorporated in the coupler cutout switch is the interlocking of the motorman's door signal light, tail lights, marker lights and train number sign light. The Waugh draft gear is used which has a capacity of about 90,000 lb. when compressed 1½ in.

Trucks Are Equalizing Type

The cars are mounted on a motor and trailer truck with 5½x10 in. journals. The trucks are the M.C.B. four-wheel equalizing type equipped with the Simplex clasp brakes, Commonwealth Steel Company's cast-steel one-piece frame, Symington journal boxes, Stucki side bearings, oil bearing brass lined center plates, cast-steel bolster, Ellcon height adjusters, Sauvage shim slack adjusters on the motor truck, Rolman rolled manganese steel wear plates, rolled steel wheels, A.S.T.M. quenched and tempered axles, and A.E.R.A. type solid bronze bearings.

On six of the cars, twelve trucks, Hyatt roller bearings are used instead of the 5½x10-in. friction bearings. Cast integral in the Commonwealth Steel Company's truck frame are the side sills, transoms, end sills, spring caps and pedestals. Mounted on the outside equalizing bars are the third rail shoe beams on which are assembled the Champion collector shoes. These shoes are held under a spring tension of 20 lb. against the third rail.

The motor truck is equipped with two Westinghouse 210-hp., 600-volt, direct-current, commutating-pole, field-control, axle-hung railway motors, driving through helical gears and pinions. A distinctive feature of the motor is the dual system of ventilation. One current of air enters the armature bearing housing at the commutator end, passes under the commutator, through the armature core longitudinally, and out through the fan at the back end of the motor. The other air current enters through openings in the frame back of the commutator, which is baffled from this air, passes through the air gap and between the field coils, continuing through the double-bladed fan and out at the back end. Thus none of the air passes over the commutators, and troubles due to dirt and brakeshoe dust are avoided. Also the wear on the brushes is decreased.

Both the motors and the control equipment have been designed especially to give rapid acceleration and high schedule speeds under the conditions of subway service. The motors are geared to propel empty cars at a speed of approximately 47 m.p.h. on level tangent track, and to maintain a speed of 24 m.p.h. with a fully loaded train on the 3 per cent grade between the Logan and Olney Avenue stations. Multiple-unit control, of the unit-switch electro-pneumatic type, has been provided, with a unit master controller in every cab.

Features of Air Brake Design

Electro-pneumatic air brakes of the Westinghouse Traction Brake Company's AMUE type give the trains, of eight cars and less, smooth retardation. They are designed for quick recharge after emergency; charging during electric holding; graduated release; electric and pneumatic service, emergency and release positions which are the same on the brake valve and which permit emergency braking during or immediately after a service application. The service brake cylinder pressure is 50 lb. per square inch. The emergency cylinder pressure is 70 lb. per square inch, obtained from the train pipe of 85 to 100 lb. per square inch pressure through a limiting valve set at 70 lb. Each car is provided with an air compressor of 35 cu.ft. capacity, arranged so that all govern-

WEIGHTS, DIMENSIONS AND EQUIPMENT DETAILS OF THE 150 BROAD STREET SUBWAY CARS, BUILT BY BRILL

Weights:	
Car body	54,000 lb.
Trucks	34,210 lb.
Equipment	21,790 lb.
Total	110,000 lb.
Length over all	67 ft. 6 in.
Width over all	10 ft. 0 in.
Height, rail to top of roof	12 ft. 4 in.
Bolster centers	47 ft. 6 in.
Motor truck wheelbase	7 ft. 5 in.
Trailer truck wheelbase	7 ft. 0 in.
Air brakes	Westinghouse AMUE
Anti-climbers	Hedley
Armature bearings	Plain
Body	Steel
Brake shoes	Diamond S
Compressors	Westinghouse D3-F
Conduit	Rigid metal
Control	Westinghouse ABF
Couplers	Van Dorn, car, air and electric
Curtain material, motorman's curtains	Pantasote
Destination signs	Hunter
Door hangers	Diamond ball bearing
Door mechanism	National Pneumatic Co.
Doors	Sliding, side and end
Draft gear	Waugh
Dust guards	Symington
Energy-saving device	Thermostat
Fans	Westinghouse, ceiling
Finish	Steel painted
Floor covering	Tuco Products Corp.
Glass	Double thick American AA
Hand brake geared	Peacock
Hand brake handle	Adams & Westlake
Hand straps	Rico Steel-Kar
Heaters	Consolidated Car Heating Co.
Headlights	Crouse-Hinds WDN
Headlining	Agasote
Height adjustor	Ellcon
Interior trim	Brass, nickel plated
Journal bearings	5½x10 A.E.R.A.
Journal boxes	Symington
Lamp fixtures	Adams & Westlake
Motors	Westinghouse 581-A-1, 210-hp., inside hung
Roof type	Monitor
Roof material	Sheet steel
Safety car device	Dead man's control
Sash	Aluminum, O. M. Edwards
Seats	Brill, longitudinal and cross
Seat capacity	75
Seating material	Rattan
Side bearings	Stucki
Slack adjusters	American Brake Co. and Sauvage
Steel flooring	Chan-arch
Storage battery	Edison
Third rail collectors	Champion
Ventilators	Hinged shutter type
Wheels	36-in., rolled steel

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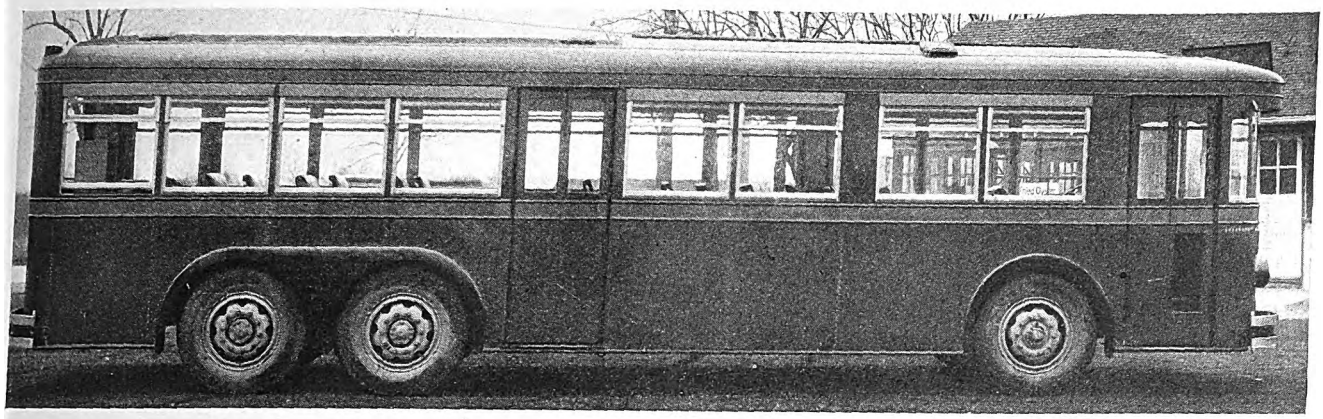

In this steam-operated motor coach the generators are at the extreme rear and the engine is ahead of the rear set of wheels

ors on a train are electrically connected and any governor can cut in all of the air compressors. On each truck is provided an automatic train stop which, when passing over a track trip which is in a raised position when signals are at "danger," causes an emergency application of the air brakes.

The hand brakes are connected as an integral part of the foundation brake rigging at the cylinder levers. The brake handle is the Adams & Westlake ratchet type. At the lower end of the brake staff there is located a train of gears of the Peacock type to multiply the power delivered from the brake handle to the foundation brake rigging.

Before opening the Broad Street subway to the public, it was necessary to make thorough tests of every part of the equipment and to undertake preliminary operation to have all parts functioning properly. The first step was getting the substations into service, and adjusting the equipment so that the various supplies of power could be maintained. Getting the different stations correlated and adjusted required many trials. Furthermore, as the capacity and arrangement of this equipment was unusual, considerable time was required to train the men. After power was supplied to the third rail, trains were operated on slow schedules to test the equipment, check clearances and obtain data to insure that all the apparatus would function properly. It was necessary also to test the electro-pneumatic interlocking control of track switches in service, together with the automatic signals and train stops. The scope of operation gradually was extended until six-car trains were being run from City Hall to Fern Rock yard, making the normal stops at the calculated schedule speed.

Each car was operated under all conditions and over all track for an average of about 600 miles. As there are 150 cars, this preliminary testing and training of personnel required a long period of time. The Fern Rock shops were opened during the tests so the cars could be inspected, overhauled and maintained as required.

Enlarged Facilities For Instruction at Morgantown

AN ASSEMBLY hall with a seating capacity of 150 is being constructed by the Monongahela West-Penn Public Service Company on the eighth floor of its building in Morgantown, W. Va. Partitions between four offices and a hallway are being torn down, and the large room is being redecorated. Folding chairs will be placed in the room. It will be used for holding classes and for general meetings of employees.

Experimental Steam Coach Has Eight-Cylinder Motor

Flexibility and power reserve are advantages claimed by its designers

REDUCED cost of operation and increased flexibility are the major claims made for a pre-manufacturing model steam operated motor coach recently designed and built under the supervision of D. McCall White and his associates for the Automotive Syndicate, Ltd., of Indianapolis, Ind. This operating model bus has been on the road, under test, for some months, and it is claimed that its reduced operating expense is due to lowered fuel and mechanical maintenance cost. Its smooth riding quality, improved ventilation and vision, absence of jerks on starting and stopping, and absence of gear and axle noises, should appeal to the riding public, according to the designers.

The coach is of the modern street car type design. It seats 40 passengers in addition to the operator, and its aisle permits a number of standees. The body is combined with the chassis, the various operating units being mounted directly on the framework of the body.

The main condensers are located in the front of the bus

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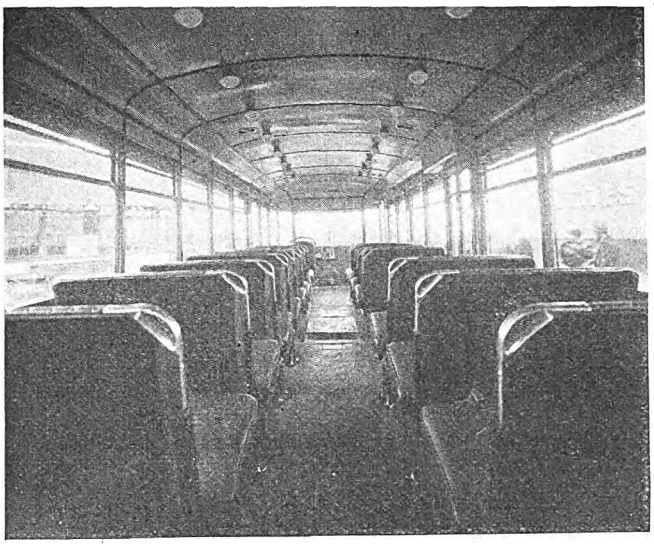
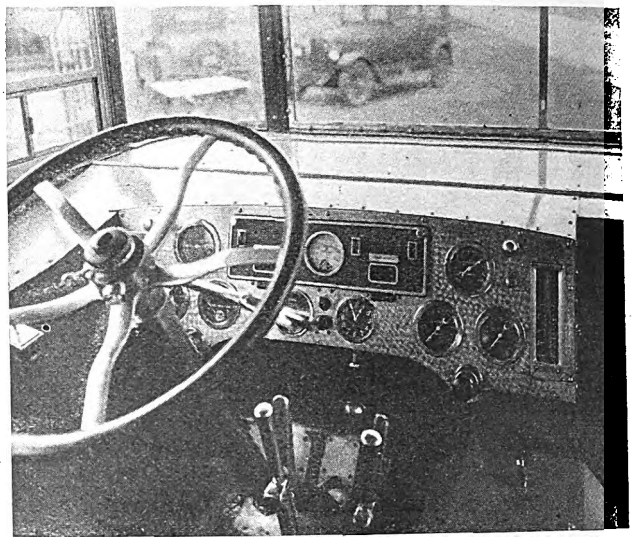
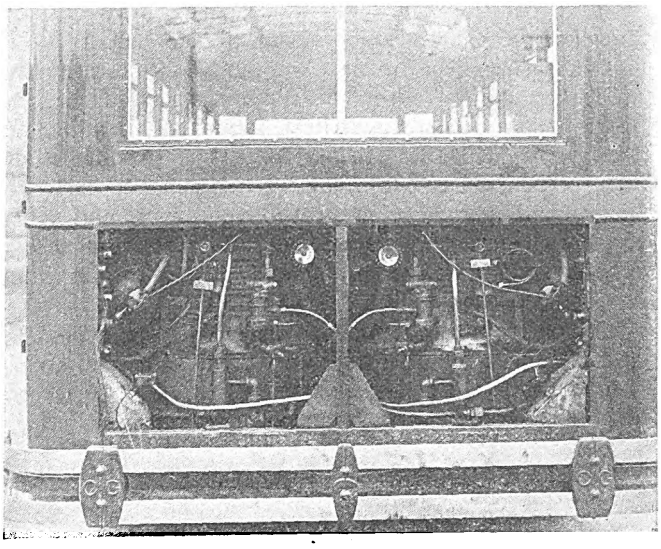


Comfortable seating is provided for 40 passengers, exclusive of the driver

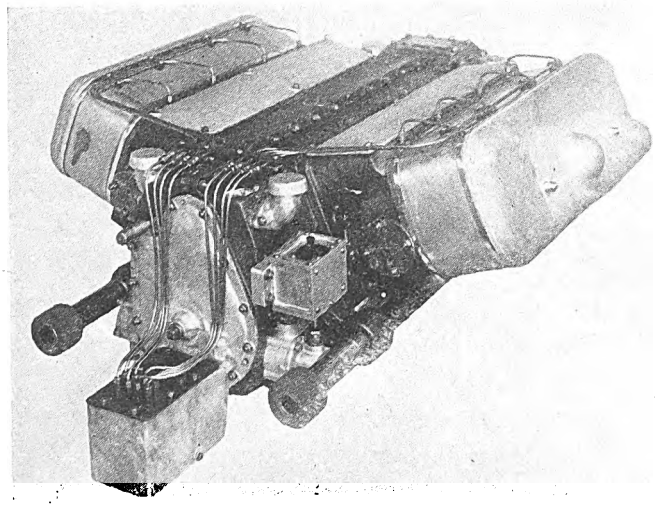


The instrument panel is conveniently arranged within reach of the driver

They are readily detachable from pits underneath, there being no necessity of working from above. The wheelhousings are part of the body and the framework and carlines extend in one piece from one side of the body frame to the other. This bus is provided with front entrance and center exit, folding-type doors, which are air controlled by the driver.



View with the rear panel removed, showing the position of the two steam generators and electric motors, with their respective distributor heads



The eight-cylinder poppet-valve steam engine is provided with a cylinder lubricator on the front end

Steam is produced in generating units of a new type, located in a compartment in the rear of the vehicle. They burn fuel oil and it is claimed that they are non-explosive. The bus is driven by an eight-cylinder reciprocating steam engine of the poppet-valve type, which is located beneath the floor near the center of the vehicle. The rear axles are driven through twin worm gears, without interposition of a clutch or change gears.

A small auxiliary steam engine provides power for the operation of the electric generator, condenser fans and air compressor. The main condensers are located at the front of the coach body, with auxiliary condensers placed in the roof. All of the operating units are installed below the floor level and are designed for quick service replacement.

The Automotive Syndicate, Ltd., is purely a pre-production organization, the purpose of which was to design and build a pre-manufacturing model of the motor bus powered by steam, using a patented steaming system developed over a period of several years of experimental and research work. This pre-manufacturing model has been completed, but details of the future manufacturing program and a technical description of the various mechanical units employed are not yet ready for release.

Expanding Services on North Shore Line

ADDITION of three new limited trains operating daily between Chicago and Milwaukee, two Chicago-Waukegan expresses and one local from Waukegan to Chicago are features of the new operating schedule of the Chicago, North Shore & Milwaukee Railroad which became effective on Jan. 20. This new service is largely for the convenience of persons wishing to reach their destination quickly at a late hour, such as theater-goers of persons attending meetings. The additional trains make a total of 45 limiteds operated by the North Shore Line daily between Chicago and Milwaukee, making stops also at Racine, Kenosha, Zion, Waukegan, North Chicago Junction and Niles Center. Between Chicago and Waukegan, 81 trains are operated daily, while the limiteds make a total of 122 trains serving Waukegan residents daily.

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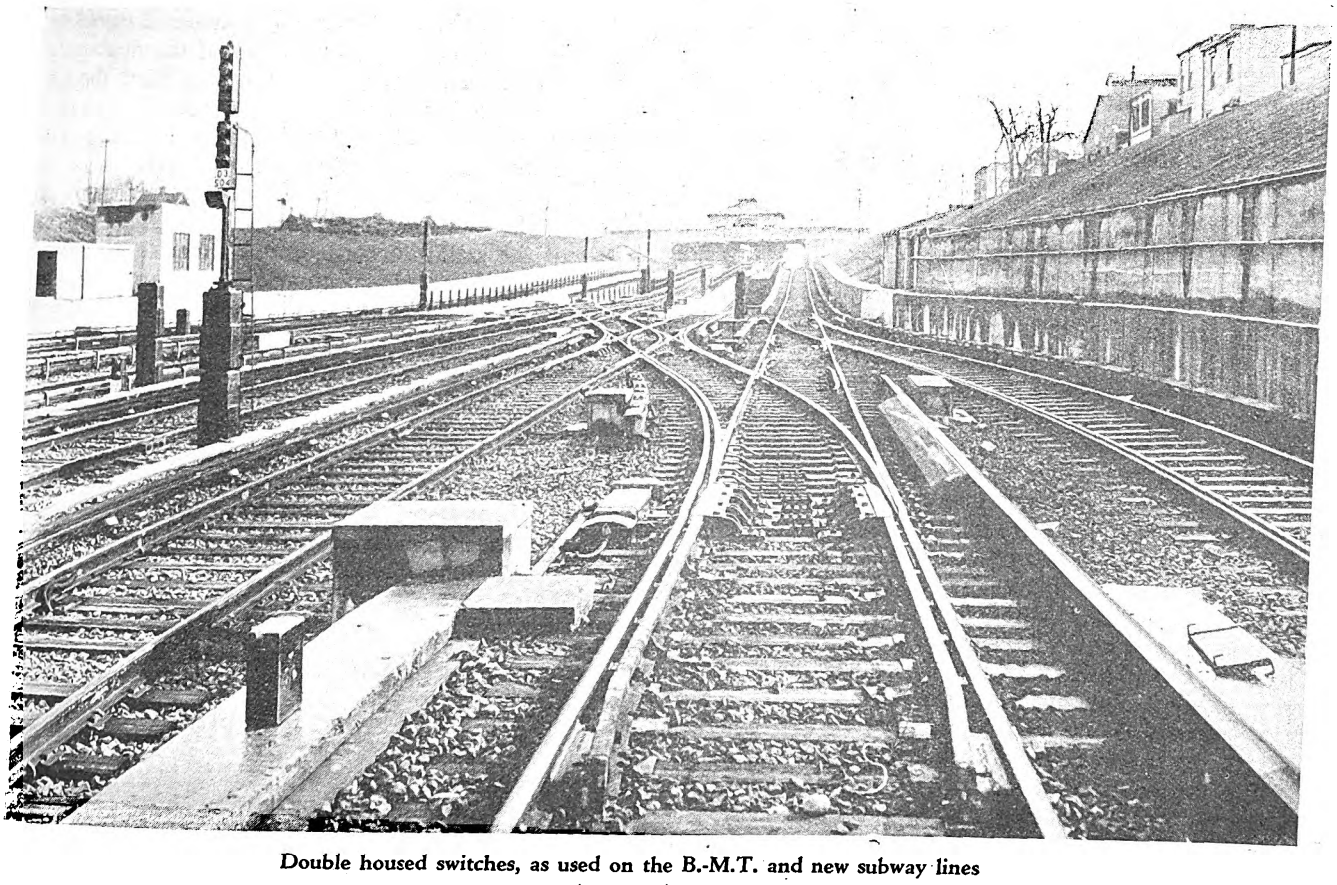
TRACK MATERIALS

Specially Designed for New York City Subways

By Robert H. Jacobs
Division Engineer
Board of Transportation, New York



Double housed switches, as used on the B.-M.T. and new subway lines

High carbon rails are used on tangent track, with manganese rail for parts of special work. Most convenient length for handling found to be 33 ft. Accurate manufacture of screw spikes essential. A 150-lb. section is used for third rail.

DUE to the large number of sharp curves on the lines of the new city-built subways in New York, it has been necessary to provide a large amount of guarded construction. This condition has made it necessary for us to provide many special parts to meet the unusual requirements encountered in this situation. The solution of the problems presented has many points of interest.

When the track standards for the existing dual system of subways operated in New York by the I.R.T. and the B.-M.T. were determined upon, the 100-lb. section had already been adopted for the existing subway. At that time the A.R.A.-B rail section was becoming very popular, and while the Interborough was inclined to favor the extension of the use of the modified A.S.C.E. section for the new lines, the representatives of the city and the B.-M.T. favored the new section. After considerable discussion the latter was adopted. The outstanding differences between the two sections are less slope of the head and a narrower and thicker base for the A.R.A.-B rail. While a somewhat lighter rail would, of course, carry the traffic satisfactorily, the use of a larger section is amply justified by the saving in maintenance and renewals.

On account of special conditions, a higher carbon rail than ordinarily used on steam railroads has been found to

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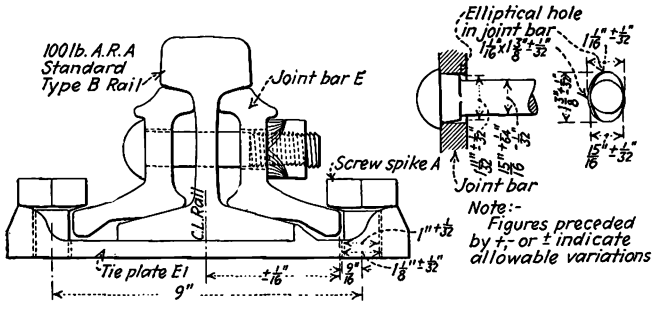
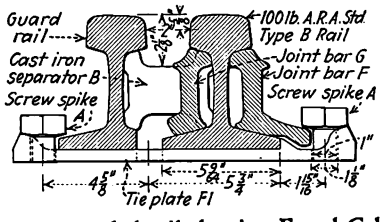


Joints at unguarded rail showing B bars



Joints at guarded rail showing F and G bars

be practicable. Our specifications call for a carbon content of 0.73 per cent to 0.86 per cent, instead of 0.62 to 0.77 per cent commonly used on steam railroads for this weight of rail. These harder rails, of course, give us longer service.

In general, rolled manganese rail was used on tracks for the dual system on curves of 700 ft. radius and under. The initial purchase of manganese rail for the greater part of the tracks of the dual system was made at a price of about $85 a ton. Since that time the rail has practically doubled in price, whereas the increase in price of the open-hearth rail has been only about 43 per cent. Records of the service on our lines of manganese rail and of high carbon open-hearth rail are not very consistent. Without any question the manganese rail has a much longer life under traffic than open-hearth rail, but it is liable to corrugation. It also has a considerable disadvantage due to the impracticability of cutting and drilling this rail in the field. This affects both original installation and renewals, as well as bonding. On account of these considerations, including its high price, there is a tendency to limit its use. Our standards for the new city subways do not call for the use of manganese rail except for parts of special work most subject to wear.

We are continuing the use of 33-ft. rails, although longer rails are now being used by many railroads. While a reduction in the number of joints is desirable, our determination was based on the difficulties of handling rails longer than 33 ft. in the restricted space in the subway.

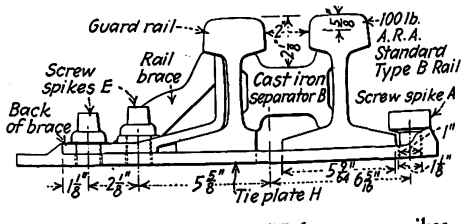
The joint bars adopted for the new city subways are similar to those now in use by the operating companies. The "head free" feature providing contact at the top of this bar with the web, instead of supporting the head of the rail near its outer edge, is interesting. Two advantages claimed for this bar are, first, that the joint assumes its final position when applied, assuring the maintenance of perfect alignment through the joint from the time of first application, and second, that the so-called "anvil action" of the wheels on the joints is eliminated, because the underside of the railhead is left entirely free, permitting the railhead to act at the joints the same as throughout other parts of the rail. Another advantage claimed for this "head free" feature is that metal may be omitted from the under faces of the railhead, where it is of no use, and an equivalent amount of metal added to the top of the head, thereby increasing the life of the rail.

The standard "E" bar with alternate round and oval holes is used for all joints except those on the low side of guarded curves and in special work. On guarded curves a so-called "G" bar is used between the running rail and the guard rail. This bar is identical with the standard "E" bar, except that the lower flange is omitted, due to the limited space in which it is to be placed. These bars have round holes only. Bars of standard section are provided with oval holes only for use on the outside of the guard rail, and of the running rail on the low side of curves. The use of bars with all round holes or all oval holes on the low side of guarded curves is due to the necessity of placing the track bolts with their heads on the outside of the rails to facilitate removal.

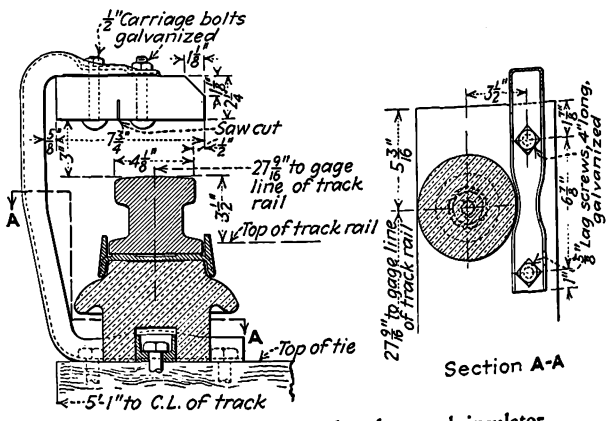
Welding of rails as an alternative to the use of splice bars has received some consideration, but has not been adopted, largely due to the difficulties of making renewals under traffic.

Contrary to the usual railroad practice, a special type of bolt was adopted for the tracks of the dual system. This bolt has a round neck and a large head, the latter being flattened on two sides so as to fit under a rib at the top of the splice bar in order to prevent turning. This made it possible in the dual system to use splice bars with round holes only. On tangent track and unguarded curves the bolts are placed with the heads on alternate sides of the rail, in accordance with the general practice. As previously stated, on guarded curves it is necessary, in order to be able to back out the bolts, to place all the nuts between the guard rail and the running rail. It was found, after years of use, that this type of bolt, in spite of its advantages, had disadvantages which have led us to abandon it and adopt an oval-neck track bolt with a ratchet or Harvey Grip thread, notwithstanding the fact that it has required the furnishing of bars with special punching for use in guarded construction.

Tie plates for ballasted track are designed for use with cut spikes. The standard "A" plates for use on tangent track and unguarded rails on curves present no special features, but correspond to those in general use. However, special plates are required for use at joints, in



Separator and tie plate H for screw spikes



150-lb. third rail with bracket and insulator

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guarded construction and in special work. A careful study of manufacturing tolerances was required in order to determine the proper dimensions of the special plates. Tie plates for concreted track are designed for use with screw spikes and require bosses for the support of the screw spike heads in a position to allow a $\frac{1}{16}$-in. space between the bottom of the head and the flange of the rail.

It was the early practice on some other railroads to turn down the screw spikes tight on the rail, but this resulted in a movement of the spike in the tie affecting the serviceability of the construction. The $\frac{1}{16}$-in. space between the head of the screw spike and the flange of the rail has overcome this difficulty.

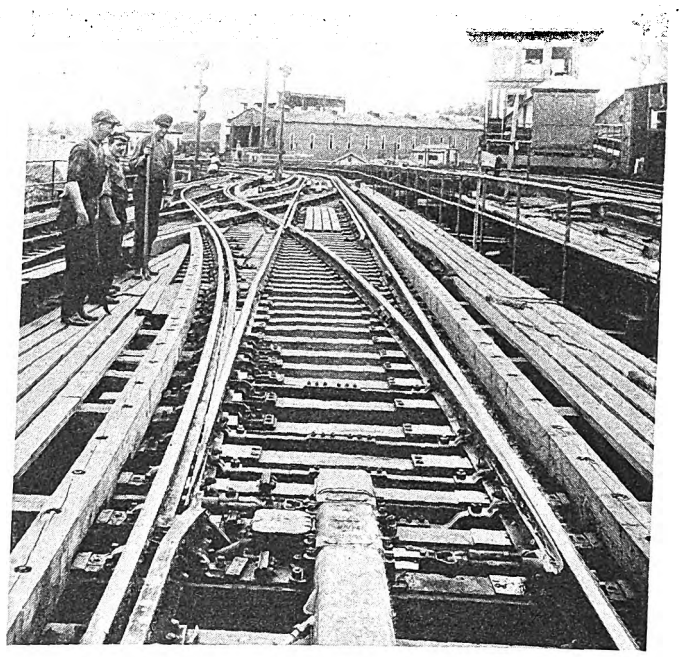
Only two types of screw spikes are used in our work. Screw spike "A" is the standard track spike for concrete track, while screw spike "E" is used principally for rail braces in curved track and in special work. The accuracy of the manufacture of the screw spike is of the greatest importance; first, in order that the space between the head of the screw spike and the flange of the rail may be maintained, and second, that the groove formed in the wood of the tie block with the first thread of the screw may be followed by the remaining threads in such a way as not to injure the fiber of the wood. In replacing screw spikes, the groove in the wood should be followed by the threads of the new spike. These conditions are not met in the so-called "commercial" screw spikes.

Service requirements necessitate a substantial form of guarded construction consisting of rail braces on the outside of the high rail, and rail braces on the inside of the guarded rail on the low side. Guard rails are secured to the running rails by bolts passing through separators, separators being needed to provide the necessary flangeway. Although the separator bolts have been placed at frequent intervals, there has been a large amount of breakage under traffic. Several special designs have been developed to obviate this difficulty, but to date none has been tested on our rapid transit lines. The operating companies have been experimenting with the use of guard rail clamps similar to those commonly used opposite frogs on steam railroads. However, these are expensive and clumsy and not well suited for use on concreted track, as they require the omission of a large amount of concrete between the tie blocks.

In our new design we are seeking to minimize this difficulty by providing bolts manufactured to a special specification which will have greater elasticity and will be less liable to breakage. We are also modifying the design of the separator, providing a larger hole for the bolt, and have adopted a headlock washer which has shown good results.

Rail creepage has in the past been the cause of a great deal of difficulty in maintaining tracks, and the use of anti-creepers to overcome this trouble has been the development of comparatively recent years. On the first subways no anti-creepers were used, but when work was started on the tracks for the dual system three anti-creepers to the rail length of 33 ft. were adopted as standard. Under actual operating conditions, this number of anti-creepers was found to be insufficient to hold the rail, necessitating a considerable amount of maintenance work which often required bucking of rail for a long distance. As the result of this experience, for the last few years we have used five anti-creepers to the rail length, which has proved satisfactory. In general, experience indicates that rail creepage occurs in the direction of traffic, more or less regardless of grades. Determinations in this matter are the result of intensive surveys which we have made of tracks under operation.

On account of the high cost and great difficulties involved in making renewals it has been the uniform practice to provide ties manufactured from a very high class of material. For the ballasted track, including the special work, our specifications call for first growth, longleaf, Southern yellow pine. No tie is acceptable with less than three heart corners, or with more than 1 in. of sap on the fourth corner or with more than $2\frac{1}{2}$ in. of sap, measured across the face anywhere in the length of the tie. Variations up to $\frac{1}{4}$ in. in width and depth and up to $\frac{1}{2}$ in. in length are accepted. These ties are delivered cut to the correct dimensions. Standard 6x8-in. ties 8 ft. long, and ties 9 ft. long for the support of the third rail, are used, with ties of various lengths as required for special work, which in some cases run up to $27\frac{1}{2}$ ft. in length.



Lapped switches, as used on the Interborough Rapid Transit Line

For the concreted track, as described in an article published in this paper Feb. 2, creosoted timber is used of the same quality as for ballasted track. These ties are furnished to exact dimensions 10 in. wide and 6 in. high, with holes drilled for screw spikes, for anchor bolts where used, and for lag screws used for fastening the third rail insulator cups and brackets. The holes are exactly spaced by templet prior to creosoting.

Long life is expected for these ties, based upon the present condition of similar ties which have been in service for about twelve years. A recent inspection shows little deterioration, and practically no tie cutting or failure in the screw spike holes. Because the ties are protected from extreme weather conditions it may be expected that deterioration from decay will be slow, and on account of the use of practically all heart timber, comparatively light wheel loads and the use of tie plates, there has been practically no deterioration from tie cutting.

On tangent and long radius curves, unused holes in the tie plates make it possible to drill new holes in the tie blocks after the first holes are unserviceable. In the case of sharp radius curves, where due to double spiking and

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other reasons it is impossible to provide spare holes, this cannot be done. However, the use of ties 10 in. wide with tie plates 7½ in. wide renders it possible in future to plug old holes, shift the tie plates, and drill new holes.

Standard frogs and switches are used wherever possible in our special trackwork. However, the many limiting conditions of the alignment necessitate the designing of numerous non-standard layouts. The greater part of our special work is of much sharper curvature than on steam roads and consists of No. 6 and No. 8, with some No. 10 and No. 12 turnouts of radii from 350 ft. to 1,350 ft., whereas in the case of high-speed crossovers on steam railroads the numbers run anywhere from No. 12 to No. 20 and even No. 30, with very few under No. 12. As a result we provide a large amount of guarding through the special work, which is not required ordinarily in steam railroad practice. Our switches are double housed for facing switches and single housed for trailing switches, with guards in front of the housings. Switch points up to a No. 8 are guarded on the turnout side. The wing rails of frogs are extended by guard rails.

For the dual system, lapped switches have been used on the Interborough lines, with guards opposite the extended points, whereas on the Brooklyn-Manhattan lines housed switches have been used. We are following the Brooklyn-Manhattan practice in this regard for the new city subways. The use of the lapped switches for the Interborough lines was based on the contention that the rolling stock is so designed that with extreme rail and wheel wear the equipment on the under side of their cars would not clear the housing, which extends ¾ in. above the top of new rail. Our new cars are similar to the Brooklyn-Manhattan Transit cars in having clearance between the equipment and the rail.

Rail built-up frogs are standard for our work. After years of service these frogs have proved entirely satisfactory and are particularly advantageous from the point of view of repairs under service. We have in a few instances installed solid cast manganese frogs. These have been in track for three years and are being watched in service. However, they are open to the objection of difficulty in repairs under operation in case of breakage.

The advantage of the use of housed switches, especially for subway tracks, consists principally of more guarding at the extreme points of the switches. In this form of construction there is an offset in the stock rail, which makes it possible to thicken up the switch point, thereby adding to its stability and life.

Rolled manganese rail is used in special work for parts that are subjected to hard service, especially frogs for main line. Where it is necessary to provide for very frequent train movements, switch points and curved lead rails of rolled manganese are also provided.

For the dual system the third rail, bonding and insulated joints, as well as signal interlocking, etc., were installed by the operating companies as equipment, while for the new city subway all this work is being done by the city. The installation of the third rail, bonding of the third rail and installation of the insulated joints and of conduits in the trackways are all included in the track contracts. The track contractor's equipment for handling materials is suitable and available for handling the third rail, and the work can be carried on to advantage by him in connection with his track work. The necessity of providing for positive and negative cables, lighting, escalators and circuit breaker connections require that a large number of conduits be placed in the trackways. These conduits must, of course, all be placed in advance of the concreting. Delays and interference are reduced to a minimum, due to having all of this work executed by one contractor.

In general, the standard section of the third rail is 150 lb. per yard of special section, with the third rail protection boards supported by brackets from the tie blocks extended for that purpose. The insulated joints are installed in the tracks at the time of track-laying.

Readers' Forum

Executives Should Show Greater Interest in Young Employees

BOARD OF SUPERVISING ENGINEERS
CHICAGO TRACTION
CHICAGO, ILL., Jan. 30, 1929.

To the Editor:

In the Jan. 26 issue of ELECTRIC RAILWAY JOURNAL appeared an editorial entitled "Wanted—Young Blood." The argument there presented will apply to young men just starting in the electric railway business, whether in engineering or other departments. The statement is made that the industry has failed to raise men of the type desired. This condition seems unnecessary and inexcusable. The young man needs first, more than anything else, a little kindly consideration from some one well up the scale in authority. If interested in the railway business he is willing to work in any department to obtain necessary experience. Naturally, however, he wishes to feel that he is being observed and that if his work is satisfactory he will be guided into that department where he can make the best use of his ability and be most valuable to the company.

It is all very well to say that ability will bring the man to the front in spite of adverse conditions, but granting this, it is sometimes a long and discouraging route, tending to dull the keen enthusiasm and interest of the young man in his work. Personal interest in the work of the young man need not be wholly an unselfish attitude on the part of the company executives, because the enthusiasm and loyalty of youth may be capitalized for the benefit of the company as well as to the advantage of the man. Failure to make efficient use of the personnel of an organization is more important and far-reaching than a failure to use properly the material assets of the company.

Consideration of the young man will not in any way lessen his obligations to perform his full service to the company. The right kind of man does not want undeserved consideration to be shown him but does crave opportunity to do an advancing grade of work and to secure increasing compensation.

Another point touched upon in your editorial is the resistance to receiving suggestions from a younger or subordinate employee. No doubt those of us who are older have received many suggestions from our assistants, some usable, some not. But in any case a suggestion should be made welcome and initiative should not be stiffled by overriding or ignoring ideas by mere weight of authority. After all the relation of employer and employee, especially the younger inexperienced ones, should be largely governed by the Golden Rule. This rule is frequently strained to the breaking point, but in the main it is a good guide. RALPH H. RICE,

Principal Assistant Engineer.

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Midwest Railway Men Discuss Fares and Claims

Executives attending meeting at St. Joseph, Mo., protest against tendency to deny the industry compensatory rates

THAT electric railways are entitled to a just and reasonable compensation for service rendered, based upon its cost plus a fair return to the investors, was the sense of a resolution adopted by the Midwest Electric Railway Association, meeting at St. Joseph, Mo., on Feb. 7-8. The delegates listened to a number of addresses wherein the speakers pointed out the discrepancy between present fares and the cost of producing the service, and the failure of the general public to appreciate the fact that this was having a serious effect upon credit and service, and the resolution was presented in the hope of securing recognition of this situation.

President F. G. Buffe of the association, calling the opening session to order on Thursday morning, introduced J. N. Shannahan, president Omaha & Council Bluffs Street Railway and chairman of the Advisory Council A.E.R.A. Mr. Shannahan said: "Given time, the pendulum swings both ways. I am just as well convinced the electric railway has a future as that I am standing before you. That future depends, of course, on the capability, tact and executive ability of our managements. The success or failure of the enterprise, whether it be hotel, bank, store or electric railway, depends on the personality of that individual."

The electric railway industry must learn that the value of an article is not based on its cost of production, but on what the public is willing to pay for it, declared Walter Jackson, fare and motor bus consultant, Mount Vernon, N. Y. "If we analyze our market," he continued, "we will find that our case is far from hopeless. Let us appreciate that we must not and cannot rest upon any assumed necessity for mass transportation. The fact that the community will suffer if we depart is about as convincing to the average public as the ant's warning to the grasshopper to save up supplies for the winter. To those who live within reasonable reach of our facilities, any handicap of waiting time should be offset by a manifest, not an asserted, economy. We are not going to get anywhere with our desire for more business and a better load factor until we appreciate that even the casual rider needs some incentive to use the street car." The chief incentive, in Mr. Jackson's opinion, is the combination of short-haul fares and short headways.

In our larger urban centers, according to William B. Bennett, director of research St. Louis Public Service Company, the street railway remains the only effective agency for the handling of real mass transportation. Even in cities where subways and elevated railroads are necessary and imminent, the surface railways will continue of increasing indispensability as feeders to bring people to the rapid transit arteries, in short-haul service, and in carrying people between points not conveniently connected by rapid transit lines.

"From the very beginning of skyrocketing of prices of all other commodities, the price of urban street railway transportation has lagged lamentably," continued Mr. Bennett. True, many companies foresaw the rapid upward trend in operating costs and made application to properly constituted authorities for relief, only to be caught in the slow grind of the law. But rare were the cases where even the demanded increases in fare were commensurate with the increased costs already experienced.

Nothing is quite so obvious, declared Robert B. Campbell, president and general manager Arkansas Valley Interurban Railway, as the futility of a fixed standard of service requirements or the prices to be charged for the service. While some may hold the opinion that the decrease in interurban passenger receipts has been due to the gradual increase in fares, Mr. Campbell disagrees, charging the decline almost entirely to the use of the privately owned automobile, aggravated in some cases by the bus. Declining passenger revenues was likewise the subject for observations by Robert P. Woods, president Kansas City, Clay County & St. Joseph Railway, who agreed substantially with Mr. Campbell. Mr. Woods emphasized the need for giving thought to both quantity and quality of interurban service, including character of equipment, time of operation and speed.

Discussing the factors involved in securing public good will and employee co-operation, C. D. Porter, vice-president and general manager Omaha & Council Bluffs Street Railway, in a paper which in his absence was read by F. S. Welty, assistant general manager, reviewed some of the difficulties which in December, 1927, confronted the new management in Omaha. An expiring franchise, a maturing bond issue with no means of refinancing, and a public relations dilemma have been succeeded in fourteen months of concentrated rebuilding by a new 30-year franchise voted by the outstanding majority of four to one, an extended bond maturity date, and a manifestly "friendly" public.

Development in city and interurban equipment was the subject of a paper by Charles O. Birney, superintendent of car construction Stone & Webster, Inc. "Our next ten cars to be built will in all probability be equipped with dynamic brake equipment or propeller shaft air brake with automatic release in connection with an internal expansion brake. While street railway officials actually purchase the passenger equipment," continued Mr. Birney, "the ride, which is the most important item, is purchased by the individual and it is his or her taste and convenience that must be considered."

The joint session on Friday morning with the Midwest Claim Agents Association was featured by two papers on the legal aspects of electric railway operation. Both H. S. Robertson, president Denver Tramway, and H. C. White, district claims attorney Illinois Terminal Railroad, stressed the desirability of close co-operation between legal and operating departments of a railway company. Both agreed that there are certain types of accidents in connection with which transportation department officials should understand the applicable legal principles, if for no other reason than to be able to explain to the individuals involved the reasons an adjustment was made.

Two roundtable luncheons Thursday noon provided both city and interurban operators an opportunity to exchange information concerning their common problems. Robert P. Woods presided over the interurban group; Charles A. Semrod, vice-president and general manager St. Joseph Railway, Light, Heat & Power Company, guided the street railway section.

The banquet speaker was Earl W. Hodges, director of personal relations Henry L. Doherty & Company. St. Louis was selected for the June meeting.

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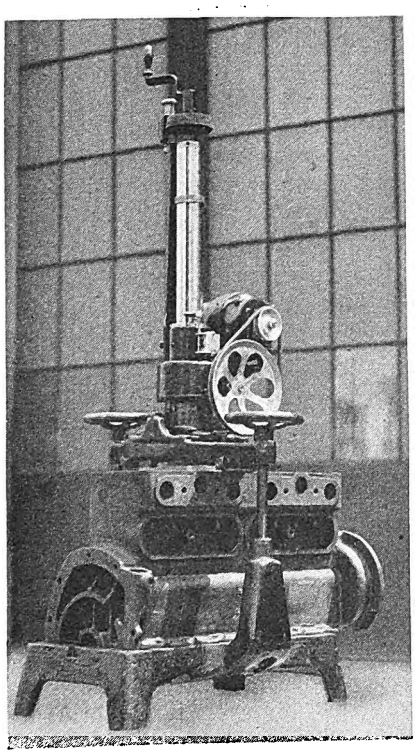
PRACTICAL IDEAS for the Mainten

New Cylinder Boring Machine Pays for Itself in Ten Months*

By C. B. Hall
Chief Clerk Mechanical Department
Virginia Electric & Power Company,
Norfolk, Va.

GRATIFYING economies have resulted at the Norfolk shop of the Virginia Electric & Power Company, from the use of a new cylinder boring machine from the Storm



New cylinder boring machine in operation in the shops of the Virginia Electric & Power Company

Manufacturing Company, Inc., Minneapolis, Minn. Prior to the installation of this machine, work of reconditioning bus and engine cylinders was given to outside contractors. The cost of this work averaged from $30 to $45 per job. This work is now being done with the new equipment at a saving of $7 per job, and with the amount of work now necessary the cost of the machine will be saved in less than ten months.

The accompanying illustration shows the machine set up for reboring the cylinders. Following this boring process a special hone outfit is used. The average time consumed for a first class job is nine hours, four hours of this being for the boring, and five hours for dressing up the cylinders with the hone.

*Submitted in Electric Railway Journal Prize Contest.

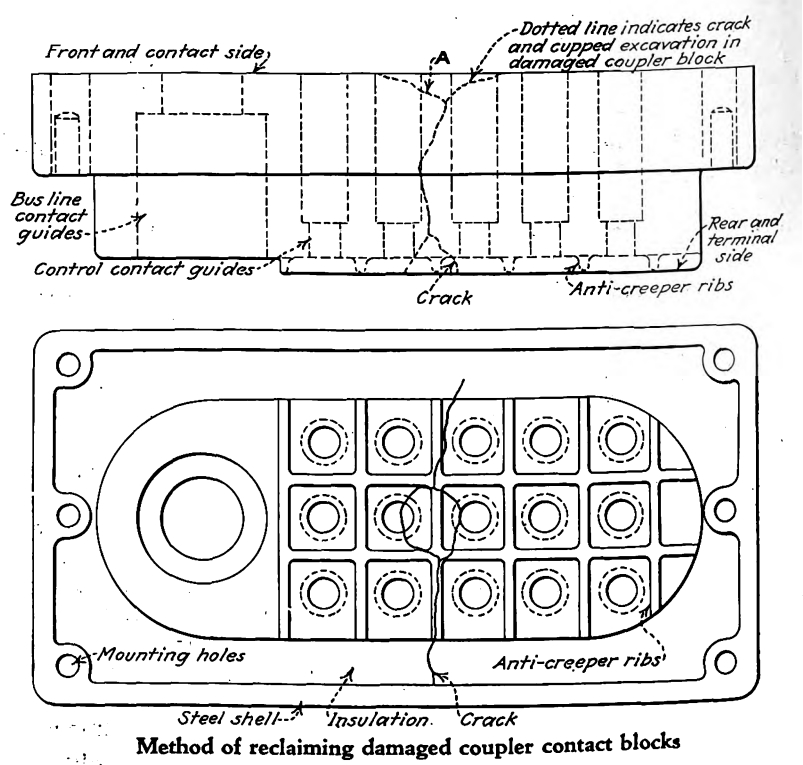
Sulphur Used to Repair Coupler Contact Blocks*

By Charles Herms
General Foreman
San Diego Electric Railway,
San Diego, Cal.

CONTACT blocks, used with Tomlinson automatic couplers on cars of the San Diego Electric Railway, are subjected to considerable damage from collisions with other vehicles and carelessness in making couplings. As a result, the contact blocks, which are made of molded insulation, are often cracked and have parts chipped out. As these blocks are quite expensive to replace, efforts have been made to devise a satisfactory method of repair. One has now been found which works out satisfactorily.

Where pieces of the insulation are chipped out, the surface is scraped out first to remove all loose particles, care being used to leave the surface rough. Hot sulphur is then worked into the hole by using a hot soldering iron. One of approximately 1-lb. weight has been found to work best. It is necessary to work the iron vigorously against the insulation to make sure that the sulphur combines with the insulation. Sulphur is melted off of a large block and ironed into the hole until it is filled. The sulphur cannot be melted in a ladle and then poured into the hole as it will not combine readily with the insulation, and this is an important part of the operation.

In performing the work, it is advisable for the workmen to be under a flue or suction fan as the sulphur fumes are annoying and often dangerous. After the hole has been filled in, the block is heated in an oven to 100 deg. C. and is then dipped in Westinghouse No. 335 varnish. After dipping, the contact blocks are again baked for 24 hours to make certain



Method of reclaiming damaged coupler contact blocks

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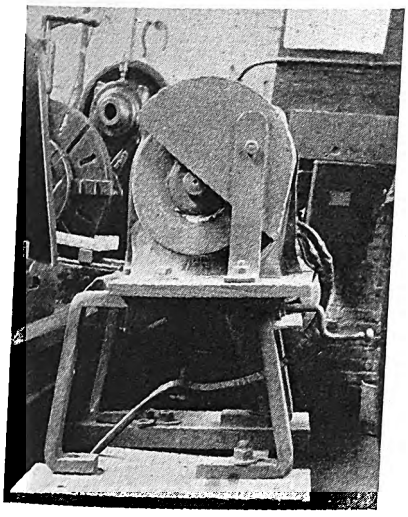
that they are dried out properly. Contacts are cleaned carefully with gasoline to make certain that all varnish is removed. The dipping seals up all cracks and prevents accumulation of moisture. This method of repair has resulted in about 150 per cent saving in the maintenance of these couplers.

Lathe Wheel Grinder

TROUBLE was experienced with the wheel-turning process in the shop of the Richmond Railways, Staten Island, N. Y., due to the fact that very often hard spots were encountered which could not be removed readily with ordinary turning tools. This caused considerable delay and a loss of production. It was



Removal of hard spots from wheels by means of grinding has decreased the cost of wheel turning and increased turning production

finally overcome by the design and construction of the grinding equipment, as shown in the accompanying photograph.

A 12-in. emery wheel is directly-connected to a motor and permanently mounted on an oak plank $\frac{3}{4}$ in. thick, 16 in. wide and 27 in. long. Two 1x2-in. conical brackets 21 in. long at the base and 12 in. wide at the top are bolted to two oak timbers $1\frac{1}{2}$ in. thick by 6 in. wide by 21 in. long and spaced 21-in. centers.

The motor and emery-wheel base are provided with two slots located at 21-in. centers. These slots are $\frac{3}{4}$ in. wide by 7 in. long. The case is bolted to the brackets through these slots. This provides for movement of the emery wheel to and from the wheel being turned. A $\frac{1}{8}$x2-in. angle is riveted across the top front of the two brackets and a $\frac{1}{2}$x4-in. angle is bolted to the under surface of the base.

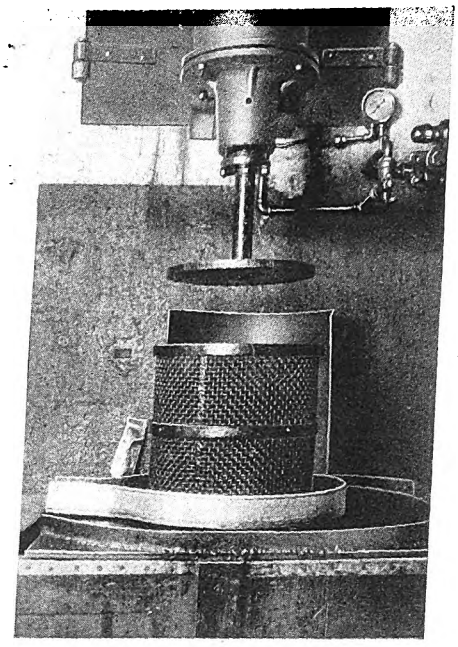
The $\frac{1}{8}$-in. angle is provided with a $\frac{21}{32}$-in. hole and the $\frac{1}{2}$-in. angle with a lever drilled and tapped for a $\frac{5}{8}$-in. screw. A $\frac{5}{8}$-in. screw with an offset handle $15\frac{1}{2}$ in. long over all and with 8 in. of thread is passed through the $\frac{21}{32}$-in. hole and screwed into the tapped hole. Two $\frac{5}{8}$-in. collars fastened to the screw on either side of the $\frac{1}{8}$-in. angle hold the screw in a fixed position.

The equipment is mounted on a platform in back of the lathe in line with the wheel being turned. Longitudinal motion of the emery wheel is obtained by moving the entire outfit, whereas the lateral motion is secured by shifting the wheelbase in the brackets by means of the screw.

Pneumatic Waste Press

SPECIAL equipment to press excess oil out of armature and journal bearing waste after it has been saturated in a temperature-controlled waste tank has been devised in the Clifton Shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y. This equipment consists of the pneumatic press, a wire waste container, an iron tray and a $\frac{1}{2}$-in. flat plate.

The pneumatic press is made up of a 10-in. brake cylinder supported by substantial brackets fastened to the wall. The usual push rod and sleeve is replaced by a stuffing box, together with a solid piston to which is fastened a $\frac{1}{2}$-in. plate, 14 in. in diameter. The brake cylinder is provided with the necessary air piping, gage, safety and operating valves. A wire basket $15\frac{1}{2}$ in. high and 15 in. in diameter is installed directly under the $\frac{1}{2}$-in. piston plate and is made of $\frac{1}{8}$-in. wire, $\frac{3}{8}$-in. mesh, and held in shape by three circular bands made from $\frac{3}{8}$x1-in. material. The basket rests upon a galvanized iron tray made of $\frac{1}{32}$-in. material. It is $2\frac{3}{4}$ in. high, 24 in. in diameter and is provided with a drainage spout 5 in. long. This spout has a 4-in. opening. The basket and tray rest upon a $\frac{1}{2}$x48-in. iron plate supported by the sides of the waste box. A semi-circular shield, 18 in. high and with a radius of $7\frac{1}{2}$ in., installed between the basket and the wall, and a $\frac{3}{8}$x$1\frac{1}{2}$-in. circular metallic strip welded to the $\frac{1}{2}$-in. plate on either side of the tray, prevent the oil from splashing over the wall and the tray overflow from running to the floor.



Press for forcing excess oil from waste

When the basket is filled with the saturated waste and air is applied to the cylinder the piston moves downward so that the piston plate presses the oil from the waste. The oil flows back into the tank through the spout of the tray. The amount of waste prepared at any one time is only sufficient to meet the immediate requirements.

This equipment provides waste with the proper saturation, and no trouble has been experienced with hot bearings from improper saturation since it has been in service, it is reported. The device is easy to operate and saves much time in this phase of the regular maintenance work.

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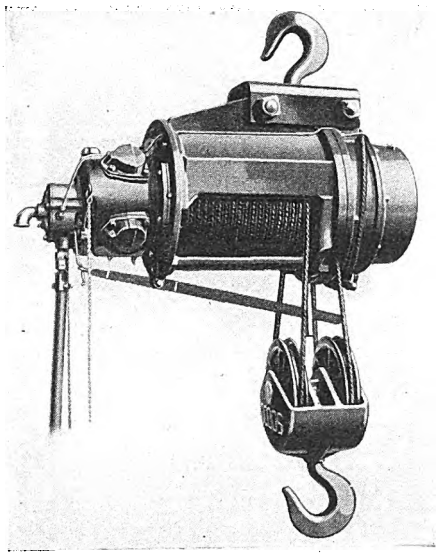
Helpful Equipment from the Manufacturers

Air Motor Hoist of 10-Ton Capacity

FOR handling wheels at lathes and presses in railway shops, and for other heavy lifting work which would ordinarily tie up a crane, a new air motor hoist of 20,000 lb. capacity is now being furnished by the Ingersoll-Rand Company, New York, N. Y.

The hoist construction employs a powerful four-cylinder air motor



New hoist for railway work

geared to a rope drum and all inclosed in a compact and dirtproof housing. The gears are made of special steel and are heat-treated to insure extra strength and wearing quality. They operate in a bath of semi-fluid grease, completely inclosed. Ball bearings or bronze bushings are provided at all points where experience has indicated that they will add to the efficiency and life of the hoist.

An automatic brake, of similar design to that used in other Ingersoll-Rand air hoists, is incorporated in this new size. This safety brake automatically holds the load at any desired position for any length of time, regardless of air pressure. Instant and complete control of the hoist movement is obtained by a graduated throttle and a well-balanced motor. The latter is practically without vibration. The cylinders are renewable and interchangeable, making it easy and inexpensive to renew the cylinders if worn after long service.

The hoist can be furnished with either a top hook or a chain-driven trolley as standard. The company is prepared, if necessary, to build special trolleys to meet customers' requirements.

PRINCIPAL DETAILS OF AIR MOTOR HOIST

Capacity, in pounds	20,000
Maximum lift, feet	16
Diameter of cable, inches	$\frac{11}{16}$
Length of cable, feet	83
Size pipe connection, inches	$\frac{3}{4}$
Weight equipped with top hook, pounds	1,300
Weight equipped with chain-driven trolley, pounds	1,800

Water Tight Motor

A WATER tight motor has been developed for a Western firm by Roth Brothers & Company, Chicago, Ill. It is rated 15 hp., 1,150 r.p.m., 30 min. duty, and is compound wound for direct current. The motor is reversible and is used for hoist duty.

The bracket on the commutator end has four hand hole covers, removal of which permits access to the brushes, brush rigging and commutator. These covers are bolted on and are fitted with rubber gaskets, so that a stream of water can be played on the bracket without danger of any getting into the motor.

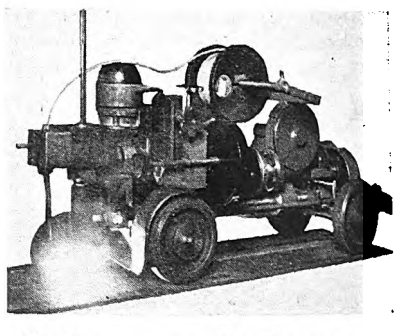
Floodlight Projectors With Improved Features

TWO improved floodlights for lighting railroad yards are announced by the Westinghouse Electric & Manufacturing Company. Both projectors have narrow beams, reflectors and heat-resisting clear lenses. The reflectors are of chromium-plated brass, spun over metal forms, assuring a high degree of accuracy and perfect beam control. The reflector surface, being chromium, is impervious to any form of corrosion or tarnishing and retains its brilliant polish permanently. The projector body is made of cast aluminum and is, therefore, quite light in weight and not subject to corrosion.

The floodlighting projectors have three thumb screws for focusing to a high degree of accuracy. A center screw adjusts the vertical position of the filament, a rear screw the focal distance, and a side screw the lateral position of the filament. All three screws work independently of each other and their adjustment is simple and rapid.

Automatic Tractor-Type Welder

AN AUTOMATIC, tractor-type arc-welder, utilizing the electronic tornado principle and used for making lap and butt welds on large surfaces, has been placed on the market by the Lincoln Electric Company,



Making a seam weld with tractor-type welder

Cleveland, Ohio. It consists of an electronic tornado head mounted on a self propelled four wheel-drive carriage. Power is supplied through a flexible cable and all that is necessary is to line up the machine over the section to be welded and to start the arc. The electrode and fibrous autogenizer are fed automatically as the tractor travels forward.

In making lap welds with this machine no additional filler metal is used. The heat of the carbon arc fuses the edge of the top plate into the lower plate, making a leak-proof joint. A filler strip is laid over the seam to be welded, when a butt weld is desired.

Advantages claimed for this machine are high welding speeds and smooth uniform welds. Speeds on $\frac{1}{4}$-in. lap joints varying from 50 to 75 ft. per hour are obtained.

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News of the Industry

Detroiters Will Vote on Subway Proposal

Voters of Detroit, Mich., will decide on April 1 whether they want the subway system proposed by the Rapid Transit Commission. Decision to this effect follows a City Council meeting when eight of the nine members voted to submit the issue to the electorate.

The plan calls for the construction of one all sub-surface and elevated line running from the Ford motor plant on the River Rouge across the city and terminating at Connors and Mack Avenues. Although a portion of this line would be elevated, through the main section of Detroit all of it would be underground. Downtown loading stations and dips and a short subway for street cars in Woodward Avenue would also be required. This proposed tube system was submitted by the Rapid Transit Commission and the Board of Street Railway Commissioners following six years of study.

Another Step Toward Co-ordination in Grand Rapids

Another step has been taken in the proposed plan of the City Commission of Grand Rapids, Mich., to assist the Grand Rapids Railroad by municipal subsidizing or by grouping of all local common carrier transportation service under the control of the railway. To this end the tentative report of Gerald J. Wagner, municipal consulting engineer, regarding the augmented transportation system, has been accepted by the commission. This action affords the railroad an opportunity to offer plans to enhance its service, obtain larger revenues and reduce private automobile congestion in the downtown or business district.

Traffic Expert for Baltimore

Announcement has been made that a traffic expert of outstanding national repute will be added to the executive staff of the United Railways & Electric Company, Baltimore, Md.

Special Paper for St. Louis Readers

A newspaper of pamphlet size to be read by street car patrons as they ride was launched recently by the St. Louis Public Service Company, St. Louis, Mo. A contest is being conducted to find a suitable name for the new publication, the first prize being $50. In its pages will appear briefly told news of current interest, civic events, stories about places to go and things to see in St. Louis, with occasional announcements of company improvements and changes.

Unexpected Turn in Akron Negotiations

Resolution adopted for competitive bids from outside companies. Company had sought 10-cent fare

COMPETITIVE bids for the city transportation in Akron, Ohio, are to be asked following the adoption of a resolution by the City Council on Feb. 19, instructing the public utility committee of Council to advertise for bids from other companies for the business. The Council appropriated $100 for the utility committee to use in advertising, and in attempting to secure transportation companies of other cities to bid for the franchise.

This action of the Council came somewhat as a surprise as negotiations between the company and the city had been progressing. The company had asked for a 10-cent cash fare, eight tickets for 50 cents, with a 5-cent school ticket and a $1.50 weekly pass. The public utility committee of the Council had made a counter proposition, offering the company an 8-cent cash fare, seven tickets for 50 cents, with a 5-cent school ticket and the $1.50 weekly pass. The company had refused the city's proposal, and the city had asked the company to submit a new one when the matter came up at the Feb. 19 Council meeting.

Following a statement by the president of the Council in which he said that, "we are headed for a deadlock on the traction franchise and as there is no harm in looking ahead to the possibility of being unable to reach an agreement with the Northern Ohio Power & Light Company, and it is entirely proper to ask for bids from other concerns to operate the transportation system in Akron," Council unanimously adopted the resolution providing for the advertising.

One member of the Council talked against the resolution, but voted for it. He declared that in his opinion Akron would not get any outside bids for service. Other members of the Council found flaws in the proposal, saying that they did not want a duplication of the situation which existed five years ago. At that time the company's franchise had expired and the administration attempted to motorize the city. The attempt failed, and the street railway was granted an increase in fare. Following this, a new franchise was written and submitted to a referendum. The franchise gave the company a 50 per cent increase in fare, and was approved by the public by an overwhelming majority. Another member of the Council declared that the thing for the Council to do was to demand that the company continue the present fare for a year and then let the city take over the lines. They could be operated as the water works were operated. However, there was no demand for municipal ownership.

Accident in Hudson River Tube

A rush-hour train, loaded with 900 passengers became stalled in the Hudson Tunnel west of the Christopher Street station in New York City at about 6:10 o'clock on the evening of Feb. 19, due to a roadbed fire and a short circuit.

The office of the general manager of the Hudson & Manhattan Railroad, operating between New York and New Jersey under the Hudson River, issued the following statement:

At 6:15 o'clock a short circuit occurred in the power cable underneath a car on a train bound for Hoboken. The train was 1,000 ft. beyond Christopher Street station, under Morton Street, not under the river. Power was immediately cut off from the third rail and fans were started. The passengers on the train were unloaded and walked back to Christopher Street. There was an exit close by, but it was more convenient to walk to the station.

This was not really a fire. There was a flash and smoke from insulation. The cable was the one which runs back from the motorman's cab. Everything under these trains is steel and there was nothing to catch on fire.

Passengers affected by smoke and needing hospital treatment were removed to such institutions.

The day following the accident the New York Transit Commission issued a statement which read in part:

The train had proceeded about 1,000 ft. south of Christopher Street station at signal No. 142Z, when motorman noticed a fire in the roadbed and intended to pass over this when his brakes went into emergency, bringing the train to a sudden stop with the fifth car No. 455 and the motor truck of car No. 353 directly over the burning roadbed.

The motorman started to go through the train to investigate this emergency stop as he realized that the train was over the burning roadbed, and after resetting the emergency valve, which had been pulled, he proceeded to the head end of the train. By this time power was taken off the third rail due to circuit breakers in the substation kicking out at 6:02 p.m. caused by a short circuit in the power cable under car No. 455 of the above train.

The commission found:

1. A short circuit in the main power junction box under car 455, which probably was the cause of one of the train crew pulling the conductor's emergency cord, realizing that the train was about to enter the river tunnel.

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2. The fire in the roadbed and motorman unable to move the train from the fire due to power being off third rail.

The state body ascribed the probable cause of the short circuit in the junction box of car 455 as possibly due to a loose connection on the connectors, as the interior and half of this metal box were burnt away, thereby destroying any positive evidence. The commission said:

The origin of the fire on the roadbed has not been determined, up to the present writing, but could have been caused by sparks from brakeshoes or a lighted cigarette being discarded to the roadbed. A preliminary inspection showed a number of ties and emergency foot walks burnt on the roadbed over a distance of about 60 ft.

San Francisco Plans for Operation of Cable Line

Tentative plans for the city's operation of the lines of the California Street Cable Railway, San Francisco, Cal., have been submitted to the Board of Supervisors. The franchise expires on Feb. 17, but, according to Supervisor Warren Shannon, chairman of the public utilities committee, negotiations to agree upon a price for taking over the lines have failed to bring results.

Mr. Shannon submitted a resume report of a survey of the cable lines, made by City Engineer M. M. O'Shaughnessy, together with a report on the franchise problem from City Attorney John J. O'Toole, acting under a resolution adopted last fall.

While expressing a hope that the public utilities committee, acting with the city attorney and city engineer, may be able to reach an agreement with the company prior to Feb. 17, when the franchises expire, Mr. Shannon had no suggestions to make as to what arrangement shall be made for the operation of the cable lines after Feb. 17.

Four plans for operation are outlined in Mr. O'Shaughnessy's report. According to the city engineer's estimates, only one gives a chance for avoiding losses in operation. It is estimated that it will give $12,650 annual profit, not allowing for amortization of bonds.

The city's estimates place $604,463 as the price that it can pay for the cable lines. If this is carried out, a bond issue of $499,911, to pay the cost of the new construction and make changes in the power plant at California and Hyde Streets, will be necessary.

The report shows that the replacement cost of the California Street lines would be $2,252,458 with the present depreciated value set at $1,097,404. As the city will not take over all of the company's property, the city's experts place the depreciated value of the property to be taken over at $903,000.

The report was referred to the public utilities committee, which will immediately start negotiations looking to a final agreement with the California Street Cable Railway.

Tax Plan Opposed

Proposal at Seattle to exact levy for benefit of Municipal Railway opposed. Situation reviewed

PROVISION to levy a tax, not exceeding 2½ mills, in 1930 and 1931 for aid of the Municipal Street Railway, Seattle, Wash., is contained in an ordinance, passed unanimously by the City Council for submission to a vote of the people at the municipal election on March 12. The measure has the backing of Mayor Frank Edwards, who said:

Consent of the public to a levy of this kind is what we need to tide the railway department over the next two years, after which the system may begin to enjoy the more permanent but slower benefits from the comprehensive program of betterment submitted by the Transit Research Commission.

Little Improvement in Finances Likely

He pointed out that the finances of the railway will be in worse condition next year than right now, when the bond interest and payments of the railway will reach a still higher peak.

Meanwhile the loan arranged by the City Council from the water department to aid the railway in meeting its $1,100,000 payment of principal and interest, due the Stone & Webster interests on March 1 on purchase bonds, has been under rigorous probe by state examiners. Just here again, J. G. Von Herberg, local theater magnate, who has been battling courts for more than a year to have operating expenses of the municipal railway take precedence over bond payments, has secured a temporary order from Presiding Judge Adam Beeler restraining Harry W. Carroll, city comptroller, and E. L. Terry, city treasurer, from making any payment on railway purchase bonds, principal or interest, until the suit is settled. He charges the City Council with "aiding and abetting" the Puget Sound Power & Light Company by loaning money from other funds to meet these payments.

In an affidavit, Von Herberg declares that the railway had on hand in cash on Jan. 1, 1929, only $264,000 and said that receipts during the month would not be more than $75,000 over and above operating expenses. To meet the crisis, he alleged, the City Council by "subterfuge" and in "secret meetings" loaned $800,000 from the water fund to which $484,000 had first been loaned from the general fund.

Right of City Challenged

State Examiner Leslie Hopkins, who has been investigating the loan transaction, challenges the right of city officials to loan general bond funds, voted for specific purposes, to other projects. He declared that "purchasers of these bonds undoubtedly have a legal right to restrain dispersion of funds raised by the bonds."

The railway still owes the city light department $100,000 from a loan of $600,000 made early last year. The state examiners found that the general bond fund, from which the Council indirectly loaned $484,000 to the railway, was created for the purpose of constructing the Garfield Street Bridge, the new fire department headquarters building at Second Avenue and Main Street, the new fire station in the University District and other municipal projects.

Preferences to Be Determined in Hampton

The Virginia Public Service Company has applied for permission to abandon railway service for one week on its East Hampton line in the city of Hampton and to substitute bus service, with a view to determining which is preferable. Hearing is scheduled for March 2.

Newspapers Tell Louisville Story

In an effort to acquaint the public with some of its problems the Louisville Railway, Louisville, Ky., is running a series of articles or statements in the daily papers, explaining its request for an increased fare rate. The company is asking for a cash fare of 10 cents, with some concession in the way of tokens or tickets.

In the fourth of the series of informatory advertisements, a list of 251 cities is given in which schedules are in effect with a single cash fare of 10 cents, but in which tickets or tokens for less than 10 cents are in effect. Letters favorable and unfavorable are appearing in the local papers.

More Than 80 Per Cent One-Man Service in Providence

Matters have reached a point where the United Electric Railways, Providence, R. I., feels it can no longer delay the institution of the one-man service on the Atwells-Academy Avenue line.

In regard to this line the Board of Aldermen of the city of Providence on Nov. 17, 1927, passed a resolution using language identical with a recent order and in response thereto the company postponed action. Nothing, however, was ever done by the City Council in that case following the postponement of the inauguration of the service.

At the present time United Electric Railways operates 81 per cent one-man cars and all cars in the city of Pawtucket and city of Woonsocket are operated by one man.

The attitude of the company is that operation on these lines disproves the suggestion set forth in the above resolution and it is important to note that four one-way trips are now being operated daily on the Atwells-Academy Avenue line by one man and during the Christmas week, 1928, sixteen one-way trips were operated over this very line by a single operator.

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Boston Program Chances

Financial commentator believes them to be good, but is not over sanguine—Public ownership on installment plan

IN THE opinion of that conservative commentator on events, the Boston News Bureau, the bill reported into the legislature by the special commission appointed to study the Boston Elevated problem has a better chance of passing the legislature than any similar measure previously reported to that body. It would continue public control of the road.

This does not necessarily mean, however, that the measure will pass. Skepticism is found in many quarters. The reason for the optimism over this year's bill is that it is really an artfully drawn compromise measure. It is drawn to win the advocates of return of the road to private management and those who are eager for complete government ownership. In fact, the very artfulness of the measure has caused certain opponents to hint that diplomacy was one of the principal weapons used by its framers.

The bill has been described as a public ownership bill on the installment plan in that after 50 years of operation, as provided for in the measure, seven-eighths of the road belongs to a specially drafted district, which is in reality the state. The state, if it then desires, could purchase the other one-eighth and operate the road under public ownership. Here, indeed, is bait for the public ownership advocates who immediately ask, "Why, if we are given near public ownership, are we not given out-and-out public ownership?" "Because," replies the bill makers, "complete public ownership is too big a bite to bite off for one chew."

Then the advocates of returning the road to private control are given a sop by a provision that eventually a fair-minded purchaser can obtain the road.

Under the proposed measure the Elevated would acquire the Chelsea division of the Eastern Massachusetts. Chelsea and Revere would obtain a 10-cent fare. Naturally those districts, which have long suffered from a double fare to Boston are jubilant and naturally every legislator from Chelsea and Revere is working might and main for the measure and promising his vote.

Under the measure great rapid transit improvements are to be made in the metropolitan district and the cost of these rapid transit improvements is to be met in part by the car rider and in part by the general taxpayer. It would seem that Arlington, Brookline, Hyde Park, etc., would resent being assessed for betterments, not placed directly in their districts. But these districts, which do not benefit directly, are being told that the various sections of Boston must adopt the cry of The Three Musketeers, "all for one, one for all."

In other words, what helps Revere directly, helps Arlington indirectly, and what helps Chelsea directly, helps Brookline indirectly. Apparently, the metropolitan district, as a whole, is accepting this "all for one, one for all" argument, as protests from Arlington and Brookline have been rather feeble.

The other side to the picture shows what difficulties the bill may meet in the House. Incidentally, no difficulties are expected in the Senate. There is a public ownership group in the House. If this group declines to accept this partial public ownership bill, it will hurl its votes against passage. There is also a return to private ownership group, which may employ the same tactics; say little and vote "anti."

Then there is a group of newcomers in the House, about 100 strong, to whom the Elevated question and Elevated finances are about as clear as the bottom of a cider jug. Not the least depressing feature is that most of this latter group take no more interest in Metropolitan Boston transportation problems than they do in transportation problems of Vienna, Paris or Tokyo.

In brief, says the News Bureau, the special commission has really drawn the most generally satisfactory Elevated public control bill yet presented to the legislature. If a few of the die-hards of public ownership and private control will support the measure, it will be enacted into law.

Exonerated in Ohio Accident

Principals in the collision of a Lake Shore Electric interurban car and a Greyhound bus near Bellevue, Ohio, on Jan. 22, in which nineteen lives were lost, have been absolved of criminal responsibility by Coroner C. L. Bell of Norwalk. Ten witnesses, including T. P. Schuyler, motorman of the interurban, and Edward Butler, driver of the bus, appeared at the hearing. The main difference in the testimony of Messrs. Schuyler and Butler concerned the degree of visibility.

Death Is Just Ahead of the Reckless

In the city of Detroit there has been erected a most terrifying reminder to motorists of the price individuals pay who disregard admonitions about being cautious. The accompanying illustration conveys a real idea of the efficacy of the warning. Incidentally, the traffic survey bureau of the Detroit Police Department reported on Jan. 31, 1929, the following record of casualties:

1927

One hundred and ninety-four vehicles hit protected safety zones, killing two people and injuring 263 riding in vehicles. There were 29 drunk drivers involved who killed one person and injured 39.

1928

One hundred and sixty vehicles hit protected safety zones, killing six people and injuring 208. There were 20 drunk drivers involved who injured 27 people.

1927

One hundred and forty-four vehicles ran through unprotected safety zones, killing nine persons and injuring 175. There were five drunk drivers involved who killed two persons and injured four.

1928

Two hundred and twenty-nine vehicles ran through unprotected safety zones, killing ten persons and injuring 268. There were thirteen drunk drivers involved who injured seventeen people.

1927

Eleven vehicles killed two persons and injured thirteen standing in protected safety zones. Drunk drivers not involved.

1928

Nineteen vehicles injured nineteen people standing in protected safety zones. Drunk drivers not involved.

1927

Eighty-nine vehicles struck protected type safety zones but did not injure occupants of vehicles. This involved nine drunk drivers and three drivers who were asleep.

1928

Eighty-nine vehicles struck protected type safety zones but did not injure occupants of vehicles. This involved nine drunk drivers and eight drivers who were asleep.

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Power Needs Being Negotiated by Jersey Roads

It seems assured that the Delaware, Lackawanna & Western Railroad, in carrying out its electrification program, will purchase its current from the Public Service Electric & Gas Company, instead of building its own power plant, which was considered as an alternative. It also is disclosed that ultimate electrification is in prospect for the New York & Long Branch, the shore road, the right-of-way of which is used by the Pennsylvania and the Central Railroad of New Jersey.

According to the Newark *News*, these facts were developed when Thomas N. McCarter, president of Public Service, disclosed a few days ago that negotiations between his company and the Lackawanna for the furnishing of power for the electrification are near completion.

Mr. McCarter also stated negotiations are continuing with the Pennsylvania Railroad for the latter's electrification in New Jersey. In past announcements by the Lackawanna regarding electrification, it was stated, the railroad was undecided whether to buy Public Service current or have its own generating plant. It is understood negotiations with both railroads have been on the basis of a cost plus plan.

Present plans for the Pennsylvania would call for the Public Service to furnish the current for electrification between the Hudson and the Delaware Rivers. Then the current would be furnished by the Philadelphia Electric Company. In Maryland, the Baltimore company would supply the energy to Washington.

Under the tentative plans, the railroad intends to electrify between Philadelphia and Trenton before extending the electrification through New Jersey. The New York & Long Branch Railroad, operated by the Pennsylvania, would be electrified last.

Systematic Planning Proposed for New York City

Edward M. Bassett, city planning expert, recommends the creation of a city planning board with unusual powers to prepare a "master plan" for New York City, to establish change of building zones and to select desirable places for bridges, parks and playgrounds, routes of railroads, buses and ferries and locations of sewers, water conduits and other public utilities.

Can't Afford New Gray Garb in St. Louis

Platform men of the St. Louis Public Service Company, St. Louis, Mo., have announced they will not wear the new gray uniforms the company has asked them to don on Easter Day unless they are granted an increase in pay.

The 1,500 men voted unanimously to reject the uniforms, it is said, as a protest against the delay of the Missouri Public Service Commission in reaching a decision in the wage controversy with the company.

The company has posted bulletins requesting the men to appear in the new uniforms on Easter Day. The uniforms would cost slightly more than $35 compared with a price range of $27 to $35 for the blue serge uniforms now worn. M. J. Douglas, president of the St. Louis Amalgamated, said that under the present wage scale it would work a real hardship on some to compel them to buy new uniforms by March 31.

Hearing on Indianapolis Wage to Be Held

A motion of the Indianapolis Street Railway, Indianapolis, Ind., to have a petition of its employees for increased wages dismissed has been denied by the Indiana Public Service Commission. Hearing on the wage petition will be held later by the commission. Another motion filed by the company seeking to strike out complaints against unnamed company officials was approved.

Cincinnati's City Manager in Charge of Rapid Transit

Colonel Sherrill, City Manager at Cincinnati, Ohio, has assumed formal control of the rapid transit and the Central Parkway, made necessary by the dissolution of the Rapid Transit Commission on Dec. 31.

His first act was to retain all fourteen employees of the commission. The engineer of highways, Frank Shipley, will assume charge of all work necessary to the completion of the rapid transit and the parkway. Work on boulevard lighting, traffic control system and all other utility matters will be under the supervision of Edgar Dow Gilman, director of public utilities. Traffic markers will be under the control of Grover C. Smith, safety secretary, while the beautification of the parkway will be in the hands of the Park Board. The study of all problems relating to the use of the rapid transit will be continued by Mr. Gilman in conference with the City Manager.

Forceful Message Reiterated for Staten Island Riders

The Richmond Railways, Inc., Staten Island, N. Y., has been running as a car "ad" the opinion of the New York *World* on Mr. Whalen's views on transit. This comment appeared in the *World* of Dec. 29, 1928. It has been referred to previously in these pages. Richmond Railways states that it is in full agreement with the *World;* that no transportation medium has yet been devised for surface operation to replace the trolley car in mass transportation.

Another interesting car "ad" entitled "1929 Resolution" gives reason No. 1 for riding on the company's lines, namely: safety, health and comfort.

Freight Stimulating An Iowa Interurban

The protective committee of Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., for first mortgage bondholders, of which E. V. Kane is chairman, has sent a letter to the first mortgage bondholders in which it says:

The results of the operation of the Waterloo, Cedar Falls & Northern Railway for the calendar year 1928 further justify the waiting policy of the protective committee. Gross earnings for 1928 were the largest in the company's history, showing a gain over 1927 of more than 14 per cent, and of more than 35 per cent over those of 1925. The increase was entirely from freight. Passenger traffic, owing to automobile competition, continues to show a loss.

Rapid Transit Between Los Angeles and Glendale

Members of the Chamber of Commerce at Glendale, Cal., were told recently that rapid transit facilities for Glendale will be increased by construction mapped out by the Pacific Electric Railway engineers between Glendale and Los Angeles.

Plans have been completed by Pacific Electric officials and are said now to be awaiting approval of the financial officers of the company in New York. They call for extension of the present railway tunnel, which runs from the Hill street station in Los Angeles to Glendale Boulevard and First Street.

The financing would be by bond issue covering San Fernando valley and the work when finished would be turned over to the railroad. The cost is placed at $10,000,000. Bus lines as feeders of the proposed railway are part of the project.

Another Honor for William E. Wood

William E. Wood, president of the Virginia Electric & Power Company, Richmond, Va., was elected vice-president of the Richmond Chamber of Commerce at the recent annual meeting of that body. Mr. Wood was formerly a member of the board of directors, in which capacity he took an active part in the city welfare. He was recently the chamber's guest of honor at a banquet held to commemorate the railway's achievement in winning the Coffin Award.

Buffalo Railway Man Honored

Walter McCausland, director of public relations for the International Railway and the International Bus Corporation, of Buffalo, N. Y., has been elected a member of the board of directors of the Greater Buffalo Advertising Club. He has been an active member of the club since going to Buffalo from Philadelphia several years ago.

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Enlargement of Commission's Statutory Powers Asked

In its annual report to the Legislature the Public Service Commission of New York asks for a considerable enlargement of its statutory powers. It desires a more clearly defined authority over bus companies and asks that airplanes serving as common carriers be brought within its jurisdiction. It also seeks an extension of its control over utility holding companies, asking that such companies be required to make full and regular reports and that it be empowered to investigate into all relations between them and their affiliated companies, as well as into the profits of non-utility companies from materials or services supplied them by public service corporations. It would have this extension of its jurisdiction apply not only to companies exercising control through stock ownership, but also through leases and operating contracts.

Committee Still Considering Jacksonville Grant

The special committee appointed by Perry Atkins, president of the City Council of Jacksonville, Fla., to report on provisions for a new franchise for the Jacksonville Traction Company is still considering various phases of the proposed new franchise. It will report to the Council only when a definite agreement is reached. It is not expected that the report and recommendations will be ready for adoption by the Council and presentation to the voters of the city by the time of the first primary election on April 16. The committee is considering drafts of proposed franchises for the company submitted by Peter O. Knight, Tampa, general counsel for Stone & Webster, operators of the company, and the Jacksonville citizens committee.

Municipal Ownership Plan Before Minneapolis Committee

The City Council of Minneapolis, Minn., after recently deciding not to contest the fare increase to the Twin City Rapid Transit Company, has now referred to the street car committee of the City Council a proposal that a vote be taken on a plan for municipal ownership at the city election to be held in the spring.

Bill to Control Pedestrian Traffic in Wisconsin

Control of pedestrian traffic at automatic signal corners, the same as the automobiles are now directed, and elimination of all unstable and unsafe vehicles that complicate traffic conditions on highways, will be provided for in a uniform motor vehicle code to be presented to the Legislature of Wisconsin. The revised code is designed by C. N. Mauer, traffic engineer of the state highway commission, and conforms to the new Hoover motor vehicle code adopted in almost a score of states.

Mr. Mauer and S. J. Williams, the head of the public safety division of the National Safety Council, conferred with traffic experts at Milwaukee on Jan. 24, among them W. E. Knoelk, chairman of the Milwaukee safety commission; Dr. B. L. Corbett, secretary; Walter J. Mattison, assistant city attorney; R. H. Pinkley, vice-president of The Milwaukee Electric Railway & Light Company; Capt. Albert J. Murray, head of the police traffic bureau; Assistant-Chief E. F. Hackett of the fire prevention bureau, and Edward Callaway, W. F. Ardern and Howard Ilgner of the safety commission.

Paving Relief Measure Offered in New York

Bearing the name of Senator Warren T. Thayer of Franklin County, chairman of the public service committee of the upper house, a bill designed to relieve street railways of some of their paving charges has been presented to the Legislature with the announcement it would be pressed for passage. The bill provides that a company shall restore only that pavement disturbed by it in the construction, reconstruction or repairs of its tracks to the same condition as before the disturbance. This would relieve a corporation of the duty of repairing pavement disturbed through natural wear and tear and weathering.

Traffic Holding Up in British Columbia

TRAFFIC on the lines of the British Columbia Electric Railway, Vancouver, B. C., has held its own in spite of the rapid increase in automobiles. Contrary to developments in the United States, Canadian street railways in general are showing increases in traffic which are puzzling traffic students. Vancouver, according to the statistics, has more automobiles per capita than the other large cities of Canada, and this condition is raising problems of traffic congestion which must be solved if the public is to be carried swiftly and economically to its destination.

There is no question of the necessity of the street car in the community, yet the minority using automobiles can so impede the progress of street cars as to make their operation difficult at the speed which people now demand. And if people further forsake the street car in favor of the individual vehicle, they join the vicious circle which increases congestion to themselves and others.

From this it will be seen that no longer can the public utility assume that it has no competition.—*Canadian Financial Post.*

Bill Against One-Man Cars

Many measures introduced in Missouri which would affect electric railways. Rapid Transit for St. Louis

FOLLOWING the introduction into the present session of the Missouri Legislature of a bill which would make two-man street car operation compulsory in the state, the public utilities committee of the Chamber of Commerce of Kansas City went on record as approving the one-man car idea. The committee's opinion was that the Kansas City Public Service Company was confronted with enough problems at the present time without requiring it to meet the demands of an order of this kind.

If the directors of the Chamber of Commerce approve the action of the committee, the chamber will probably wage a fight at Jefferson City against the bill.

According to Powell C. Groner, president of the Kansas City Public Service Company, a return to two-men operation would necessitate the employment of about 800 additional operators with a total annual salary of $1,500,000. Alteration costs would be an additional $750,000.

The bill was introduced by William Hicks, a representative from the county in which Kansas City is located. It would affect St. Louis as well, although only a few one-man cars are operated in that city.

About $750,000 was spent in making the changes in Kansas City cars necessary to convert them to one-man operation.

Several bills, intended to clear the way for a rapid transit system in St. Louis, Mo., were presented to the Missouri General Assembly at Jefferson City on Feb. 4. They were prepared by the St. Louis Rapid Transit Survey Commission. One would amend the constitution to permit cities of the first class to issue public utility bonds to finance rapid transit systems on a 50-year term basis instead of the present limit of twenty years.

Another measure is an enabling act authorizing the city to establish, construct, own and operate rapid transit improvement, either subways or elevated lines, to issue bonds to finance such projects and to condemn lands and assess benefits against real property for such improvements.

E. J. Russell, chairman of the City Plan Commission at St. Louis, Mo., and of the St. Louis Rapid Transit Survey Commission; R. F. Kelker of Chicago, consulting engineer for the transit commission; and City Counselor Muench on Feb. 14 recommended to the judiciary committee of the Missouri House of Representatives at Jefferson City the passage of a bill that would sanction for the public utilities in the state, exclusive of telephone companies, indeterminate permits instead of fixed period franchises. It is regarded as more than likely that the committee will report favorably on the measure.

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Experimental Period for Seven-Cent Fares on California Line

Effective Feb. 1, 1929, for an experimental period of six months, the California Railroad Commission authorized the Southern Pacific Company to establish a 7-cent fare between the Broadmoor-Dutton Avenue districts and the business district of Oakland, and a one-way fare of 28 cents to San Francisco. The present fare from and to the Oakland business district is 14 cents, and from and to San Francisco 32 cents.

A reduction of $1.50 in the commutation fares applicable between the East Bay points and Oakland Pier was also authorized.

Illumination for Cars Discussed

All forms of lighting of interest to electric railways are being studied by special rolling stock committee No. 4. This includes cars, buses, shops, and yards. Many interesting developments were discussed at the meeting of the committee held at association headquarters, New York, on Feb. 4. Those present were R. W. Cost, chairman; A. L. Broe, L. T. Colman, A. C. Dick, E. E. Dorting, W. S. Hadaway and H. A. Otis. In reviewing last year's report of the committee, with the idea of incorporating new information this year, there was considerable discussion of what should be considered as adequate illumination of cars. The present tendency appears to be to increase illumination over what was considered necessary a few years ago.

In discussing the illumination of signs for cars and buses, it developed that the width of letters in relation to their height, and the spacing of letters, played a very important part in the legibility of the signs. Also, where lights are placed too close to the sign a spotty effect makes reading difficult.

In discussing headlights for cars, it was considered desirable to floodlight the ends of cars. The newly developed headlight which provides for this will be considered by the committee. Proposed recommendations for motor coach lighting were discussed.

Ideal Equipment an Object of Sub-committee's Program

Believing that revenue rather than maintenance should be the governing factor in the design of new rolling stock, and that the operating man, rather than the master mechanic, should have the first word in the matter of car design, if the comfort and the convenience of the passenger are to receive the consideration to which he is entitled, a subcommittee of the committee on "The Equipment," meeting at association headquarters, New York City, on Feb. 14, decided to plan its program with these ends in view. At the outset the committee will recognize the following general tendencies:

1. Higher speeds, acceleration and deceleration, and free running speeds are necessary, and any recommendations made will conform to this principle.
2. Economic necessity indicates a trend toward one-man operation with single-end control.
3. Greater comfort and cenvenience for the passenger, as well as greater comfort and convenience for the operator, must be held uppermost in any recommendations.
4. There is a need for more than one class, quality and price of service.

The scope of the committee will include the layout of an ideal city-type car and bus, considering appearance, comfort and convenience, and the investigation proposes to subdivide the subject further into consideration of the exterior appearance, the interior appearance, fixtures and fittings, signs, and matters having to do with acceleration, deceleration and noise reduction.

The meeting in New York was attended by W. T. Rossell, chairman, Adrian Hughes, George Frey, J. F. Craig, J. C. Thirlwall, A. R. Barclay representing L. H. Palmer, R. J. Bennett, C. H. Strong and J. W. Welch.

COMING MEETINGS OF *Electric Railway and Allied Associations*

March 1—**Metropolitan Section, American Electric Railway Association, 33 W. 39th St., New York, N. Y.**

March 12-14—**Oklahoma Utilities Association, annual meeting, Oklahoma City, Okla.**

March 14-15—**Illinois Electric Railway Association, Hotel Abraham Lincoln, Springfield, Ill.**

May 1-3—**Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

May 13-15—**National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

May 15—**Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.**

June 5-7—**Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

June 21-22—**New York Electric Railway Association, Bluff Point, N. Y.**

June 27-28—**Central Electric Railway Association, Michigan City, Ind.**

Aug. 15-16—**Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Foreign News

New Tramway Under Construction in Italy

Construction of an electric tramway from Marina di Pisa to Pisa, Italy, was authorized recently by the Italian government. This line will connect with a tram line now under construction which is to extend from Leghorn to Marina di Pisa. Pisa and Leghorn will be within one-half hour by tram when the line is completed. It is expected that the undertaking will greatly increase the traffic between the two cities.

Argentine Company Passes to American & Foreign Power

The American & Foreign Power Company, a subsidiary of the Electric Bond & Share Company, has made its entry into the public utility industry of Argentina through an agreement just concluded with the Atlas Light & Power Company, Ltd., of England, for the purchase of all that company's holdings in electric supply and electric railways operating in Argentina. The purchase price of £8,500,000, or $42,500,000, is payable by instalments in cash, according to the reports, and, in addition, the sum of £850,000, or $4,250,000, has been paid as a deposit to cover the revenue balance. The Atlas company has utility holdings in Uruguay, but its holdings outside of Argentina will be retained.

Proposed Express Tramway in Manchester

Recommendation has been made to the City Council of Manchester, England, by the tramways committee to construct a sleeper-laid tramway track for a service of express tramcars, extending 6 miles from the Manchester Town Hall to the border of Wythenshawe.

New Electric Railway in Spain

Service was installed on a new electric railway in Alicante, Spain, on Aug. 15, 1928. This line extends from the business section of Alicante to the San Blas Ward, a distance of about 2 miles. The ordinary fare from the city to the end of the line is about 3 cents, but for 20 pesetas (about 4 cents) one may travel in the first-class section and enjoy a rattan spring seat instead of a wooden seat. Although Alicante has a population of about 75,000, all street car lines are single track, and in traveling only short distances considerable time is lost by waits at turn-outs.

This, however, is only one of a number of similar Spanish projects. Between the town and railway station at Guadix, Spain, a new electric tramway is approaching completion. Application has been made for a concession to construct an electric tramway in the town of Sanabria, province of Zamora.

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Recent Bus Developments

Commission's Bus Order in Chicago Reversed

In a decision handed down on Feb. 14, Judge Otto Kerner, of the Cook County Circuit Court, reversed the Illinois Commerce Commission's order of last September, denying the Chicago Surface Lines permission to operate feeder buses on the northwest side of Chicago. The decision follows one of several weeks ago, when Judge Kerner declared invalid the commission's order authorizing the Chicago Motor Coach Company to operate its buses in the same territory in which the surface lines had asked permission to establish feeder bus service. Attorneys for the motor coach company announced that they will appeal from Judge Kerner's ruling, and will continue to operate the 34 miles of bus extensions established with the commission's approval on Oct. 3 of last year.

A large number of residents of the northwest side, testifying at the original hearing, had demanded feeder bus service operated by the Chicago Surface Lines to connect with existing street car lines, thus giving the patrons service to the downtown district at a single 7-cent fare. The motor coach concern, on the other hand, had proposed to furnish service at a flat 10-cent rate.

Judge Kerner held valid the original order of the state commission in January, 1928, finding the public convenience and necessity required additional transit facilities in the neighborhoods adjacent to Belmont and Diversey Avenues, and that the most practical way to provide this needed service was by operation of buses as feeders to the street car lines on those two streets as a part of the system of the Chicago Railways.

In his first decision last month, Judge Kerner ruled that the commission had entered its order approving the motor coach company's application without giving due notice of the hearings to the surface lines. In entering an order of this kind, the commission, therefore, had exceeded its authority, he said.

Test Case by Michigan Commission

The Michigan Public Utilities Commission has ordered the United Freight Forwarding Company and the Star Transfer Line, Grand Rapids, to discontinue their motor truck freight service from Grand Rapids to Grand Haven and to Muskegon, cities formerly served by the Grand Rapids, Grand Haven & Muskegon interurban, which abandoned business a year ago. By this move the commission hopes to determine its right to control the highways and traffic of the state of Michigan. The commission regards as a subterfuge the claim of the carriers that they were contract carriers and could operate without a permit.

Expansion Planned in Jamestown

The Jamestown Motor Bus Transportation Company, subsidiary of the Jamestown Street Railway, Jamestown, N. Y., has applied for a certificate of public convenience to operate a line between Jamestown and Frewsburg, a one-way distance of 5½ miles. Service would begin with three buses, maintaining fifteen-minute service during the greater part of the day, with additional vehicles to be placed in operation during the morning and evening rush hours. This is the second extension of facilities of the Jamestown Motor Bus Transportation Company within a few months, a line from Jamestown to Greenhurst having been opened a few weeks ago.

Higher Fare in Massachusetts

An increase in fares on the buses of the Milford, Framingham & Uxbridge Coach Company in Massachusetts has been put into effect. The company operates a line between Framingham and Uxbridge, passing through Milford and Hopedale. When the coach service supplanted the railway on July 3, the fares on the buses were slightly reduced from the trolley rates as the officials of the line believed there would be an increase in riding. Because of lack of patronage, however, an increased rate must be charged between Hopedale and Uxbridge and Milford and Framingham. The same 10-cent rate will exist between Milford and Hopedale, a ride of about 2 miles.

The new fare schedule will be similar to the fare that was charged on the railway, excepting for the Milford-Hopedale zone the rate will be 13 cents or two zones for 25 cents. General Manager Adams says the 25 cents will be charged between Milford and Holliston and 50 cents between Milford and Framingham. The present fare is 20 cents from Milford to Holliston and 40 cents to Framingham. Traveling west the fare is 25 cents between Hopedale and Uxbridge.

The interests that own the Milford, Framingham & Uxbridge Coach Company own the Milford-Hopedale railway. The future of the railway between the company's east Main Street carhouse and the Draper Corporation plant is open to conjecture. Recently the Selectmen of Milford conducted a public hearing on the matter of revoking the location of rails of the railway in Milford. If the railway did not accept the Selectmen's decision within 30 days, it was provided that the matter would go to the state department of public utilities.

Two Miles of Abandoned St. Louis Line to Have Buses

The Missouri Public Service Commission has authorized the St. Louis Public Service Company to abandon its Vandeventer Street car line for a distance of 2.5 miles. A provision stipulated by the commission is that when the tracks are taken up the company must substitute adequate bus service at a rate not to exceed that charged on the street cars and with transfer privileges for passengers to all intersecting railway lines. The city of St. Louis interposed no objection provided buses were substituted.

Service by Bus to Ford's Los Angeles Plant Favored

Operation of a motor coach line by the Pacific Electric Railway between Los Angeles and Wilmington to provide a service for employees of the proposed Ford plant, the Goodyear, Firestone and Samson tire plants and Pan-American Petroleum company's industries has been approved by the Los Angeles Board of Public Utilities. That body decided that, while there is a slight paralleling of transportation systems because the route is near the Pacific Electric's service to Wilmington, there is certain public convenience and necessity to be served. It will recommend to the California Railway Commission that the application be approved, particularly as the territory is growing as an industrial section.

The proposed fare is 35 cents between terminals, 60 cents for the round trip and 5 cents between local points.

Taxi a Menace in Rochester

President James F. Hamilton of the New York State Railways operating in Rochester, Syracuse, Utica and Schenectady declared on Feb. 13 that unless city authorities in Rochester or the Public Service Commission step to the front and put an end to what he says is illegal operation of taxicabs he will go to the courts and apply for an injunction. Mr. Hamilton says the companies are violating the old jitney law which fixed 16½ cents per passenger as the minimum rate which may be charged by taxicabs or other vehicles not operating on a fixed schedule and routes. The taxicab companies deny they are operating as jitneys.

Substitution of Bus Denied in Sacramento

Members of the City Council, Sacramento, Cal., have upheld the contention of the people residing in the territory served by the G and H Street railway line of the Pacific Gas & Electric Company and denied the application of that company for franchises for bus lines, one of which had been planned to replace the electric railway.

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Financial *and* Corporate

Segregation Ahead for Annapolis Line

Nelson, Cook & Company, Baltimore bankers, in discussing the affairs of the Washington, Baltimore & Annapolis Electric Railroad, say it once more becomes feasible to assume that the railroad end of this property will be permitted to pass (not without adequate compensation) into the hands of some consolidated railroad system. That necessarily means full protection for the first mortgage bondholders which will assure them a more stable market position for their bonds. Under this reopened aspect the bankers reiterate the idea of the former theory that the railroads' 5 per cent bonds may eventually be redeemed at the call price, 105 and interest, so that the railway portion of the property may be segregated and separated from the light and power end.

Contral of a majority of the stock of the railroad is lodged with the Consolidated Gas, Electric Light & Power Company, Baltimore. Among the holdings of the railroad is the stock of the Annapolis & Chesapeake Bay Power Company.

Loan of Funds in Seattle Approved

Recent action of the Seattle, Wash., City Council in loaning general obligation bond funds to the city water fund, so that the latter might assist the Seattle Municipal Street Railway in meeting its annual instalment due on the purchase bonds, has been approved in an opinion issued at Olympia by E. W. Anderson, assistant attorney-general. The opinion was rendered to C. W. Clausen, state auditor, as the result of a question as to the legality of the Council's proceedings which was raised by state checkers working at the City Hall. Mr. Anderson sustained Corporation Counsel T. J. L. Kennedy in his advice to the Council that making of temporary loans from one city fund to another would be legal, provided that the "borrowing" fund is solvent. Despite the long series of financial difficulties, city officials declare that the Seattle railway system is still solvent.

Rights for Holders of Engineers Public Service

The Engineers Public Service Company has authorized the sale of about 200,000 shares of additional common stock to its stockholders at $42.50 a share. Common and $5.50 cumulative preferred stockholders will receive rights to subscribe for one new common share for each ten shares held, and convertible preferred stockholders will receive rights to buy one and one-half common shares for each ten shares held. Option warrant holders will receive rights to buy one common share for each twenty warrants held, all rights applicable to holders of record Feb. 14. The proceeds of the issue are to be used for further investment in the company's subsidiaries, thus supplying a part of their 1929 construction requirements.

$108,989 Balance in Grand Rapids

Gross earnings and traffic show decrease. Considerable reconstruction work accomplished. Good results of safety educational methods

DUE largely to unfavorable industrial conditions which affected employment in some of the large factories and to the increasing use of privately owned automobiles, 4.86 per cent fewer revenue passengers were carried by the Grand Rapids Railroad, Grand Rapids, Mich., in 1928 than in the preceding year. This statement was made in the annual report to the stockholders for the year ended Dec. 31, 1928. Gross earnings consequently were adversely affected, but steps taken to effect operating economies resulted in savings which partially offset the decline in earnings. While gross earnings for the year decreased $101,181, gross income decreased only $53,284 due to savings in operation.

No change was made in the rates of fare during 1928, and based upon this schedule, the company was entitled to earn a return of 7¾ per cent on the value of its property, after deduction of operating expenses, taxes and provision for retirement reserve. The company's earnings in 1928, available for such return, were $108,795 less than those allowed by the franchise.

COMPARATIVE STATEMENT GRAND RAPIDS RAILROAD

	1928	1927
Gross earnings:		
Passenger revenue	$1,551,679	$1,627,157
Revenue from special cars	1,012	1,893
Rent of equipment and tracks	18,678	44,375
Non-operating revenue	2,801	1,925
Total	$1,574,170	$1,675,351
Operating expenses and taxes:		
Operating expenses	$957,624	$1,005,642
Taxes	133,617	133,495
Total	$1,091,241	$1,139,138
Gross income	$482,929	$536,213
Interest on funded debt	236,274	
Interest on unfunded debt	4,640	
Total	$240,914	
Net income	$242,014	
Dividends on preferred stock	10,276	
Provision for retirements	122,748	
Balance	$108,989	
		Per Cent
Ratio of operating expenses to gross earnings		60.83
Ratio of operating expenses and taxes to gross earnings		69.32
Revenue passengers carried		17,483,996

During 1928 $179,762 was expended for additions and betterments to the property. This included the reconstruction of double track and the construction of single track, and the remodeling of twelve single-truck, one-man operated cars.

No important changes were made during the year in bus service. Buses are being operated on five different routes in various sections of the city supplementing the car service.

No public financing was done by the company during the year. Capital expenditures were made from earnings and from retirement reserve. The equity of the stockholders was further increased by the retirement through sinking fund obligations of $95,000 in principal amount of first mortgage sinking fund 7 per cent bonds due May 1, 1939. In this connection a total of $412,000 in principal amount of this issue has been retired since the bonds were offered to the public in May, 1924.

The group life insurance plan, started by the company in 1926, was continued during 1928 and on Dec. 31 a total of 370 employees was insured, without cost to them, for $479,200.

In conjunction with other organizations in the city, the Grand Rapids Railroad continued its work in promoting public safety and 1928 was another year of excellent results. Many employees were enrolled in the safety council's classes and in addition, educational material in the shops and carhouses was supplemented with personal instruction by the company's welfare director. Expenditures in connection with injuries and damages were only 0.93 per cent of the gross transportation revenue.

The report goes into some detail on the problem of traffic congestion in certain business sections, and refers at length to the comprehensive report submitted by Gerald J. Wagner, city consulting engineer, to the City Commission. The Grand Rapids Railroad is now making a careful study of this report for the purpose of ascertaining just what it properly can do along the lines of the proposals made.

The accompanying statement covers operations for 1928 and 1927, in which is included figures for the eight months following organization of the present company, and for the first four months of 1927 which cover operation by the preceding company.

Preferred Stock in Settlement of Mill Tax in St. Louis

An ordinance, authorizing the Board of Estimate and Apportionment to sell 16,000 shares of the St. Louis Public Service Company's 7 per cent preferred stock, accepted by the city in settlement of its mill tax claim against the United Railways, was passed on Jan. 25 by the Board of Aldermen. The minimum price fixed for the stock was $80 a share. The Board of Estimate and Apportionment several weeks ago offered all or part of its stock for sale in lots

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of not less than 400 shares, but received only one bid for 400 shares at $83.

Aldermen Eilers and Wimer said the city made a mistake in accepting the stock in lieu of cash, but President Nuen replied that in his opinion the Board of Estimate and Apportionment will eventually realize $500,000 more through the stock than if it had taken the cash offer.

$46,286 Under Tucker Grant

Under the provisions of the Tucker grant the Connecticut Company has sent the city of Hartford, Conn., a check for $46,286, which is 2 per cent of $2,314,317, the gross fares collected during 1928, within the city limits of Hartford. Recently the Tucker grant was under discussion and was taken before the courts, where its validity was upheld by the Supreme Court.

FARES RECEIVED AND TAXES PAID IN HARTFORD

Year	Receipts	Tucker Grant Tax
1923	$2,470,880	$49,417
1924	2,494,614	49,892
1925	2,496,690	49,933
1926	2,509,426	50,188
1927	2,363,303	47,266
1928	2,314,317	46,286

Bus fares not included.

Directors of the Connecticut Company indicated a decrease in receipts from railway fares during 1928. A statement by officials shows that the gross fares in 1928 were approximately $50,000 less than in 1927, making the tax payment under the Tucker grant $1,000 less.

Orleans-Kenner Line Would Discontinue Part of Route

A. B. Paterson, president of the Orleans-Kenner Traction Company, New Orleans, La., declared at a recent hearing before the Public Service Commission that the company needed a revenue of $45,000 per mile a year to operate profitably, and was only receiving $6,000 a mile a year. He proposed that the line be abandoned beyond Orleans Parkway, 3 miles above the protection levee, leaving the traffic between Orleans Parkway and Kenner to the Teche Transfer Company, bus operators.

Mr. Paterson said that a fare of 10 cents would be charged from Orleans Parkway to Carrollton Avenue, with privilege of transfer to cars of the New Orleans Public Service. He promised a basic schedule of twenty minutes, with cars at ten-minute intervals during the rush hours. It was further proposed to allow the Teche Transfer Company to carry passengers between Kenner and Canal Street without picking up fares between Orleans Parkway and Canal Street.

Mr. Paterson stated that the New Orleans Public Service owned $55,000 of the interurban company's bonds, on which no interest had been paid since 1925, and was owed $24,000 additionally on open accounts. The New Orleans Public Service feels that it cannot bear the load any longer.

Mr. Feight said the Teche Company could easily handle all the passengers between Harahan and Kenner by bus. He suggested that his company could maintain an hourly schedule from Kenner into the city between 6 a. m. and 9 a. m., service every two hours up to 4 p. m., and hourly service again from 4 p. m. to 7 p. m. The fare would probably be 30 cents from Kenner, as compared with the present fare of 37 cents, and 20 cents from Harahan to Canal Street. Chairman Williams said that in the meantime he would take the case under advisement.

$131,369 Balance on New York State

The accompanying tables give the comparative summary of operations of the New York State Railways and a summary of operations of affiliated bus lines, submitted by James F. Hamilton, president, to the stockholders.

SUMMARY OF OPERATIONS OF NEW YORK STATE RAILWAYS—YEARS ENDED DEC. 31

	1928	1927
Railway operating revenues	$9,658,535	$9,879,150
Railway operating expenses	6,945,011	7,058,067
Net revenue railways operations	$2,713,523	$2,821,083
Taxes	583,732	596,565
Operating income	$2,129,791	$2,224,517
Non-operating income	31,665	122,955
Gross income	$2,161,456	$2,347,472
Deductions:		
Interest on bonds	1,286,177	1,290,294
Other interest and deductions	215,722	218,086
Total deductions	$1,501,899	$1,508,381
Net income	$659,556	$839,090
Appropriations:		
For sinking fund	28,187	30,525
For depreciation reserve	500,000	500,000
Total appropriations	528,187	530,525
Balance for dividends and surplus	$131,369	$308,565

SUMMARY OF OPERATIONS OF BUS LINES OF NEW YORK STATE RAILWAYS

	1928	1927
Gross revenues	$611,880	$601,362
Operating expenses	533,571	532,968
Net operating revenue	$78,308	$68,393
Taxes	15,825	13,129
Operating income	$62,483	$55,264
Deductions	15,763	18,613
Available for depreciation and surplus	$46,719	$36,650

Conspectus of Indexes for February, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY

Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	Feb. 1929 **7.75**	Jan. 1929 **7.71**	Feb. 1928 **7.59**	Feb. 1929 **7.75**	Jan. 1924 **6.91**
Electric Railway Materials* 1913 = 100	Feb. 1929 **145.0**	Jan. 1929 **145.3**	Feb. 1928 **139.5**	March 1924 **163.9**	Feb. 1928 **139.5**
Electric Railway Wages* 1913 = 100	Feb. 1929 **229.9**	Jan. 1929 **229.9**	Feb. 1928 **228.7**	Feb. 1929 **229.9**	Jan. 1924 **217.4**
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Feb. 1929 **205.2**	Jan. 1929 **204.5**	Feb. 1928 **200.9**	March 1924 **206.8**	Sept. 1927 **199.4**
Eng. News-Record Construction Cost (General) 1913 = 100	Feb. 1929 **210.4**	Jan. 1929 **209.4**	Feb. 1928 **204.6**	March 1924 **224.7**	Nov. 1927 **202.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	Jan. 1929 **97.2**	Dec. 1928 **96.7**	Jan. 1928 **96.3**	Nov. 1925 **104.5**	April 1927 **93.7**
Bradstreet Wholesale Commodities 1913 = 9.21	Feb. 1929 **12.98**	Jan. 1929 **12.96**	Feb. 1928 **13.53**	Dec. 1925 **14.41**	July 1924 **12.23**
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	Jan. 1929 **154.6**	Dec. 1928 **155.8**	Jan. 1928 **155.1**	Nov. 1925 **167.1**	May 1924 **141.0**
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	Jan. 1929 **160.9**	Dec. 1928 **162.1**	Jan. 1928 **163.1**	Nov. 1925 **171.8**	April 1928 **160.8**
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	Jan. 1929 **132.5**	Dec. 1928 **127.3**	Jan. 1928 **118.4**	Nov. 1928 **135.0**	July 1924 **73.4**
Bank Clearings Outside N. Y. City 1926 = 100	Jan. 1929 **108.7**	Dec. 1928 **106.6**	Jan. 1928 **104.1**	Jan. 1929 **108.7**	May 1924 **84.4**
Business Failures Number	Jan. 1929 2210	Dec. 1928 1672	Jan. 1928 2180	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	**56.50**	**52.76**	**54.50**	**122.95**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Rumors on Resumption of Tacoma-Seattle Line

Past employees of the Puget Sound Electric Railway, operating the Tacoma-Seattle interurban in the state of Washington but discontinued since the first of the year, contemplate bidding in the line at the receiver's sale to be held on Feb. 25, and again placing it in operation, according to insistent reports from that city. O. O. Rutledge, Puyallup, who was employed by the company for twenty years, states that the project is under consideration, and the road's former employees are being canvassed at the present time. The reasons for the suspension have been reviewed previously.

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Personal Items

J. F. Uffert Directs in Rochester, Syracuse and Utica

Appointment of John F. Uffert, superintendent of equipment of the New York State Railways, as general superintendent of transportation of the company's lines in Rochester, Syracuse and Utica, has been announced by President James F. Hamilton. Mr. Uffert, who retains his position as general superintendent of equipment, succeeds Roy R. Hadsell, Rochester, recently made general manager of the Schenectady Railway.

Starting his career when a boy of twelve in the shops of the then Newark Passenger Railway, now the Public

John F. Uffert

Service Railway, Mr. Uffert for 34 years has been an active figure in the electric railway industry. During his long experience in the industry he has worked in the East, Middle West and on the Pacific Coast.

From the various departments of the shops at Newark, he rose to the carhouse and later shop foreman. He was a motorman in New York City and for the Coney Island & Brooklyn Railway. After serving as inspector of equipment in New York, he became shop foreman for the Union Railway at New York and served in a similar capacity for the Atlantic City & Shore Line Railway at Atlantic City. Since then he served as master mechanic, West Chester, Pa., and Sanford, Pa.; foreman for the Detroit United Railway at Rochester, Mich.; for the Illinois Traction System at Decatur and for the Chicago City Railway; equipment inspector United Railways, San Francisco; master mechanic Tacoma Railway & Power Company and the Puget Sound Railway at Seattle and Tacoma; foreman Portland Railway & Light Company, Portland, Ore.; Cleveland Railway and the Bay State Railway, Brockton, Mass.; master mechanic Hudson Valley Railway, Glens Falls, N. Y., and the United Traction Company, Albany. After serving as general superintendent of the Albany system, Mr. Uffert went to Rochester in 1917, as general superintendent of equipment.

Mr. Uffert will retain his present headquarters in Rochester. His appointment, covering general supervision of the lines of the New York State Railways in the three cities of Rochester, Utica and Syracuse, besides retaining his post as superintendent of equipment, is regarded as a high tribute to his ability and his long experience.

Changes in Auditing Department at Fairmont

William G. Neiert, assistant for several years, was recently elevated to the position of auditor of the Monongahela-West Penn Public Service, Fairmont, W. Va. He succeeds J. R. McCartan, who resigned after a year's service. At the same time Charles E. Breckenridge, formerly divisional auditor, becomes assistant auditor, filling the vacancy created by Mr. Neiert's promotion.

Mr. Neiert has held several positions as an accountant, one of them with the railroad in Cincinnati. Since his affiliation with the Monongahela Valley Traction Company he has held several different positions in the auditing department.

Mr. Breckenridge went to the company after a varied experience. The Agricultural Implement Manufacturing Company in Toronto claimed his services for nine years. Later he affiliated himself with a firm of public accountants in Buffalo. From 1922 to 1925 Mr. Breckenridge was traveling auditor for the American Water Works & Electric Company, going to Fairmont in 1925.

Mr. McCartin left that company to become associated with Price, Waterhouse & Company, accountants for the American Water Works & Electric Company and the West Penn System, with which he was previously connected.

J. H. Henderson Appointment on Iowa Board Confirmed

The Iowa Senate has confirmed the appointment of J. H. Henderson as commerce counsel for the State Board of Railway Commissioners, the name being sent to the senate by the railway commission. Mr. Henderson has served nearly a year on the board in that position, having been appointed to fill the vacancy caused by the resignation of Dwight N. Lewis. His term will expire June 30, 1933.

F. J. BUCKLEY, general manager Bury Corporation Tramways, England, has been appointed general manager and engineer of the Norwich Electric Tramway.

New Vice-President of Eastern Massachusetts

As successor to the post left vacant by R. B. Stearns, Albert J. Boardman, as vice-president and acting general manager of the Eastern Massachusetts Street Railway, Boston, Mass., has the advantage of a technical education supplemented by practical experience in problems of service and management. His promotion by the Board of Public Trustees was referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 16. Some months ago Mr. Boardman was advanced from the Brockton division to larger responsibilities at the general headquarters of the company in Boston. The next step was his advancing to the managerial post.

Mr. Boardman joined the Eastern Massachusetts Street Railway official force in 1919, a few months after the beginning of public control, and was

Albert J. Boardman

assigned as manager of the Fall River division. In 1921 he was promoted to the management of the Brockton district. Prior to his going to Boston to become connected with the system of the Eastern Massachusetts Street Railway he was connected with the Indianapolis Traction & Terminal Company as engineer and at one time was superintendent of transportation of the Terre Haute, Indianapolis & Eastern Traction Company.

Mr. Boardman is a graduate of Cornell University in mechanical engineering. During the World War he served overseas with the American Expeditionary Forces. One of the local newspapers correctly sensed the opinion of the men held in the railway industry when in its comment on his appointment it referred to his force, sound judgment and capacity to meet issues and stated that he was fitted to maintain sound public relations.

WALTER L. ADAMS, who was superintendent of the Milford & Uxbridge Street Railway for many years, and more recently president of the Milford, Framingham, Hopedale, Uxbridge Street Railway has resigned this office. He is still general manager of the railway and bus lines.

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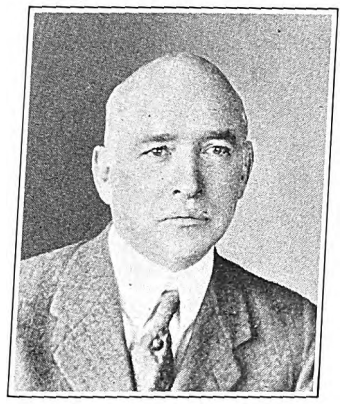
West Penn Promotions

At a testimonial dinner in his honor in Connellsville, Pa., on Jan. 31, H. L. Mitchell surprised his well-wishers by the announcement of the selection of Daniel Durie as vice-president of the West Penn Railways. Mr. Mitchell had listened to the eulogy on his accomplishments in the nine years since 1920 when he went from vice-president of the West Penn Railways to his recent promotion as president of both the railway and power companies. Among the speakers was W. S. Finlay, president of the parent company, the West Penn Electric Company. Then it was Mr. Durie's turn to be surprised for the announcement of his advancement was unexpected.

Mr. Mitchell, in a quarter of a century, has gone through the ranks from a clerkship to the presidency of the West Penn Railways and West Penn Power Company. Entering the employ of the Pittsburgh, McKeesport & Connellsville Railway in 1902, he has occupied increasingly important positions in the West Penn System since that time. During the acquisition of the lines which now form the West Penn Railways system, Mr. Mitchell was located in Connellsville. He was transferred to Pittsburgh in 1911 as assistant to W. E. Moore, then vice-president and general manager. In 1918 he became assistant to Vice-President Williston Fish, and on Sept. 15, 1918, was elected vice-president and manager of the Wheeling Traction Company and transferred to Wheeling. On Feb. 1, 1919, he returned to Pittsburgh as general manager of the West Penn Railways, was elected vice-president March 1, 1920, and president April 14, 1927. On Jan. 9, 1929, he was elected president of the West Penn Power Company.

Dan Durie, since he came to the coke region in 1901 from New Jersey to take over the foremanship of the West Penn's shops, has been identified with the modern equipment of the West Penn and other progressive tendencies of the system. For a while he interested himself in transportation matters, but his inclination was for maintenance detail and after serving in the mechanical department he was made master mechanic of the entire system. From 1909 to 1913, additional properties were taken over and many cars different in type, and carhouses and shops ranging in size and in the nature of their equipment were added. In June, 1915, he became general superintendent of railway operation and in addition in 1917 he was made general superintendent of equipment.

On Sept. 27 when H. L. Mitchell announced two operating divisions, the Pennsylvania division was put in charge of Daniel Durie, who had been superintendent of what is known as Territory "A." Other than his service with the New Jersey system, Mr. Durie's entire career has been with the West Penn system. Mr. Durie served as president of the Engineering Association 1926-1927.



Herbert A. Wagner

Messrs. Wagner and Cohn with Washington-Baltimore Road

Herbert A. Wagner, president of the Consolidated Gas, Electric Light & Power Company, Baltimore, Md., has been elected president of the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, filling the vacancy caused by the recent death of James J. Doyle. Mr. Doyle had been president for several years. At the same time Charles M. Cohn, vice-president of the Consolidated Gas, Electric Light & Power Company, was elected vice-president of the railroad. H. T. Connelly, who has been general manager of the railroad for some time, was also elected a vice-president. He will continue to fill the position of general manager. The Consolidated owns the majority of the stock of the Washington, Baltimore & Annapolis Electric Railroad.

Mr. Wagner began his business career in the electrical industry in the engineering department of the Westinghouse Electric in 1887. He represented that house in St. Louis in the organization of the Missouri Electric Light & Power Company, which undertook, under Mr. Wagner's supervision, the installation of the first incandescent electric lighting plant in St. Louis in 1889. Later, he became general superintendent Missouri Electric Light & Power and its successor, the Missouri Edison Company. Many features of the present-day alternating current distribution and transmission systems were first worked out in St. Louis and put into successful commercial operation there. The Wagner Electric Manufacturing Company was organized by Mr. Wagner, who was its first president. All his career he has been connected with the development of some of the largest electric light and power companies in the East. Mr. Wagner was graduated in engineering from the Stevens Institute of Technology in 1887.

Charles M. Cohn

Charles M. Cohn, the new vice-president of the Washington, Baltimore & Annapolis road, was elected president of the Industrial Corporation of Baltimore City in 1919. This is an enterprise which grew out of the Aldred Industrial Survey of Baltimore, and has assisted in the organizing and establishing in Baltimore of industries having an aggregate capitalization of more than $5,000,000 and employing more than 4,000 workers. This work, of course, was secondary to his duties as vice-president of the Consolidated Gas, Electric Light & Power Company, Baltimore. In 1906 he was secretary of that company, and for some time discharged the duties of general manager. Mr. Cohn is a graduate of Loyola College and an alumnus of the Baltimore University School of Law. He began his career in the gas department of the Consolidated company.

Appointments to California Commission

Arthur T. George has been appointed by the California Railroad Commission to succeed Carl I. Wheat, whose resignation became effective on Feb. 15. Mr. George has had the benefit of more than two years' experience in the legal department of the commission, having served as assistant attorney from 1925 to 1927. Since the latter date he has been engaged in the practice of law at Los Angeles with the well-known firm of Newlin & Ashburn. Prior to his appointment as assistant attorney for the commission in 1925, he was connected for two years with the County Counsel's office of Los Angeles County. He was co-author with Mr. Wheat of the volume entitled "Public Utility Regulation in California," published by the commission in 1927. Mr. George is a graduate of Stanford University and Harvard Law School.

The commission has also named Ira H. Rowell as its assistant attorney to succeed Reginald L. Vaughan, who has resigned to re-enter the private practice of law on March 1, 1929. Mr. Rowell has been connected with the commission since December, 1927, as an examiner. He was admitted to the bar in California in 1923, and practiced law from that time until his appointment as an examiner. He was graduated from Eureka College, Illinois, and studied law at Harvard Law School, the University of Chicago, and was graduated from the law school of the University of California. For a number of years he was connected with the business management of the Fresno *Republican*

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Construction Projects Progressing

St. Louis Terminal Railway accepts authority to build subway. New York subway construction progresses. Track construction in Vancouver

FORMAL acceptance has been filed by the St. Louis Electric Terminal Railway with the city registrar, of a St. Louis ordinance granting the company authority to build a subway, elevated line and surface track to connect the McKinley Bridge with a new terminal to be erected at Twelfth Boulevard and Lucas Avenue. The St. Louis Electric Terminal Railway, which is a subsidiary of the Illinois Terminal System, Chicago, Ill., posted a $50,000 bond to assure the compliance with the terms of the ordinance.

On Feb. 9 a motion was granted to permit the three commissioners on the North Twelfth Boulevard widening project to file a partial report, covering the property condemned south of Cass Avenue and in the vicinity of the new terminal of the St. Louis Electric Terminal Railway. The motion was filed at the request of the board of public service to facilitate the construction of the railway subway. It is proposed to use the reinforced concrete roof of the subway as the foundation for the widened street.

New York Subway Construction

The Bronx Concourse subway extension in New York City, which will join the Manhattan Line at 148th Street and St. Nicholas Avenue, is progressing along St. Nicholas Place toward the vicinity of the Polo Grounds, where it will cross under the Harlem River and pass the Yankee Stadium, continuing on up under the concourse. Five contracts on the Bronx line have been awarded as far as Kingsbridge Road, amounting to approximately $28,000,000. The balance of the concourse line will be under contract during the present year, according to the authorities.

According to Mayor Walker of New York City, plans for the consummation of the entire program of the rapid transit development, involving an expenditure of $700,000,000, are being anticipated. It is expected to advance the work this year by at least $100,000,000 and that the end of 1929 will bring a solution of practically all the problems involved in this undertaking.

Work of reconstructing the Big Four Railroad Bridge at Louisville, over which the Louisville to Jefferson, Ind., interurban railway and the lines to Indianapolis will operate, is progressing. The bridge went out of service last summer and is being entirely rebuilt of heavier steel construction. Operation of the Belt Railway which connects all steam lines entering Oklahoma City will be started by the Oklahoma Railway under a ten-year lease on May 1. Three freight locomotives to handle the increased freight business of the company, when this line is taken over, are being constructed at a total cost of approximately $100,000.

Vancouver Improvements

A number of improvements are to be made on its lines by the British Columbia Electric Railway, Vancouver, B. C., in the near future. Approximately 1,400 ft. of double track will be laid on Alma Road, replacing the existing single track. Two thousand feet of track on Hastings Street, which is now under stringer construction, will be laid with slab and fill construction.

The North Vancouver City Council has under consideration a plan for the extension of this company's tracks to the ferry wharf at a cost of approximately $2,000. Traffic to this wharf was resumed Nov. 30, 1928, after the construction of the subway at the Esplanade, the railway connection with the bridge over the second narrows of Burrard Inlet.

The Toronto Transportation Commission and the Toronto City Board of Control, Toronto, Ont., have agreed on plans for the provision of electric service on Bathurst Street, south of the steam railway. Approximately ½ mile of double track will be built, probably after the new bridge is constructed over the steam railway tracks.

Material Purchases

Considerable track and line material has been purchased recently by the Pittsburgh Railways, Pittsburgh, Pa. Included in their orders are 10,000 ft. of No. 9 single-conductor cable, 2,000 ft. of No. 9 double-conductor cable, 2,000 ft. of No. 14 seven-conductor cable and 8,000 ft. of No. 14 single-conductor cable. Other line material ordered includes 25 4-in., four-pin, single-iron cross arms, 10 section insulators, 1,000 28-in. bonds, 1,000 40-in. bonds, 2,500 7-in. bonds, 600 10-in. pin bonds, 600 12-in. pin bonds, 70 trolley frogs, 30 5-in., four-pin, single-iron cross arms, 25 8-in., four-pin, single-iron cross arms and 40 miles of No. 00 round copper trolley wire.

Track materials ordered by this company include 10,000 oak ties, 10,000 tie plugs, 5,000 creosoted ties, 160 kegs of track bolts, 200 kegs of track spikes, 14 carloads of slag ballast and 3 carloads of ½-in. screening. Other materials ordered include one standard city catch basin, 10 No. 2 adjusting rods and 10 No. 1 adjusting rods, 200 slide plates, 200 braces, 20 switch point clips, 20 guide plates, 10 Century switch stands, and 500 pairs of 32-in. joint plates for 80-lb. T-rail.

The Tri-City Railway, Davenport, Iowa, has ordered one Mack four-cylinder, 29-passenger bus equipped with a suburban type body. The Cummings Car & Coach Company, Chicago, Ill., which purchases buses for the Chicago & West Towns Railway, Oak Park, Ill., has ordered one Mack four-cylinder, 29-passenger city type bus. The Pittsburgh Railways, Pittsburgh, Pa., has placed orders for six Yellow model W, 21-passenger parlor coaches, and the Springfield Street Railway, Springfield, Mass., has accepted three Mack 233-in. bus chassis.

Eight low-floor type, two-man cars are being remodeled by the Pittsburgh Railways for one-man operation. Four of these cars are the 4300 type and four of the 5000 type. This company has also ordered one set of rewinding material for a 10,000-volt, 1,420-hp., 60-cycle motor, and has ordered track circuit signaling equipment from the Union Switch & Signal Company for four blocks of signals on the interurban division.

The Chicago, Milwaukee & St. Paul Railroad is in the market for three 15-ton electric overhead cranes for Milwaukee. The Pacific Electric Railway, Los Angeles, Cal., plans a new power substation at Glendale, Cal.

Changes in Valentine & Company

At the annual meeting of the stockholders of Valentine & Company, held at the company's office, 386 Fourth Avenue, New York City, on Jan. 23, the following officers were elected:

N. T. Pulsifer, chairman of the executive committee. Mr. Pulsifer has been actively identified with the affairs of the company in executive capacities for many years, becoming vice-president in 1902, president in 1915, and chairman of the board of directors in 1922. He has had a long record of honorable achievement in the industry.

A. L. Phillips, chairman of the board, has been actively identified with Valentine & Company for the past 38 years. Mr. Phillips became cashier of this company on Jan. 1, 1890; was elected treasurer of the company in 1893; president in 1922; and became chairman of the board on Jan. 23, 1929.

Lawson Valentine Pulsifer, president, has devoted his entire business life to the interests of Valentine & Company,

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starting as an assistant chemist in 1913. He represents the third generation to become chief executive of this company.

The other officers of the company, namely: O. A. Hasse, executive vice-president; Langdon B. Valentine, vice-president; Lawrence Phillips, vice-president and treasurer; L. H. Roper, assistant treasurer; and L. A. Osborne, secretary, are men of long experience in the industry. New plans and products have been developed for the expansion of the company's business.

Exhibit Committee Meets

Considerable progress was made at the first meeting of the exhibit committee held recently in Atlantic City, N. J. In reviewing the exhibit work accomplished thus far, it was pointed out that last July President Stevens appointed a special fact-finding subcommittee on convention location. The Cleveland proposal for 1929 was the same tendered for the 1928 convention. The committee, therefore, turned its attention to tentative proposals received from Atlantic City and held several meetings in both Atlantic City and New York, finally securing a contract from Atlantic City, basically comparable with previous contracts. This was submitted to and had the approval of the committee on convention location, which, in turn, recommended its acceptance by the executive committee. Under this contract all monies will be paid directly to the Atlantic City convention and publicity bureau, and, as the new Atlantic City Auditorium is municipally owned, the contract bears, in addition to the signatures of the bureau officers, those of both the Mayor and the general manager of the auditorium.

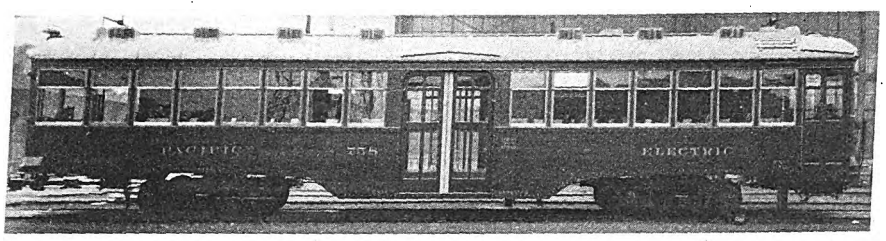
The contract for furniture and rugs will be handled by the local contractors, C. M. Koury Company, who are well known and whose prices have been brought into line with what has been paid for the past several years. The Knoble Brothers Company, who handled the floral requirements at Cleveland, presented a proposal for caring for the work in Atlantic City. However, it is felt desirable to retain J. J. Habermehl Sons Company, of Philadelphia, as they have handled this contract for the large conventions held in Atlantic City for a number of years. The Eldredge Express & Storage Warehouse Company, who have handled drayage at previous Atlantic City A.E.R.A. conventions will again receive this privilege, and the Atlantic City & Shore Railroad, through the courtesy of Vice-President Purinton, have agreed for a nominal figure to handle all exhibit display street cars of 50,000 lb. weight or under. The Robinson Supply Company, a local concern who handled the drinking water contract at the previous Atlantic City convention, will again do so this year. The Atlantic Foto Service will look after the convention photographic work as they have for many years.

The rules and regulations governing exhibits and under which the exhibits have been held for a number of years will be practically the same for this year's show. These have worked out very satisfactorily in the past and will only be changed to meet the new conditions.

The executive committee, at a meeting held in New York, Nov. 23, approved a budget which had previously received the consideration of the finance committee and the price of space for the 1929 show will be 60 cents per square foot. This is the same rate as charged for space at the 1928 show, there being no charge for track space to be used for street car display, either on the Convention Hall Plaza or on the existing tracks on Georgia and Mississippi Avenues. It is planned to send out space applications April 12. Thirty days will be allowed for filing of space requests as in the past. At the conclusion of that period, there will be another meeting of the exhibit committee for the purpose of making the official space allotment.

Minutes of a meeting of the special subcommittee of the exhibit committee,

Pacific Electric Cars Delivered



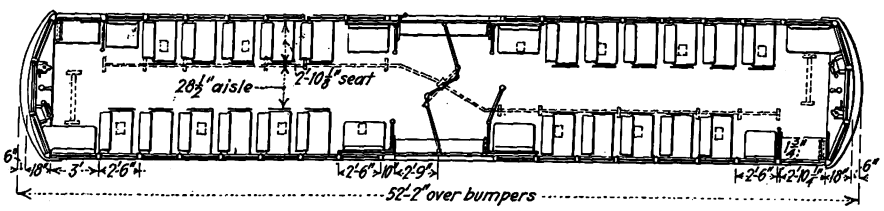
One of the all-steel cars recently delivered to the Pacific Electric Railway by the St. Louis Car Company

Ten two-man, motor-driven, city-type passenger cars were recently delivered to the Pacific Electric Railway, Los Angeles, Cal. These cars, manufactured by the St. Louis Car Company, St. Louis, Mo., are of the double-truck type. Each car weighs 55,800 lb., is 52 ft. 2 in. long, 8 ft. 11 in. wide and seats 65 passengers.

The cars are of the center entrance and exit, front exit type. The bodies are all-steel construction with arch-type steel roofs. The center doors are the sliding type with stationary steps, and the front doors are of the folding type with folding steps. The exterior is finished in dark red lacquer. Semi-individual, high back, leather upholstered, deep cushioned seats are used.

Deep cushioned leather upholstered seats are used

The trucks have a wheelbase of 6 ft. and are spaced on 29 ft. centers. They are equipped with roller journal bearings and 26-in. cast-iron wheels. Additional details are given in the accompanying specifications.



Floor plan of the Pacific Electric Cars

Weights: car body	27,466 lb.	Door mechanism	Consolidated
Trucks	15,360 lb.	Finish	Duco
Equipment	12,974 lb.	Floor covering	Flexolith composition
Total	55,800 lb.	Glass	Double strength AA
Bolster centers	29 ft.	Hand brakes	Miner
Length over all	52 ft. 2 in.	Heat insulating material	Salamander and Flaxlinum
Length over body posts	48 ft. 2 in.	Headlights	Crouse Hinds
Truck wheelbase	6 ft.	Headlining	Agasote
Width over all	8 ft. 11 in.	Journal bearings	Roller
Height, rail to trolley base	10 ft. 9¼ in.	Journal boxes	Hyatt
Window post spacing	30 in.	Lamp fixtures	Electric Service Supplies Company
Body	All steel	Painting scheme	Dark red
Roof	Arch steel	Registers	Ohmer
Doors	Center sliding and end folding	Sash fixtures	Curtain Supply Company
Air brakes	Westinghouse	Seats	Heywood-Wakefield 327-M
Axles	Pollak-heat treated	Seat spacing	30 in.
Car signal system	Faraday	Seating material	Leather
Compressors	DH 16	Step treads	Feralun
Conduit	Metal	Trolley	Eclipse
Couplers	Westinghouts air and electric	Trucks	St. Louis-Commonwealth
Curtain fixtures	Curtain Supply Company	Ventilators	Automatic
Curtain material	Pantasote J86	Wheels, type	Griffin cast iron, 26 in. diameter
Destination signs	Hunter	Wheelguards or fenders	Eclipse

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appointed for the purpose of laying out floor plan (showing detailed space arrangement for the coming Convention) revealed that the ballroom on the second floor level would be used as the main meeting room for the sessions of the American Association in the mornings and that all entertainment features would be held in the ballroom each evening during the convention; that the other available rooms on the second floor would be used for meeting room purposes for the other affiliated associations, special committee meetings, etc., leaving the stage, and the two rooms on either side of the stage, as well as the entire arena floor, free for exhibition purposes, and that Monday afternoon and Wednesday morning of convention week had been set aside by the committee on subjects and meetings for exhibit inspection, during which periods there would be no meetings.

Upon motion of Mr. McCalla, seconded by Mr. Price, the report of the director of exhibits and the minutes of the special subcommittee meeting, held Feb. 4, were accepted and filed, and all of the recommendations contained in the report and in the minutes of the subcommittee meeting approved with the exception of the exhibit space layout and the classification of exhibits which were left for separate action.

The chairman then presented Plan "A" as approved by the special subcommittee appointed to layout floor plan and explained the layout in detail. After discussion upon motion of Mr. Cotsworth, seconded by Mr. McCalla, it was decided that Plan "A," as presented and explained, be approved and the chairman and director of exhibits were authorized to proceed with the preparation of detailed plans showing this space layout, of the necessary printed matter regulations, etc., to be sent out to exhibitors on April 12.

It was decided that all exhibits, with the exception of street cars to be shown on the Convention Hall Plaza, should be closed down at 6 p.m. each day, but that the auditorium should remain lighted so that a general view of the exhibits might be had from the balcony.

It was decided by the committee to recommend that meetings of the Transportation and Traffic Association, which are held in the afternoon, be held in some other room than the main ballroom so as to leave this room available for afternoon entertainments. Upon motion of Mr. Robinson, seconded by Mr. Bale, it was decided that the date of the next meeting of the committee should be tentatively set for May 16, at Atlantic City.

To Study Curing of Concrete Paving

The executive committee of the Highway Research Board, National Research Council announces the formation of a special committee to conduct an investigation of the problem of proper curing methods for concrete pavements. The work will consist largely in correlation of the research work being carried on by the Bureau of Public Roads and various state highway departments.

The committee is composed of Chairman F. C. Lang, University of Minnesota and Minnesota State Highway Department; E. F. Kelley, chief of the division of tests, U. S. Bureau of Public Roads, Washington, D. C.; W. A. Slater, research professor of engineering materials and director Fritz Engineering Laboratory, Lehigh University, Bethlehem, Pa.; F. V. Reagel, engineer of materials and tests, Missouri State Highway Department, Jefferson City, Mo.; Frederick E. Schnepfe, civil engineer, Washington, D. C.; H. F. Gonnerman, manager research laboratory, Portland Cement Association, Chicago, Ill.; Stanton Walker, director of engineering and research division, National Sand & Gravel Association, Washington, D. C.

The work of the investigation will be carried on by Fred Burggraf under the general direction of R. W. Crum, director of the board.

METAL, COAL AND MATERIAL PRICES F.O.B. REFINERY

	Feb. 19, 1929
Metals—New York	
Copper electrolytic, cents per lb	17.775
Copper wire, cents per lb	19.875
Lead, cents per lb	6.95
Zinc, cents per lb	6.7
Tin, Straits, cents per lb	49.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.45
Central, Ill., screenings, Chicago, net tons	0.975
Kansas screenings, Kansas City, net tons	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$5.90
Weatherproof wire base, N. Y., cents per lb.	20.875
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.6
White lead in oil (100-lb. keg), N. Y., cents per lb	13.25
Turpentine (bbl. lots), N. Y., per gal	.63

Spanish Improvements Progress

In line with a ten-year public works program for which Spain is spending some $600,000,000 for the development of her railways, roads, and hydro-electric power facilities, trains throughout the country are being speeded up and electrified.

Potential hydro-electric power of more than 3,000,000 hp. provides more than an adequate supply of electrical energy for home consumption, with possible long distance transmission to France and Portugal.

All kinds of machinery for the development projects—electric generators, lighting outfits, batteries, switches, electric motors, electric tools, power shovels, internal combustion engine, and various railway equipment, is being imported, and to large measures through American markets.

With an estimated national wealth of $31,000,000,000, Spain is increasingly interesting industrially and commercially.

TRADE NOTES

MARTINDALE ELECTRIC COMPANY, Cleveland, Ohio, has recently taken on national distribution of the Seneca Electric Arc Welder, manufactured by the Seneca Electric Welder Corporation, Seneca, Kan. This company has published a manual entitled: "Electric Arc Welding with Alternating Current." This book contains a number of profitable ways in which this process is being used and technical and practical operating information which will help users of Seneca Alternating Current Arc Welders. A copy of this manual will be mailed on request to those interested by addressing Martindale Electric Company.

THE WATSON-STILLMAN COMPANY, 75 West Street, New York, N. Y., manufacturer of hydraulic machinery, has appointed the Midvale Mining & Manufacturing Company as its representative in the St. Louis district. The Midvale Mining & Manufacturing Company has its main office at 705 Olive Street, St. Louis, Mo., and its warehouse at East St. Louis, Ill.

DELTA-STAR ELECTRIC COMPANY, Chicago, Ill., and the Monarch Electric Company, St. Johns, Quebec, Canada, have formed an association whereby the Canadian factory will now have full advantage of Delta-Star designs engineering and research facilities. A complete line of unit-type, standardized equipment will be produced at St. Johns for Canadian distribution.

ADVERTISING LITERATURE

NATIONAL CARBON COMPANY, New York, N. Y., through the co-operation of a number of representative wholesalers undertook the investigation and analysis of wholesalers' operating costs for the purpose of determining what should be the wholesaler's typical cost of distribution; how this cost may be apportioned among various products; what factors have a major influence on these costs. The work was undertaken with no preconceived ideas of what the results should be, nor was any special use to be made of the information gathered, other than to submit it to wholesalers for any value which it might have in assisting in the solving of their operating cost problems. The methods of combination and interpretation of statistics were studied and developed in what may be described as an engineering way so that as much as possible might be learned from the study. A report of this work has been published for distribution so that the results of this analysis, which definitely show why different products may entail widely varying handling costs and why the average cost of handling the whole line cannot be safely accepted in studying margins on any one line, may be used to help distributors curtail operating costs.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL, *Publishing Director*

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Unproductive Transportation Charges

FIXED firmly in the minds of many people is the idea that, because their gross revenues are large, the companies rendering public transportation service must be enormously wealthy. It is usually popular with the public, therefore, to demand that transportation agencies make huge expenditures for purposes that do not in any way benefit the companies themselves. At one time this was done largely by taxation of one sort or another. Shining examples of this practice are the park tax paid by the United Railways & Electric Company of Baltimore, Md., and the school tax paid by the steam railroads in New Jersey. Numerous other taxes of a similar nature have been imposed, differing in detail but not in principle.

The energetic campaign carried on by the transportation industry in recent years for relief from unreasonable tax burdens has at least prevented new inroads, although it may not have accomplished much in the way of actual relief. But now the incursions into the treasuries of the transportation companies take new forms. The carriers are subjected to countless demands for "improvements" that neither increase their revenue nor enable them to render better service. For example, the street railways are asked to relocate their tracks for the convenience of the general public, but at the expense of the companies. The steam railroads are asked to build new and enlarged stations when the old ones are entirely adequate. Both steam and interurban electric lines are subjected to constant demands for the elimination of grade crossings, although the conditions which make this necessary are no fault of theirs.

Of course, transportation companies desire to be good citizens in the communities they serve and to co-operate to the fullest possible extent in all public improvements, but they have only one source of income—the passengers and shippers who use their lines. When they undertake costly improvements that neither increase their revenue nor reduce their operating expenses, the costs must eventually be reflected in the price paid by the users of the service. This fact is frequently overlooked by those who clamor loudly for improvements. Absurd as it may seem, it is not unusual to find the same individuals demanding improvements, on the one hand, and encouraging competition on the other.

Earning Public Good Will

PRINTED records often are powerful not so much in what they say as in what they convey. Thus, to those who have been following the course of recent events, the item "Springfield Work Commended" published in the JOURNAL for Feb. 16, perhaps conceals more than it conveys. The Mayor said that Clark V. Wood, president of the Springfield Street Railway, has steadfastly kept every promise made to the city. This most important reference to the street railway he tucked away in a municipal review in which the work of the company was itemized.

It was a gentlemen's agreement into which the New Haven Railroad as the owner of the Springfield system entered for the expenditure of $2,000,000 for rehabilitation in Springfield, under which in 1928 $500,000 alone was spent for new cars, motor coaches and similar equipment. The Mayor is hard headed enough to know that even the expenditure of $2,000,000 within two years has not made the Springfield Street Railway perfect, but it was a real compliment that he paid the management. And it was well deserved. The railway has kept faith with the city. And the city has kept faith with its railway.

Not so long ago the relations between city and company were not so cordial. That was because neither thoroughly understood the other. It needed only the kind of confidence that grew out of the conferences held several years ago over the matter of rehabilitation to iron out many misunderstandings. The Springfield case offers a striking example to this industry. Incidentally it is a testimonial to the efficacy of a municipal management which has recognized that it, too, has obligations to its transportation system, which if ignored must inevitably act unfavorably upon the entire community.

Another Phase of New York's Traffic Problem

LOADING and unloading of commercial vehicles in the city streets cause traffic congestion. This fact is being realized to its fullest extent in the nation's largest city. The merchants of New York have for years looked at the receipt and delivery of goods as a disagreeable detail required in all business, and have been totally blind to the ever-increasing traffic congestion caused by it, and its corresponding bad effect on their business. The realization of this congestion has at last been forced on them by the sheer lack of facilities to deliver and receive goods.

Suggestions and recommendations are now being prepared to improve the situation. Night delivery of certain commodities is being considered. Regulation of end-to-the-curb loading of trucks where side loading is possible has been mentioned. Elimination of street delivery of the major portion of construction material for the erection of new buildings would considerably decrease traffic problems. A change in the building code is suggested, which would require the provision for adequate elevator and off-street shipping and receiving and storage facilities in all new buildings. These suggestions are all good, and will be effective in preventing a growth of traffic congestion. They would have been of inestimable value had they been enforced ten or fifteen years ago.

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It is apparent that only drastic regulations, entirely preventing street loading and unloading, will relieve this traffic situation. Such an ordinance would require the construction of a ramp and the establishment of a shipping, receiving and storage plant in the basement of practically every large building in the city. This city's major traffic problem has been created by the erection of large buildings. Why, then, should not the owners of such property be required to relieve the congestion for which they are responsible? However, considering the influence of such a body of property owners and their usual adverse attitude toward enforced expenditures, is it not reasonable to doubt if such an ordinance could be passed? Whether or not this plan can be worked out satisfactorily, does it not behoove other cities of growing importance to consider carefully ways and means of circumventing this mess into which Father Knickerbocker has stepped while looking skyward?

Mixing Fiction With Facts

EDWIN LEFÈVRE has been writing a very interesting series headed "Bulls on America," for the *Saturday Evening Post*. He is a veteran Wall Street commentator. His recent articles have been mostly words of warning, and his predictions presaged the spectacle of liquidation which is apparently now taking place.

It is a needed warning that Mr. Lefèvre has uttered, but it is not so much with that phase of his recent comments that the JOURNAL is concerned.

In discussing the inability to gage accurately the full effect of certain economic changes in the Feb. 16 issue of the *Saturday Evening Post,* he says "just as the trolley has been superseded by the bus and no one yet knows exactly what will happen to our passenger transportation business," etc. Incidentally, this is a statement only slightly different from one made by Mr. Hughes, another financial writer, and repeated in the *Literary Digest.*

How men like Mr. Lefèvre come to say that the trolley has been superseded by the bus when even the most radical bus enthusiast would scarcely make that charge, is difficult to understand except as an evidence of sheer ignorance of the subject. The electric railway business is a $6,000,000,000 industry. It has gone through many difficulties, but the trolley has not been superseded by the bus. Where are the eyes of the writers of these statements? They can't be expected to know the history of all industry, but the facts contradictory of what they write are so apparent that charity toward them becomes difficult to maintain.

To recapitulate the facts of this industry for the benefit of this industry is not necessary, but for the benefit of Mr. Lefèvre and other commentators it would be well to repeat that more than 300 electric railways in the United States and Canada are now operating approximately 10,700 buses in conjunction with their rail services, and that some 50 additional companies have entirely replaced their rail service by substituting more than 500 buses. Buses owned by these electric railways operated 300,000 miles during the past year and carried more than 1,000,000,000 passengers. Electric railway cars in the United States last year carried more than 15,000,000,000 passengers. These facts are all on public record. Mr. Lefèvre and others who venture to cite experiences of the transportation industry as the basis for their conclusion owe it to the publications to which they contribute to distinguish between fact and fiction.

Austrian Commission Disagrees on Intangible Values in Electrification

RESULTS on the electrically equipped lines of the Austrian State Railways have been so good that one may be astonished at the opposition offered to extensions eastward to Vienna. However, there is a very good reason in the cost of capital in Austria. It is still so high there that the government has to allow 8.3 per cent for interest, plus a 30-year amortization reserve. It takes strong arguments, indeed, to leap this high barrier.

The pros and cons are set forth in an article published elsewhere in this issue. From this it will be seen that Austria already has 366 km. (227 miles) of electrified trunk line, extending from the Swiss border to Saalfelden, with another 112 km. (69 miles) to Salzburg for completion in mid-1929. Plans have been made for continuing 312 km. (193 miles) on to Vienna. Because of the great outlay required, the Minister of Commerce and Traffic put the estimates of the State Railways and of the manufacturers before a commission for report.

As with most commissions, there is a majority and minority report. The majority favors electrification; the minority does not. While the members are in agreement on costs and the unprofitableness of electrification as regards direct benefits, they differ widely on the indirect benefits. An analysis of the arguments used develops another example of what the philosophers call "the will to believe."

The electric men figure more mileage per vehicle to be a great advantage, but the steam men see only that the brakeshoes will wear out faster. The electric men see airplanes as real competitors for long-haul business, and say: "We must move faster and more pleasantly." The steam men see in this advance of transportation a reason for assuming that everything will be different 30 years hence—so why invest money in electrification? The electric men point out that removal of smoke and dirt increases patronage and raises property values for taxation. The steam men clutch at some still mythical smokeless locomotive and assert that electrification isn't needed after all.

The electric men see that the electrifications of neighbor states will keep down Austria's pro rata of through business unless that country electrifies its lines, but the steam men see only the situation within their own country.

The electric men see greater safety with an electrified track, particularly in signal visibility, but the steam men grasp the opportunity to point out that wires and poles do not help visibility in any respect. The steam men also score in discussing the hazards from high-tension wires.

Neither side, however, quotes figures. The electric men make a strong point in stressing the value of greater capacity of tracks and yards due to higher-speed operation. The steam men ignore this but argue that manufacturers will not pay the higher cost of electrified sidings. Preconceptions rather than figures are also allowed to govern when the steam men assert greater reliability for individually powered trains than those dependent upon outside power supply. Why could not the commission have made a comparison of delays before and after electrification on one of its own electrified divisions? The steam men are blind to the fire hazard from sparks and burning coal but see very clearly that high-tension wiring is a pyromaniac.

It is rather amusing that electric railway extension

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should be asked to wait until locomotive standardization has been obtained, when the very same report suggests the purchase of steam locomotives much better than the present type! The steam men argue that electrification would produce greater stresses in track and draft gear, and then go on to suggest more powerful steam locomotives that would do the same thing. After all, the real objection to extension of electrification is the high cost of capital. It is to be hoped that some reasonable refunding plan will be acceptable to the financiers, but amelioration in this respect can come only with the continuance of domestic peace. It may be that another year will produce that ½ per cent to 1 per cent drop in interest that means so much to this project.

The Place of Rapid Transit in City Planning

WELL-DESERVED criticism has been directed at the city of New York in connection with its transit planning, by Daniel L. Turner, consulting engineer for the New York Transit Commission. His main thesis is that transit facilities must be furnished in advance of population and in the way it is desired to develop the city.

On the whole, Mr. Turner is right. Transportation is an inherent and a most important part of the general problem of city planning. Best of all, it appears now that New York will so regard it in the future, as Edward M. Bassett, authority on zoning and city planning, has submitted to Mayor Walker recommendations for a permanent city planning board of three members to supervise all improvements providing for the city's rapid growth.

Of course, it would be foolish to imply that the routes of the rapid transit lines already built were not carefully planned. That is not the fact, but it is a fact that they were not planned in accordance with the ideas behind the more inclusive program proposed for the future under the master plan which would provide for the city's growth until a population of 18,000,000 is reached. To this proposed planning board would be submitted all proposals for streets, highways, street grades, bridges, tunnels, viaducts, parks, parkways, playgrounds, sites for public piers, routes for railroads, ferries and other public utilities.

Similar master plans are in existence in 300 cities. Only as the planning of transit facilities is made a part of this work are these programs really complete. In the past too often, far too often, as Mr. Turner indicates, the construction of transportation facilities and their expansion have been spasmodic. In consequence much waste, duplication and unwise construction have resulted.

As ELECTRIC RAILWAY JOURNAL has pointed out repeatedly, development of comprehensive transportation plans as a part of the general city plan would permit each step in construction to be made as a part of a broad program. Construction budgets could thus be anticipated and the conditions of financing improved. Of course, the larger the city the greater the need for the most systematic planning, but no city sufficient in size to sustain an organized transportation system can afford not to consider that system as one of the most important factors affecting its welfare. Cities need to plan, but to plan only on a basis that takes into account a program shaped to the best interests of the city as a whole. Certainly they will continue to suffer in a civic way in direct proportion to the extent that they ignore transit requirements.

Potential Possibilities of Steam

STEAM is inherently suitable for the propulsion of transportation vehicles. It has been said that if the same degree of research and developmental effort had been put behind the steam engine for vehicle propulsion that have been applied to the internal combustion engine, automobile drive today would be far in advance of its present state. The abundance of power and flexibility that are available with steam, high torque of the steam engine at low speeds, its mechanical simplicity and small number of moving parts make it superior where these requirements are of major importance.

With the introduction of the gasoline engine as a drive for the automobile it became necessary for the owner who drove his car to become familiar with its construction. As the use of the automobile grew, machinists, blacksmiths and tinkers soon were doing a large business in the upkeep of the early models. Thus the future success of this type of motive power was assured by the growing attention given it by its users. Steam drive, on the other hand, was confined to a relatively small number of high-priced cars, and while its development was attended with certain technical difficulties, not the least of its handicaps was that the American public had become so well acquainted with the principles and the methods of maintenance of the gasoline automobile engine.

The potential possibilities of steam for the propulsion of buses, however, have continued to attract the interest of engineers ever since this type of transportation vehicle began to assume a position of major importance. More than any other free-wheeled vehicle, the bus demands a reliable source of power. It is also necessary to have the engine of sufficient size to provide rates of acceleration comparable to the lighter constructed, less continuously operated automobile. Steam provides these features and in addition offers the prospect of cheaper fuel and reduced maintenance because of comparatively simple construction.

These features, combined with the acute demand for faster schedules on buses, put steam in the position of a potential contender in the field of bus operation, and its successful development in this field will be an important factor in expanding the use of the bus in community transportation. True, there have been numerous unsuccessful attempts to develop steam drive for this purpose, and it will require considerable research to make it compete actively with the internal combustion engine backed as the latter is by seemingly endless resources. In fact, it is doubtful if the bus industry alone could support such an extensive development program as seems necessary.

But another incentive to the development of steam drive that is coming rapidly to the forefront is aviation, imposing still more severe power requirements than any other form of transportation. Here there must be not only high output per pound of weight, but high continuous output as well, and, above all, reliability. Self-starting and non-stalling characteristics of the steam engine would eliminate one of the greatest hazards of air travel, i.e., a stalled motor, particularly just after taking off the ground.

Thus in the background of steam drive development for buses loom the almost limitless possibilities of aircraft. Undoubtedly here is an incentive which is growing greater almost daily. Under the stimulus of such a field of application, steam may again come back into its own as a serious contender with the internal combustion engine.

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Passenger train on the Salzkammergut branch line electrification, Austrian State Railways

Austro-Swiss Electrification

Progressing Rapidly

Service already being given from Geneva to Saalfelden, a distance of 472 miles. A total of 542 miles will be completed by summer of 1929. Salzburg-Vienna line, 193 miles long, being considered

IN 1919, or within a year after the disastrous war which disrupted the Austro-Hungarian Empire, the new-born Austrian Republic took up the task of electrifying the State Railways. Rich only in water power, the republic was anxious to exploit it for the twofold end of reducing costs and of enhancing the attractiveness of travel in Austria.

Despite the harrowing years of fiat money, usurious loans and economic readjustment, electrification has gone forward in accord with the program set forth in the electrification act passed July 23, 1920. As a matter of fact, work was actually started during 1919. By the summer of 1929, or in practically a decade, Austria will be operating 296 miles of electrified main line route from the Swiss border at Buchs to the city of Salzburg, famous for its music and drama festivals.

This additional electrification will place the Paris-Zurich-Salzburg route to Vienna on a parity with the competitive Paris - Stuttgart - Munich - Salzburg route which required only 27 hours traveling time instead of the 28½ hours of the first route when steam-operated. The electrification to Salzburg was made all the more imperative because the planned electrification between Salzburg and Stuttgart will cut the running time to 25½ hours or less.

Before the end of 1928, the Austrian State Railways also expect to complete the 38-km (24 miles) Innsbruck-Brenner connection with the Italian State Railways. Besides these lines, there is the pioneer Salzkammergut branch line, totaling 107 km. (66.3 miles) of single track in operation since 1925. By the summer of 1929, the Austrian State Railway's electrified lines will total

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366 route miles. The Schwarzach-St. Veit and Spittal-Millstättersee lines also have been chosen for electrification, but so far only the hydro-electric supply has been taken in hand.

Capital and Amortization Charges 10 per Cent

The capital charges, including amortization, on the electrifications already undertaken, have approximated 10 per cent. Officials of the State Railways estimate that the future charges will be about 8.3 per cent. The principal question to be decided by the Austrian Parliament, which has the final say, is whether it would be economically justifiable to electrify from Salzburg to Vienna for 312 km. (193 miles) and also from Vienna to the important industrial city of Graz, 211 km. (132 miles).

Like the Swiss electrification, the Austrian State Railways standard is single-phase, 16⅔ cycles, with an average line potential of 15,000 volts and a maximum of 16,500 volts.

The first main line work was begun in 1923, covering 20 km. (12.4 miles) west of Innsbruck. Thereafter, 60 to 70 km. (37.2 to 43.4 miles) were electrified per annum. An extended account of the situation up to the end of 1925 was published in the issue of this paper for June 5, 1926. In the summer of 1928, 366 km. of track were in operation and 112 km. more were to be completed by the summer of 1929.

Through coaches over the line from Buchs to Saalfelden, 70 miles west of Salzburg, are now operated from the electrified divisions of the Swiss Federal Railways. Later this year the traveler can make an all-electric trip from Geneva to Salzburg, a distance of 874 km. (542 miles) without changing cars.

Various types of overhead construction have been installed on the different divisions. Experience has indicated that the Austrian-Bergmann design of gas-pipe bracket construction, as applied between Feldkirch and Bludenz and on the Salzkammergut line will be most satisfactory for general use. These brackets have two double-petticoat insulators with flashover ratings of 85,000 volts dry and 53,000—81,000 volts wet. The insulator for the upper horizontal member of the bracket can rotate in its fixture. The insulator for the diagonal or strut member has a pipe sleeving fixture to permit vertical movement of the diagonal.

On tangents, the poles are set at intervals of 60 m. (197 ft.) The contact wire over the running track is of 100 sq.mm. cross-section and over the switching tracks is 65 sq.mm. with tensions of 600 kg. and 390 kg. respectively.

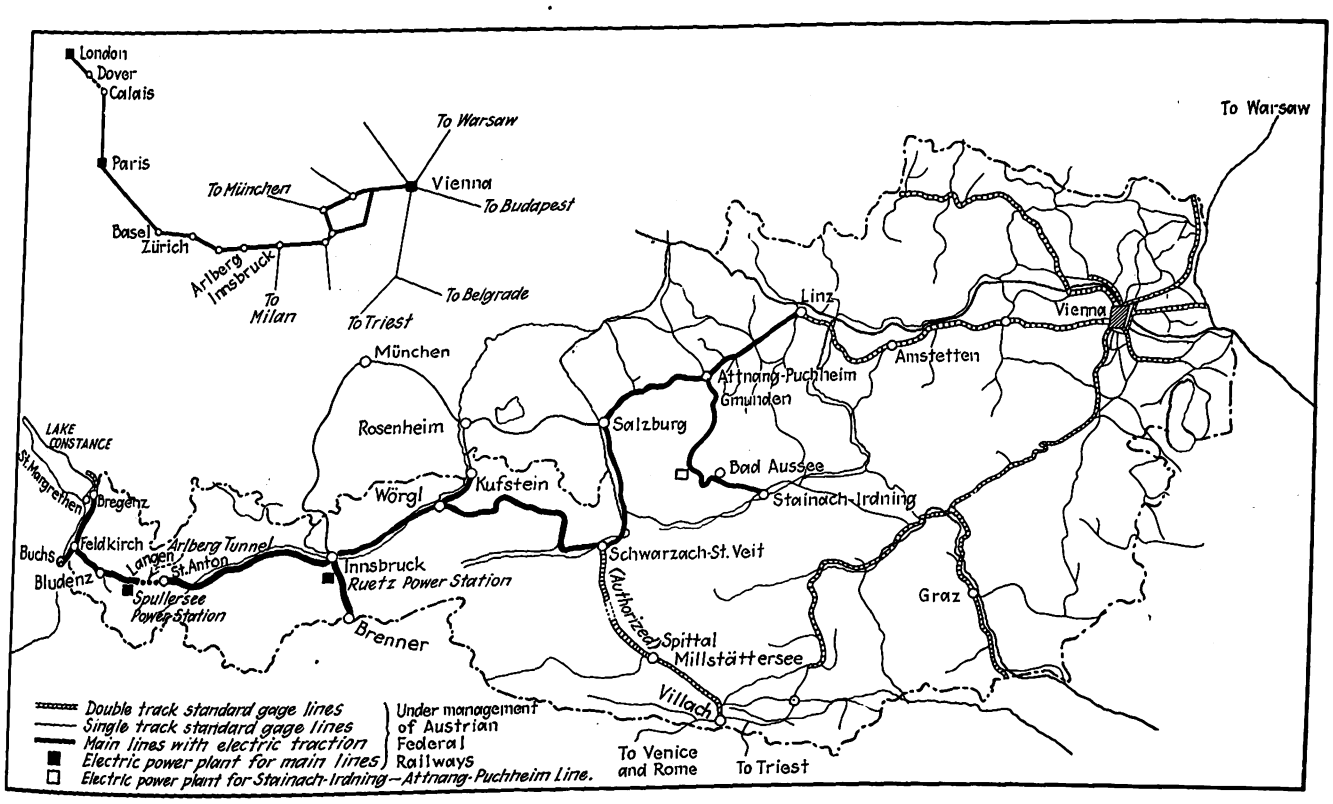
The steel catenary is 35 sq.mm. except for 50 sq.mm. at stations. It is usually under a tension of 600 kg. (1,320 lb.), but at stations it is rigidly anchored.

Electrification Speeds Up the Freight Service to Steam Passenger Speeds

The steepest grades on the main line are on the Arlberg division (Innsbruck-Bludenz) over a stretch of 136 km. (84.3 miles). This portion was opened in May, 1925. After electric locomotives were put in service on this division, freight trains were speeded up from 15 to 30 km. per hour (9.3 to 18.6 m.p.h.). This new maximum is greater than the speed of the former passenger train when operated by steam. The improvement on this stretch alone has been of noticeable help in competing for traffic between Paris and Vienna, with the South German lines via Salzburg, Munich, Stuttgart and Strasburg.

Another important advantage developed in electric operation is the greater effective capacity of train yards, which had grown to be inadequate with steam. In some districts, the expansion of such yards would be a very costly matter.

By 1928, the Austrian State Railways had in use or on order some 124 locomotives of eleven different types,



Electrified lines from the Swiss border into Austria

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Austrian State Railway's freight locomotive of design shown in use on the Mittenwald Railway

two of which were Kando single-phase, multi-phase design for experiment. The service weights of locomotives varied from 55.4 to 118 metric tons; and their tractive effort from 55.4 to 89 tons. Hourly ratings ranged from 950 to 3,000 hp.; continuous ratings from 775 to 2,000 hp.

The earlier locomotives weighed only 14 metric tons per driving axle, then 15.2 tons and now up to 18 tons on rebuilt locomotives. Normal schedule speeds are on the order of 45 to 50 km. an hour (27.9 to 31 m.p.h.), but passenger trains attain a maximum speed of 80 km. an hour (49.6 m.p.h.) on level track.

All power is derived from hydro-electric plants as follows:

	Kilowatt Units in Use		Kilowatt Units Eventually	
Stubach	4	5,300	6	5,300
Mallnitz	2	3,300	4	3,300
Achensee	3	5,300	4	5,300
Ruez	2	2,200	2	2,200
	1	5,300	1	5,300
Spullersee	4	5,300	6	5,300
Total	16	74,600	23	107,700

Experts Differ With Regard to Salzburg-Vienna Change

In February, 1928, the Minister of Commerce and Traffic appointed a commission of eight steam, electric and financial experts to report on the feasibility of electrifying the Salzburg-Vienna continuation of the main line on the assumption of 20 per cent more traffic than was carried in 1926.

The cost of money was placed at 8.26 per cent, of which 7.3 per cent was for interest and 0.96 per cent for amortization on a 30-year basis.

As matters stand today, the Austrian State Railways have almost no fixed charges exclusive of the investment in electrification. As of Jan. 1, 1925, the railways were valued at 2,818,782,000 schillings (14 cents to the schilling) of which all but 87,790,000 schillings steam investment had been written off. Extensive electrification would change this picture, especially in regard to amortization.

Comparison with electric operation was made more difficult by the fact that the State Railways had not been making any regular allowance for depreciation but had made renewals on a more or less arbitrary basis.

If further electrification were put through, said the commission, the track structure should be strengthened to take locomotives weighing 18 tons per axle and making speeds up to 110 km. an hour (68.2 m.p.h.). The 42 kg. per m. (84 lb. per yd.) rail used over most of the Salzburg-Vienna section should eventually be replaced by the type of rail used by the German State Railways, that is, 49 kg. per m. (98 lb. per yd.).

How Cost Estimates Vary from Manufacturers' Figures

The cost estimate of the State Railways was 200,000,000 schillings ($28,000,000) on the basis of 2,890,000,000 gross ton-kilometer traffic or 20 per cent more than was moved in 1926. The estimate of the electrical manufacturers was 150,000,000 to 151,000,000 schillings ($21,000,000 to $21,140,000) on the basis of 2,240,000,000 gross ton-kilometer. The difference in traffic was due to the State Railways' assumption that at least five years would elapse before electrification was complete. The commission accepted the manufacturers' estimate

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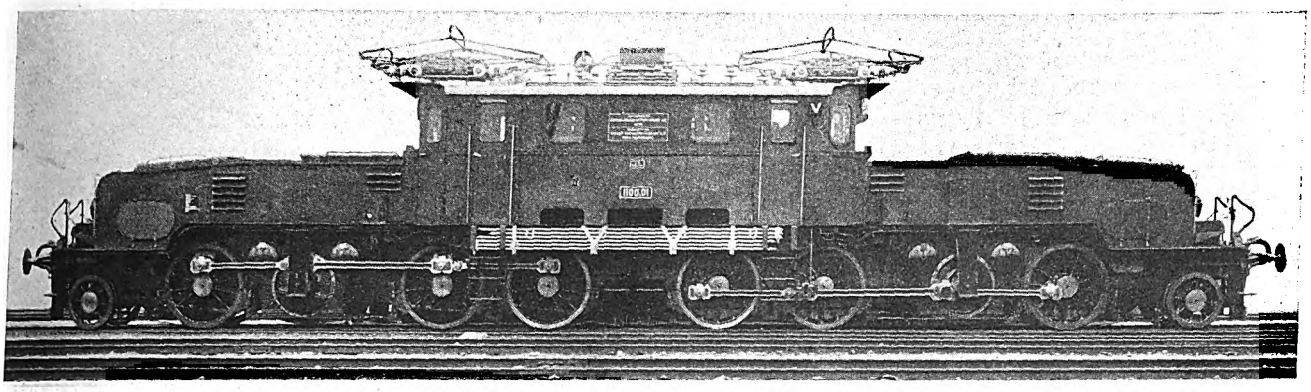


Mountain type high-speed passenger locomotive of 1100 series used by the Austrian State Railways

that five instead of six substations would do. The manufacturers estimate of investment for 110,000-volt tie-in lines was 1,800,000 schillings ($252,000) less than the State Railway's figures.

The cost of changing and conducting weak-current (telephone, telegraph, signal, etc.) circuits was set at 21,000,000 schillings ($2,940,000) by the State Railways but at only 11,400,000 schillings ($1,596,000) by the manufacturers. The State Railways also included 7,000,000 schillings ($980,000) rolling stock supplies.

Perhaps the greatest discrepancy was in the allowance for "contingencies." The manufacturers thought 2⅔ per cent or 4,000,000 schillings ($560,000) was enough; the State Railways figured 9 per cent or 18,000,000 schillings ($2,520,000). The argument of the State Railways was that there might be a considerable upward move in material and wages over the five-year construction period.

As regards weak-current circuits, the commission concluded that because of the need for placing such wiring in conduit, the cost assessed against the railways after allowing for the benefit to the State Telegraph and Telephone Department should be closer to the State Railways' estimate than the manufacturers, viz., 16,800,000 schillings ($2,352,000).

Since telegraph-telephone disturbance would be avoided by the radical but costly cure of conduiting the spacing of substations could be made to depend entirely on the factor of line drop. The specifications called for a contact line range of 10,500 volts minimum to 16,500 volts maximum, with the proviso that the equipment must be capable of giving full output at 12,000 volts line potential. This condition favored long intervals between stations.

Section breakers as installed to date prevented the equalization of potential, but this could be remedied with special relays. Since the line voltage would not fall below 12,000 volts even with four stations, except for a rare congestion of trains, the commission agreed that five stations spaced an average distance of 79 km. (49 miles) would be adequate. The estimated transformer peak per station was placed at 11,000—12,000 kva. The total cost of the five substations was figured at 5,500,000 schillings ($620,000).

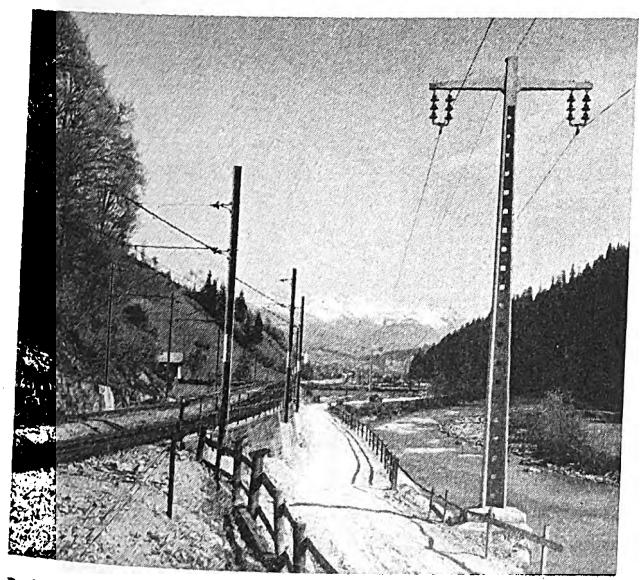
The commission decided that the initial supplies should be charged to capital account but that replenishments ought to be charged to operating account. The State Railways' allowance of 9 per cent for "contingencies" was accepted as correct, but owing to reductions in estimated investment, etc. the amount was placed at 15,000,000 schillings ($2,100,000) instead of 18,000,000 schillings ($2,520,000).

The commission refigured the total investment on the State Railways' assumption of 20 per cent more business (2,890,000,000 gross ton-kilometer). It calculated a cost of 174,500,000 schillings ($24,430,000) less a credit of 30,500,000 schillings ($4,270,000) for release of all steam equipment except switchers. This gave a total of 144,000,000 schillings ($20,160,000) as follows:

ESTIMATE FOR ELECTRIFICATION OF AUSTRIAN STATE RAILWAYS DIVISION BETWEEN SALZBURG AND VIENNA

	Schillings	
Overhead (850 track-km.)	25,200,000	
Substations (five)	5,500,000	
Rolling stock and supplies	76,300,000	
Electric heating	6,000,000	
Tower and service cars, etc	800,000	
Dwellings for employes	900,000	
Changes in railway's low voltage circuits, incl. signals	9,000,000	
Changes in state telephone and telegraph circuits	7,800,000	
Changes in dispatching and maintenance layouts	5,000,000	
Changes in bridges, tunnels, and other clearance measures	3,000,000	
Changes in lighting	500,000	
Management, supervision, etc	4,000,000	
Interest	15,500,000	
Contingencies	15,000,000	
Total	174,500,000	
Less credit for steam equipment transferred	30,500,000	
Total investment	144,000,000	$20,160,000

The rolling stock covers 127 locomotives totaling 10,358 tons with 5 per cent allowance for renewals totaling 60,905,000 schillings ($8,526,000); also 26 motor-car outfits of single and double units in equal number with 4 per cent allowance for renewals for 15,395,000 schillings ($2,154,000).



Perforated concrete poles used by the Austrian State Railways for transmission line betwen Hopfgarten and Soll-Lenkental on the Wörgl-Saalfelden route

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The steam credit item included an allowance for new steam investment that would be required to handle 20 per cent more business.

Power requirements for the Salzburg-Vienna division were placed at 100,000,000 kw.-hr. per annum of which 35,000,000 kw.-hr. would come at 4.05 groschen (0.567 cents per kw.-hr.) and 65,000,000 kw.-hr. would come at 6.3 groschen (0.882 cents per kw.-hr).

Electrification was expected to increase the schedule speed of expresses from 68 to 83 km. per hr. (42.2 to 51.5 m.p.h.) or 22 per cent; and of freights from 27 to 38 km. per hr. (16.7 to 23.6 m.p.h.) or a 40 per cent increase.

The saving in personnel was estimated as 4.6 per cent of the labor cost in 1926 for 20 per cent more traffic and without regard to possible one-man operation of locomotives. It is observed that permission to run one-man locomotives in certain classes of service had already been granted. Furthermore, the German State Railways had introduced one-man operation on lines under 70 km. (43.2 miles) per hour maximum speed. In Switzerland, most of the Loetschberg and Rhaetian trains were driven by one man; and the Federal Railways had lately tried some one-man locomotive operation.

In maintenance, the State Railways figured that electric would cost 78 per cent of comparable steam equipment, while the manufacturers figured only 55 per cent. The commission's estimate is 55 per cent. One factor in the commission's calculation was that the later electric locomotives would be maintained for 15 to 20 per cent less than the first electrics, which were rather light for the service.

Would Electrification Pay?

In answering the question: "Would this electrification pay?" the commission was unanimous in declaring that, disregarding the direct merits and demerits of electrification, it would not pay within the 30-year period allowed for amortization. Beyond this point, the members disagreed.

It was estimated that with overhead charges of 8.26 per cent included, the annual cost of electrified service would be 2,425,000 schillings ($339,500) greater than steam.

Five of the commissioners believed that after the loan charges of 11,894,000 schillings ($1,665,160) had been wiped out and the rolling stock renewal allowance doubled, there would be a gain of 8,100,000 schillings ($1,134,000) in favor of electrification.

The three minority commissioners hold that the charges on the cumulative deficit would not be met by the surplus obtaining after the 30-year period. They ask: "Who can tell what the cost of fuel or electricity will be 30 years hence; or what the transportation requirements will be at that time?" Electrical equipment might also be very different after a period of 30 years.

Indirect Factors in Favor of Electrification

The five who favored electrification set forth the following factors:

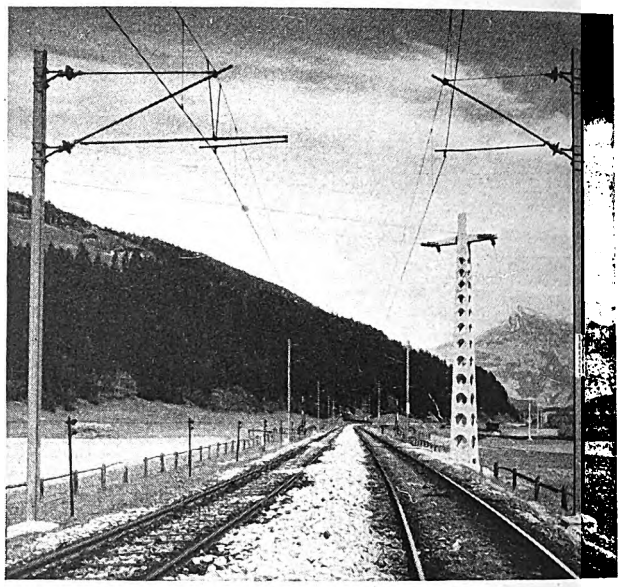
More milage per vehicle; also less rent for freight cars after modern, through brakes are adopted.

Fewer special or extra trains.

More flexible operation of suburban service with motor-car trains.

More effective competition with aeroplanes for long-haul, high-speed travel, and more effective competition with motorbuses for short-haul travel on short headways.

Removal of the smoke and dirt nuisance would greatly increase patronage.



Note type of concrete tower used to carry high-tension transmission line over contact line at Kitzbühel between Wörgl and Saalfelden, Austrian State Railways

More effective competition with foreign lines for greater pro-rata of mileage because of improvements in speed and cleanliness.

Lower painting and cleaning cost of cars, upholstery, stations, bridges, etc., due to elimination of smoke and dirt.

Less cost for uniforms (which are paid for by the railways—Editor.)

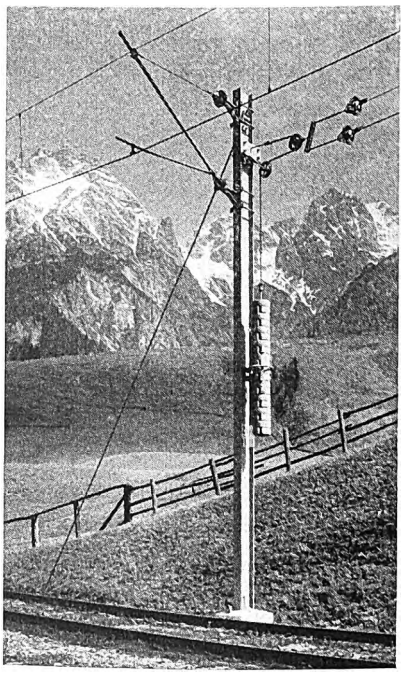
Decrease in maintenance of weak-current circuits because of enclosure in conduit.

One-man operation of locomotives on an increasing scale.

Postponement of third and fourth track construction because of higher schedule speeds.

Lower fixed charges at some future date in converting assumed 7.3 per cent loan to lower rate when financing conditions become more favorable.

Increased safety: First, clearer view of track and signals; second, fewer non-scheduled train movements; third, greater ease in making up time because of better rates of acceleration and higher speeds than steam; fourth, better control because conduiting permits longer-distance telephoning and better tie-up of signal towers, booths, etc.



Standard steel pole with tension take-up weights between Leogang and Hochfilzen on the Wörgl-Saalfelden route, Austrian State Railways

Elimination of dependence on foreign countries for coal.

More healthful working conditions for train and shop personnel.

Smoke and dust relief for cities along the railway.

Recapture of valuable yard space now needed for coal storage and tanks.

More effective use of track when freed from tenders and water cranes.

No more freezing troubles, especially of heating lines.

Favorable opportunity afforded for modernizing schedules and maintenance facilities.

Stimulation of home material and labor markets.

The minority members saw things differently as the following summary shows:

The money in the renewal fund of non-

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electrified divisions would not be available for some years because of the transfer of steam equipment from the electrified section to keep down investment cost. These steam divisions would therefore be compelled to operate with old, inefficient locomotives instead of buying better ones out of the renewal fund.

Less efficient use of personnel because of taking over surplus men from the electrified division.

Operating reliability would be decreased because interruptions of power affects whole divisions instead of single trains.

High-tension wires would increase employee hazards.

High tension would bring new fire hazards.

Greater hazard in crossing the right-of-way.

Visibility of signals decreased because of overhead wire and pole lines.

Greater difficulty in reaching the scene of an accident because a section may be dead.

Lack of locomotive construction designs based on long tradition.

Lack of flexibility on account of type of current, voltage and periodicity. (This ignores present Austro-Swiss operation—Editor.)

Greater stresses in draft gear because of heavier trains and greater acceleration.

Greater stresses in brake-rigging and wear of brakeshoes.

Factory owners would object to paying the higher cost of all-electric sidings. Such sidings would also interfere with existing cranes, derricks, etc., and increase hazards because of high tension.

The unfavorable financial balance with foreign countries would be increased from the present 7,000,000 schillings ($980,000) a year for foreign coal to 11,890,000 schillings ($1,664,600) for interest payments. There was hope, also, for more efficient use of Austrian brown coal in future.

Cost of capital would be excessive.

Modern steam locomotives with superheaters and smoke-consuming devices would do all that was expected of electricity, producing a saving of 5,155,000 schilling ($721,700) over electricity.

Indirect Advantages Justify Electrification Says Majority

In the opinion of the five majority commissioners, the indirect advantages of electricity are worth 1,500,000 schillings ($210,000) a year. This would reduce the electrical excess cost to approximately 900,000 schillings ($126,000) a year. After the 30-year amortization period, the gain from electrical operation would rise to approximately 9,600,000 schillings ($1,044,000) a year.

The initial extra electrical cost of $126,000 a year is held to be relatively small in comparison to the total gross of the Austrian State Railways. This was 566,000,000 schillings ($79,240,000) in 1926. Furthermore, increased traffic, and avoidance of higher wage and coal cost may be expected to change this deficit into a gain in a short time. A 10 per cent rise in coal would make steam operation cost 400,000 schillings ($56,000) more. On the other hand, a ½ per cent cut in interest return on conversion of securities would reduce the cost of the loan by 720,000 schillings ($100,800) a year.

A brief delay in electrification progress would not bring any important advantage but would disturb the labor and material market. A long delay would not be desirable in view of the electrification work of neighboring states.

The interim remaining until the completion of the electrification west of Salzburg gave ample time for the development of standards in maintenance and equipment. Delay, finally, would mean that any new steam locomotives ordered for the easy-grade Salzburg-Vienna division could not be advantageously adapted to the other, mountainous divisions.

While no interruption in electrification was desirable, the work could will be spread over a period of five years. This would make it easier to raise money, train men and shift steam equipment and personnel with less confusion. It would be most helpful to split the electrification as follows:

First year	Salzburg-Attnang-Puchheim
Second year	Attnang-Puchheim-Linz
Third year	Linz-Amstetten
Fourth year	Amstetten-St. Polten
Fifth year	St. Polten-Vienna

Comparison with Swiss conditions would not be fair, because the latter covered a network with a variety of lines. The traffic density of the electrified Swiss lines at the end of 1927 was only 60 per cent of the Vienna-Salzburg route, reckoning 20 per cent increase in the 1926 business of the latter.

Moreover, the Swiss lines were electrified during the highly expensive period of the war and just after. The same work would be cheaper today.

The minority suggestion of modernizing the steam equipment was so unlikely of fulfillment that no comment is made on the calculations offered.

The majority holds that the determining factors in electrification, aside from the fuel versus power cost, are the price of capital and the cost of meeting a given traffic density. In general, it paid to electrify busy trunk lines, and it did not pay to electrify lines of weak traffic. This explained the break in the Swiss and Swedish electrification program after the main-line work had been done.

Austria really was only at the start of electrification. Even so, only the following sections were under consideration:

Vienna-Salzburg	Vienna-Strass-Sommerein
Wels-Passau	Vienna-Graz
Bruck-an-der-Mur-Klagenfurt-Villach	

This totaled 900 km. (558 miles) or 30 per cent of the trunk line mileage. A decade had been required to electrify the 526 km. (327 miles) west of Salzburg and the 107 km. (66 miles) Salzkammergut area. The 558 miles suggested would therefore be likely to require fifteen to twenty years at the same rate of progress.

In view of the need for taking a perspective view, current financing and fuel conditions should not delay the electrification of the Salzburg-Vienna section.

Hungary had already decided to electrify its trunk lines, beginning with the section between Budapest and the Austrian border at Strass-Sommerein. This would certainly spur electrification of the Austrian trunk line east of Vienna. Mid-Europe would then have an all-electric operation of 1,400 km. (992 miles).

It is finally declared that electrification means a great increase in the value of property, and this will produce more revenue from taxes. This would also relieve the government from paying a considerable amount in unemployment doles. Such benefits justify following the lead of Switzerland, which had promoted electrification with the aid of a subsidy.

Indirect Disadvantages of Electricity Forbid Electrification, Says Minority

The minority report asserts that the disadvantages of electricity outweigh the advantages. Therefore, the estimated excess cost of electrification remains unaltered. While repeating the allegation that smoke-consuming devices are available, the minority admits that electrification is generally regarded as modernization and that the traveling public demands it.

If the non-electrified sections were supplied with 183 new instead of transferred locomotives, 11 per cent fuel or 1,200,000 schillings (168,000) would be saved in a year.

They also asserted that the 30 per cent higher speed of electric operation would increase brakeshoe costs 50

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per cent or 75,000 schillings ($10,500) a year. In Austria, the cost of money was very high while coal was particularly low.

Swiss figures for 1927 did show a saving of 1,750,000 francs ($337,750) for electrification, but this was based on a 5½ per cent cost of capital, not 7.3 to 8.26 per cent. Furthermore, the Swiss coal figure was 38 francs ($7.33) per metric ton of 7,500 calories, while the Austrian figure was 23.86 schillings ($3.34) for ton of 4,300 calories.

Traffic density per kilometer was 5,500,000 gross ton-kilometer compared with 9,200,000 gross ton-kilometer on the Salzburg-Vienna division.

The minority said that endorsement of electrification would no doubt be more agreeable to the public and perhaps to the government, but it could not be recommended from the economic viewpoint.

Excluding Switzerland, whose 60 per cent electrification was due to total absence of coal, Austria was well ahead in proportion of electrified track as shown by the following tabulation for conditions in 1927:

	Per Cent		Per Cent
England	2.1	Italy	6.6
Germany	2.2	Sweden	7.5
France	2.3	Austria	8.7

On conclusion of the electrification eastward to Salzburg in 1929, Austria's ratio of electrification would be 12 per cent.

Full-Time Man Substitutes for Safety Committees

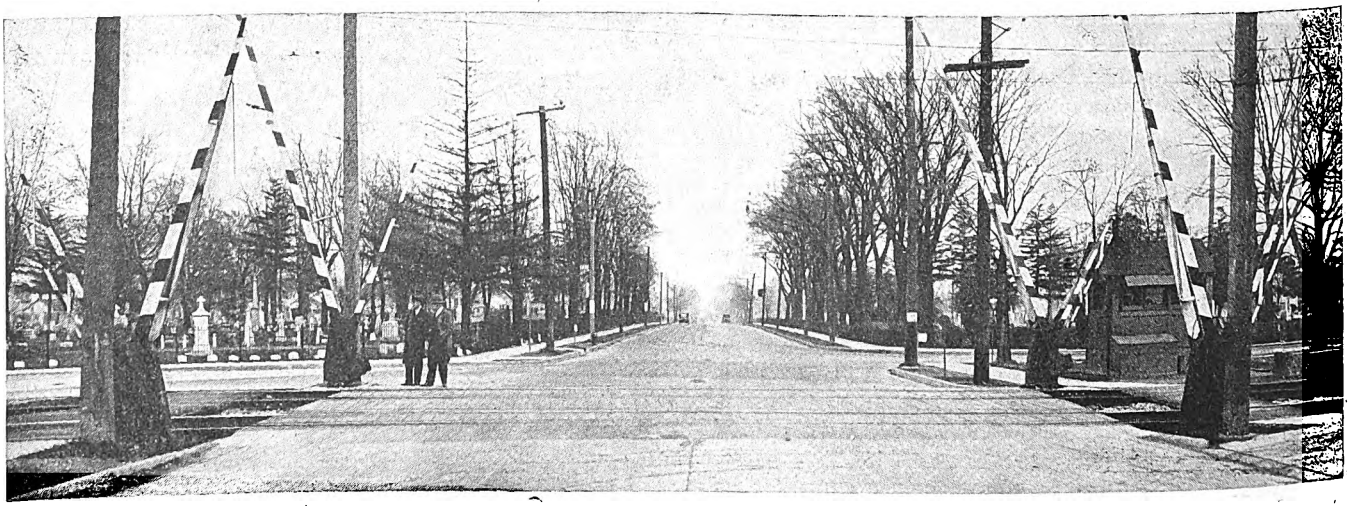
ON THE system of the Northern Ohio Traction & Light Company, a departure has been made from the usual plan of safety committees. The latter was followed for a year, but was abandoned in favor of a full-time safety superintendent, known as superintendent of accident prevention, with safety committees making investigations on special days and submitting reports. This plan has been found more efficient.

To maintain interest among the employees, the company has an honor roll with emblems which are presented to employees operating without accidents for periods of one, two and three years. These honor rolls are posted at division headquarters and the emblems are presented annually to the winners by the general manager of the company.

The left-hand or northbound track was raised 14 in. to eliminate double bump in highway crossing

North Shore Line Builds Model Grade Crossing

RECENTLY the Chicago, North Shore & Milwaukee Railroad completed a double-grade crossing over the tracks at Kinzie Avenue and Osborne Road, Racine, Wis., transforming a former "rough spot" into a safe and satisfactory rail-highway junction. To eliminate the double bump caused by the banking of the two tracks for the same-level curve, the northbound track was raised 14 in., starting 400 ft. north of Osborne Road and continuing to a point 250 ft., south of Kinzie Avenue. The vertical curve on the surface of the crossing with the crest just east of the tracks created by the new work is so gradual as not to be noticed. Creosoted planks, 4 in. thick, were spiked to the track ties and surfaced with 2 in. of elastite. New concrete and asphalt paving extending 28 ft. to the east and 4 ft. to the west of the tracks was laid on the crossing approaches. This was the only part of the job not handled by the North Shore Line's own maintenance forces. With the permission of city officials a drainage system installed to carry off all surface water was connected with the municipal sewer and three drains placed along the right-of-way. Estimated cost of the whole job of crossing reconstruction is placed at $6,000.



Looking east in Kinzie Avenue, Racine, across revamped rail-highway crossing of North Shore Line

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C., H. & D. Railway
Modernizes Power Supply

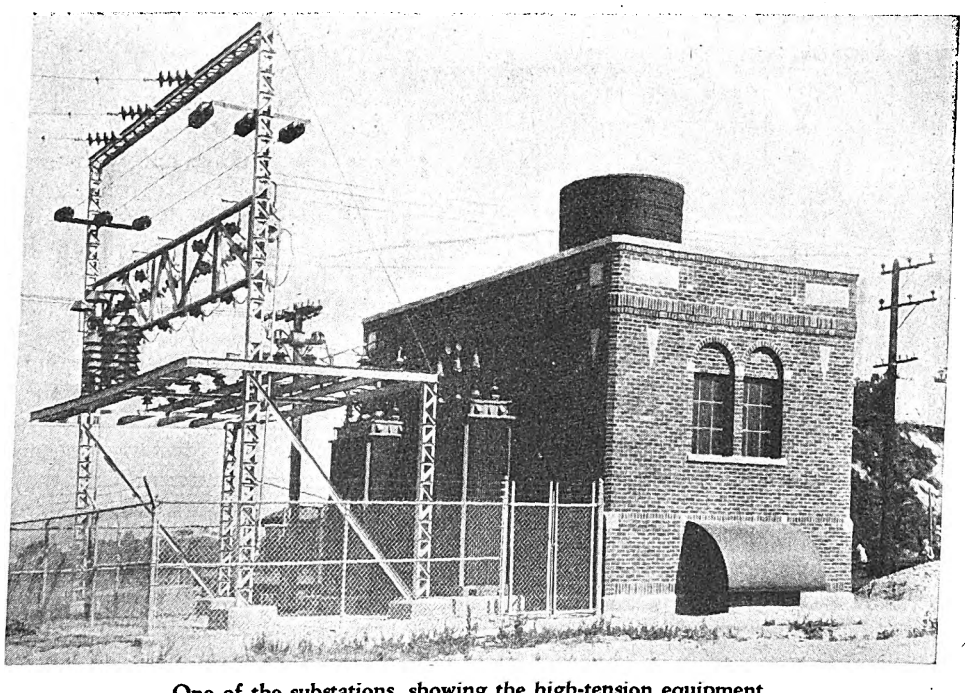
Automatic substations replace obsolete manually-operated stations, and purchased power is used instead of power generated in the railway's old steam-driven power plant

By H. A. Rose
General Engineering Department, Westinghouse Electric and Manufacturing Company

POWER for traction purposes on the Cincinnati, Hamilton & Dayton Railway formerly was generated in the company's power plant near Hamilton, Ohio, by reciprocating engine-driven generators of obsolete design, at 390 volts, three phase, 25 cycles. This was stepped up by transformers to 33,000 volts for transmission purposes. Naturally, power costs were high, particularly as the load had outgrown the power system. It was found that a substantial saving could be made by scrapping this plant and purchasing 60-cycle energy.

The six old manual substations had 25-cycle, 600-volt, compound-wound synchronous converters, with total capacity of 3,900 kw.

With insufficient feeder copper the average trolley voltage was low. Passenger schedule speeds were at times curtailed and power for freight haulage was insufficient.



One of the substations, showing the high-tension equipment and the hood for protecting the air inlet

In order to determine the proper locations and capacities for substations, a graphic study was made of power demands of each train, from which the heaviest daily loading for each 5-mile section was indicated. An economic study was made to determine the direct-current distribution losses and the average voltage conditions for different substation spacings. The losses were compared with the investment required to finance a new substation of proper rating. With slight modifications, the arrangement best suited to meet the requirements was found to be that given in the map. The total conversion capacity of the new substations is 3,800 kw.

The average substation spacing under the new system is 7.64 miles, as compared with 10.7 miles for the old system.

Since the capacity of each substation was determined on the basis of sufficient nominal rating to handle the present maximum load conditions adequate capacity is available for any normal increase in power demand. It follows that any future traffic developments requiring added system capacity would be most economically handled by the addition of substations midway between the existing locations rather than by the installation of a second unit, requiring additional feeder copper. For this reason all except the end stations are of the single-unit type.

Although the methods used for determining substation capacities indicated that a two-unit 1,000 kw. station was required at Hamilton, it was decided to locate a single-unit 500-kw. station on each side of the city.

Although a single-unit substation would ordinarily be sufficient at each end of the line, a station failure would

COMPARISON OF OLD AND NEW SYNCHRONOUS CONVERTER SUBSTATIONS OF THE CINCINNATI, HAMILTON & DAYTON RAILWAY

Name of Station	Old Stations Units	Old Stations Total Kw.	New Stations Units	New Stations Total Kw.
O'Neils	3	900	2	1,000
Miamisburg	1*	300	1	300
Franklin	2	600	1	300
Elk Creek			1	300
Trenton	2	600		
Coke Otto			1	500
Lindenwald	3	900	1	500
Pleasant Run			1	300
College Hill	2	600	2	600

*Portable substation.

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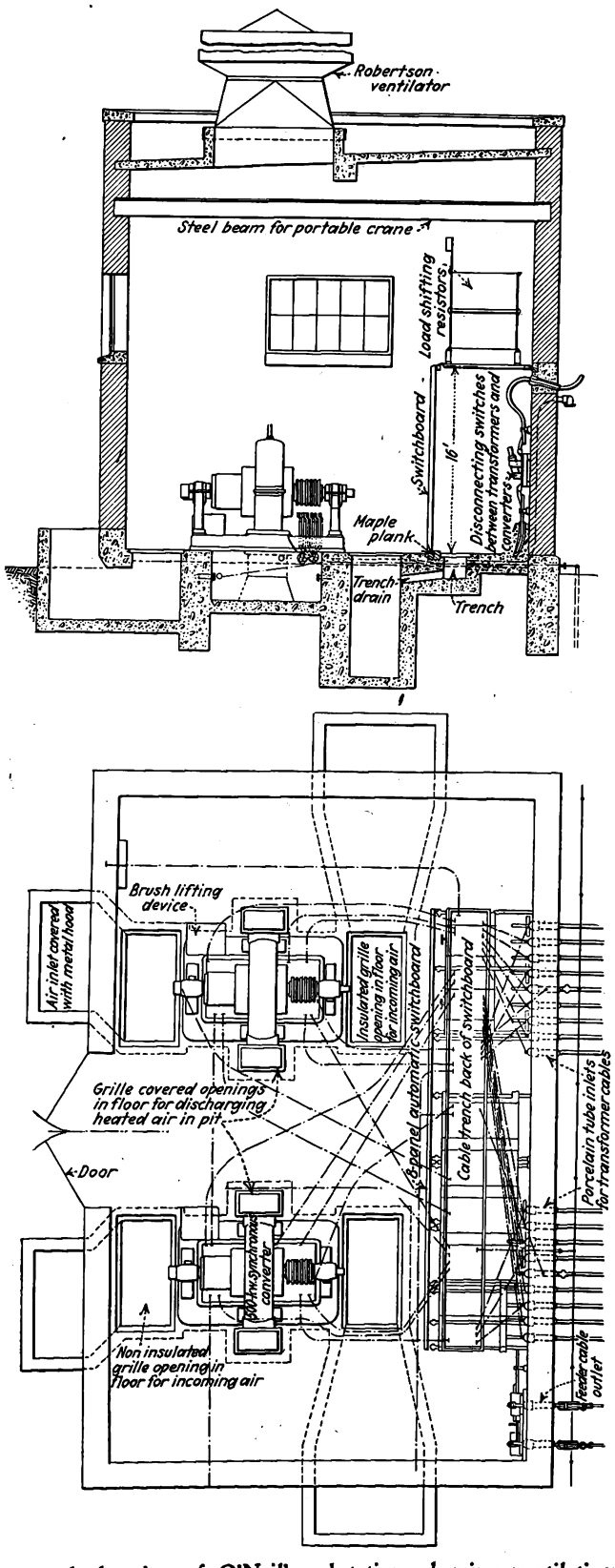

Plan and elevation of O'Neil's substation, showing ventilating system and arrangement of power ducts

cripple service, since the power required would be fed stub end from the adjacent station. Also, the growing passenger business near Dayton and a particular freight haulage situation near College Hill made advisable the addition of a second unit. O'Neils and College Hill are the only two-unit substations on the property. The O'Neils substation near Dayton has two 500-kw. synchronous converters, while the College Hill substation near Cincinnati has two 300 kw. machines.

New buildings were constructed for all the substations except College Hill, which was remodeled, incorporating the same essential design features used in the others. The structures, which are of red tapestry brick, are well proportioned and pleasing in appearance. The interior dimensions for the 300 and 500-kw. single-unit substations are the same. The following table gives the dimensions for the various types.

STATION INTERIOR DIMENSIONS

Station Capacity	Floor Space, Ft.	Height, Ft.
Two-unit 500 kw.	17½x28	16
Two-unit 300 kw. (remodeled)	21 x30	25
Single-unit 500 kw.	17 x16½	16
Single-unit 300 kw.	17 x16½	16

Air for ventilation enters inlets on adjacent sides of the building, is carried downward under the foundation and floor, and enters the interior through a grille-covered opening at each end of the converter bedplate. After passing over each bearing into the armature and field windings it is discharged radially on each side of the field frame. A single Robertson type ventilator in the roof, in line with the pressure belt built up by rotation of the armature, discharges the heated air. For the single-unit substations the ventilator is placed to one side of the converter in line with the direction of rotation. This assures efficient ventilation and at the same time prevents leakage of water on the machine.

Recirculation of air through the machine is reduced by small scavenging ducts which maintain a constant flow of air from the pit to small openings in the floor on each side of the field frame.

A hood covers each inlet at the entrance to the air ducts to prevent the entrance of rain and snow. The ducts are of large cross-section to insure low air velocities, thus aiding in the precipitation of entrained materials. A certain amount of moisture, snow or dirt, which may enter on windy days, is in this way deposited before entering the substation.

One of the illustrations shows the method of terminating a number of large conduits in the pit. All conduits leading to the machine terminate here instead of passing through the floor near the bedplate. This arrangement facilitates cleaning and adds to the appearance of the substation interior.

A trench in the floor at the rear of the switchboard terminates the control and power cables between the machine and transformers. This provides a junction or pull box, which aids in the installation and inspection of the cables.

Power is supplied to the railway's 33-kv. high-tension lines from the Union Gas & Electric Company's Hamilton substation. The high-tension lines are sectionalized at this point, one section feeding the substations located north, and the other those south.

Manually-operated high-tension pole-top switches near each station make it possible to sectionalize at any of these in case of a high-tension line fault.

Inexpensive steel structures are used for mounting the high-tension switching and protective equipment and for making taps to the power line. The high-tension equipment consists of three-phase lightning arresters, three-pole gang-operated disconnecting switches, choke coils and expulsion-type fuses. High-tension oil circuit breakers are not used, since the light-load losses of the transformers are not sufficient to justify them.

Shunt-wound synchronous converters connected to

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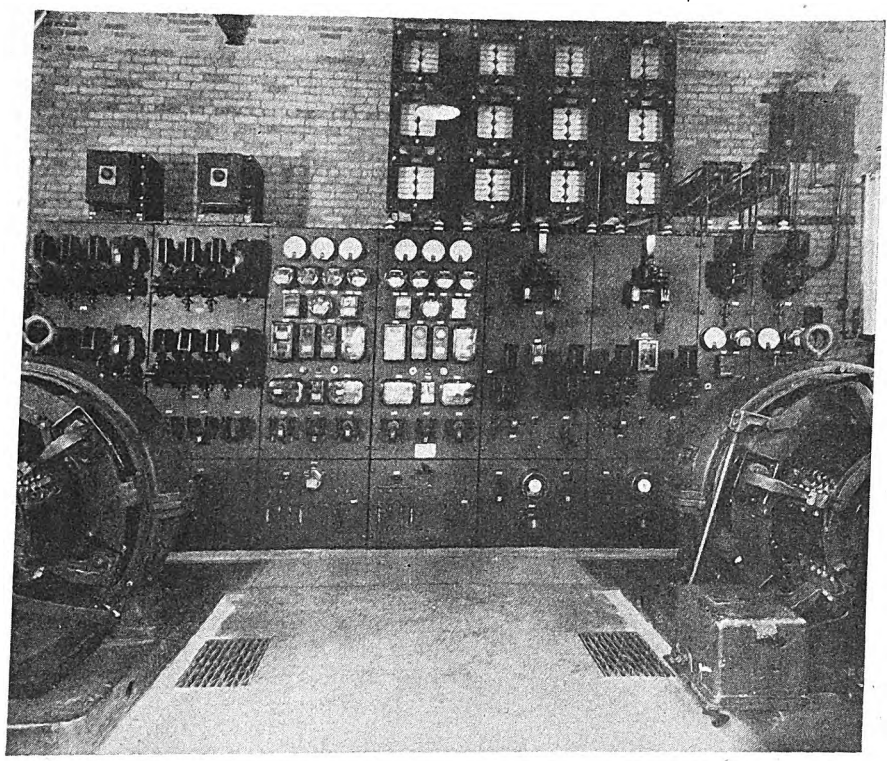
low-reactance three-phase transformers convert the 33-kv. three-phase power to 600 volts direct current. The many advantages to be obtained through the use of the shunt machine were responsible for its adoption.

The shunt converter with transformers of 7 per cent reactance gives a direct-current voltage regulation of approximately 5 per cent. The effect of this characteristic is to cause a shift in part of the load to adjacent substations, thus automatically providing for greater conversion equipment capacity at times of heavy loads. In automatic substations, resistance must be inserted between the machine and the bus when the load builds up to a value sufficient to endanger the machine. By lowering the bus voltage in proportion to the load, part of the load is shifted to the adjacent substations. Experience has shown that with compound-wound machines, two such steps of load-shifting resistance are desirable. With shunt machines, one step is all that is necessary.



The switchboard and a partial view of the two converters in the O'Neil's substation

The use of shunt or drooping voltage characteristic makes possible savings in the car resistor losses incident to the acceleration of heavy interurban or freight trains. This saving obtains through the lesser time required by the motorman to reach the series or full parallel combinations.

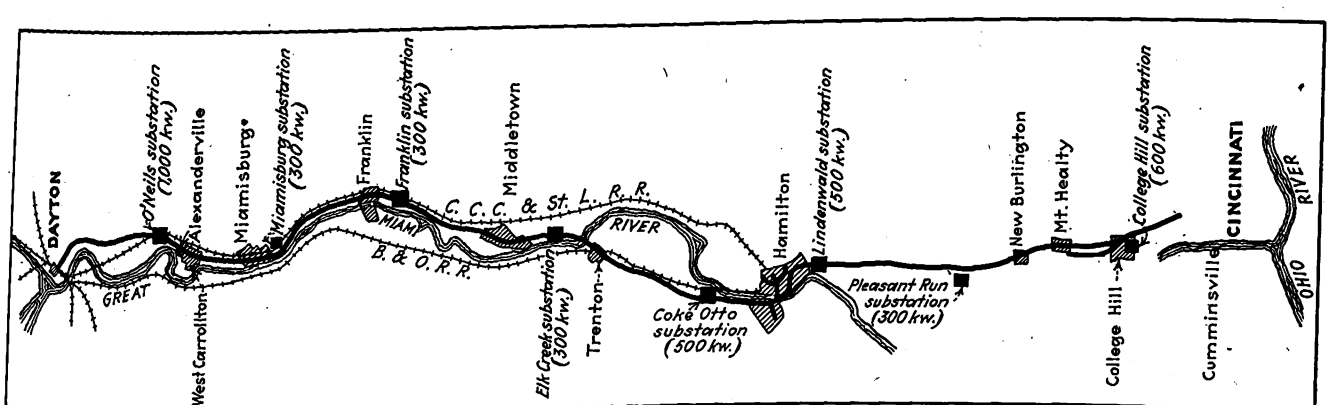
The shunt converter operates at leading power factors above 95 per cent between one-third and full load. From full load to 1½ load the power factor is slightly lagging, being approximately 99 per cent for the higher value. With compound machines and the high reactance transformers required, the deviation from unity is much more pronounced, being approximately 85 per cent lag for one-third load and 97.5 per cent lead for 1½ load. Since the load factor of the railway's substations is necessarily low, it follows that the leading power factor, obtained at light loads through the use of shunt converters, is advantageous.

The kilovolt-ampere rating of the transformers is equal to the nominal kilowatt rating of the synchronous converters. A spare 500-kva. transformer is available in the event of failure of any of those in service. Each transformer has a 10-kva. single-phase, 440/110-volt tertiary control winding.

The substations are arranged for both full and semi-automatic operation and are unattended except for periodic inspections. Full automatic operation provides for starting and stopping of the station in response to load, and stopping if faults develop which might prove detrimental in case of continued operation. Troubles of a serious or permanent nature lock the equipment out of service, and an inspector must restart the station. Troubles of a minor or less permanent nature allow the station to be placed back in service as soon as normal conditions are resumed, providing the load is such as to demand additional machine capacity.

Under semi-automatic operation the station runs continuously until shut down manually or by the functioning of a protective device which either locks or holds the equipment out of service, depending on the nature of the fault. For troubles of a minor or less permanent nature, the equipment in semi-automatic operation functions to hold the unit out only during the fault period, it being returned to service as soon as conditions become normal.

The change from full to semi-automatic operation is made by a double-throw knife switch. It is customary practice to retain at least one station under continuous



Eight substations now supply power to the Cincinnati, Hamilton & Dayton Railway system

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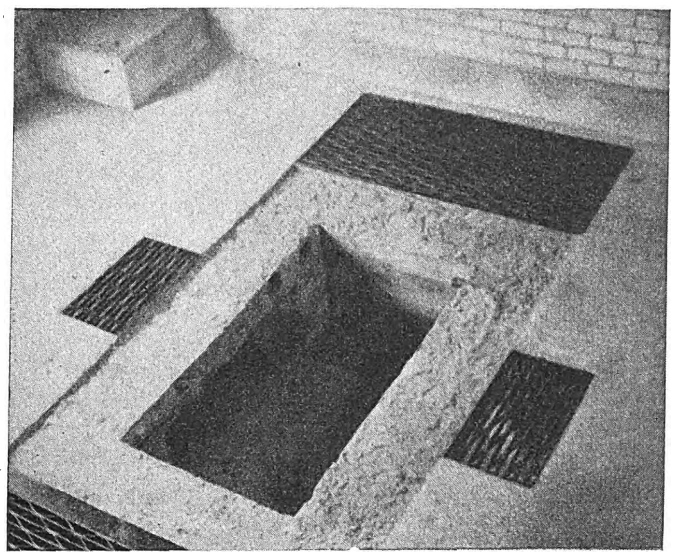
or semi-automatic operation as the master station. The others then stop and start in response to load in their immediate vicinities.

In order to sectionalize the feeder system and to protect the machines from damage due to short circuits between the trolley and rail, two automatic short-circuit detecting, service-restoring, contactor-type breakers are installed at each substation. An insulator in the trolley



Converter pit and air inlet construction

circuit in front of the stations sectionalizes this circuit. Power is thus fed each way from the stations through a single feeder.

In event of a short circuit on one section of track, the short-circuit detecting feeder equipments, which supply this section from adjacent stations, open. This removes the faulty section of line while service is allowed to continue on the normal sections. Following the opening of a feeder contactor, a resistor, which is permanently connected across the main contacts, feeds a small current into the circuit presumably at fault. A sensitive relay, connected in such a manner as to measure the resistance of this circuit, automatically recloses the contactor as soon as the circuit resistance has risen sufficiently to indicate that the fault has been removed.

For convenience of inspection and reference, all switchboard devices are marked either by metal plate numbers for devices mounted on the front of the switchboard, or with painted figures for those back of the switchboard. These are in accordance with the latest Power Club device numbers. This indicates the particular purpose for which the device is used. All resistor tubes, fuses, connections and terminal blocks are given wiring numbers. This facilitates inspection and reading of wiring diagrams. It is with the protective device numbers that the annunciator targets of the lockout relay are labeled.

The switchboard and auxiliary equipment are insulated from ground by maple planks in the floor and wall. This arrangement practically eliminates the danger from accidental grounds in the wiring from doing damage.

The electrical equipment for the substations was supplied by the Westinghouse Electric & Manufacturing Company. J. W. Bishop, superintendent of substations for the Detroit Edison System, was consulting engineer, while engineering work in connection with the rehabilitation of the power supply was under the direction of the company's chief engineer, J. E. Dallas.

Milwaukee Devises Test for Substation Operators

SUCCESS in the selection of motormen by means of a standardized test, as worked out by the educational department of the Milwaukee Electric Railway & Light Company, has been so impressive that an investigation into the possibilities of developing a somewhat similar means of forecasting the capabilities of applicants for substation operators' posts was undertaken recently at the urgent request of the electric distribution department of the company. The methods developed in making tests for selection of motormen were discussed in articles in ELECTRIC RAILWAY JOURNAL for April 10, 1926, page 624, and Nov. 10, 1928, page 830. Preliminary to any attempt to prepare a selection test a detailed job analysis was made, the task being delegated to a young engineer who started as a station operator and had worked at the various substations of the company for more than 2½ years. This study took a month, and when completed made it possible to specify the necessary qualifications for the position.

The work of the substation operator consists essentially of the following duties: (1) Daily inspection of substation equipment; (2) putting machines on the line; (3) removing machines from the line; (4) testing relay protection, primary and secondary meters, feeder regulators, etc.; (5) cleaning and charging lightning arresters; (6) clearing rotary converters, rectifiers, transformers, and other station equipment of minor troubles; (7) tracing trouble in station wiring; (8) answering telephone and door.

QUALITIES NECESSARY FOR STATION OPERATOR

From careful study of the job analysis, visits to a large number of the stations, observation of operations in each, discussion of the work with supervising engineers, and an analysis of types of errors most frequently made by station attendants, the qualities needed by a successful substation operator were summarized: (1) Ability to understand and carry out written directions; (2) ability to understand and carry out oral directions; (3) ability to distribute attention; (4) ability to act quickly; (5) caution; (6) good emotional control; (7) at least average intelligence; (8) good mental control; (9) good memory for numbers and location.

With the above data at hand a group of tests was devised for experimental purposes, consisting of an apparatus designed to measure reaction time, distribution of attention, learning ability, memory, emotional control, freedom and co-ordination of movement. This apparatus as designed and built consists of three parts, a signal and response board, an automatic signal control and recording machine and a tachistoscope. The last is a small box with a cross slot past which five-digit numbers move at approximately five-second intervals. The switchboard contains seven switches of the various types encountered in an ordinary substation. Five of the switches are numbered; the three-pole, double-throw switch is lettered A; the two-pole, double-throw switch is lettered B. Switches A and B provide master control of the five numbered switches. Whenever one of the numbered switches is operated, switch A or switch B must be closed to right or left to complete the desired circuit.

There are three signals, two audible, one visible. These

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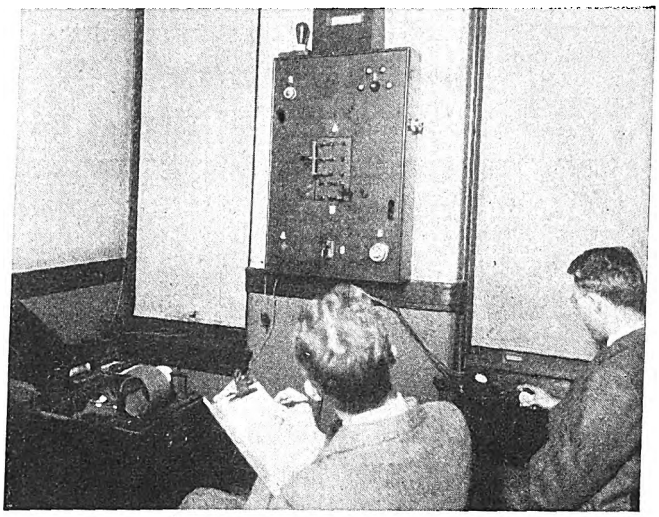
are a horn, a buzzer, two small green lights and a large red one.

The individual under test is supplied with typewritten directions, giving him the sequence which must be followed in acknowledging and shutting off each of these three signals and the emergency red light signal. He is allowed to read and reread these instructions until he believes he understands them and is ready to practice the answering of them at the test board. This study of instructions lasts from three to fifteen minutes, according to how quickly the individual assimilates the printed word, and how thoroughly he feels it is necessary for him to understand directions before trying to carry them out. He then goes to the test board for practice and is given the various signals, to which he responds by manipulation of the switches in definite sequence. He is drilled on these responses until he feels satisfied he can go through all of them without error. This practice period may last from six to twenty minutes, depending on the individual. The instructions relating to the answering of the emergency signal appear on the instruction sheet, but are not unduly emphasized.

The test is commenced with the individual seated at a convenient distance and angle from the test board. He is instructed to copy on a sheet of paper as rapidly and accurately as possible the five-digit numbers which commence to appear in the illuminated slot in the tachistoscope. This work is to be interrupted when signals sound or flash on the board, but is to be resumed as quickly as possible, however, following the answering of the latter. There are 25 signals in all during the test, with two emergency signals. Correctness of responses, errors, and reaction time, as well as the operator's method of handling the switches, are recorded graphically on a tape paralleling the signal sequence tape in the automatic control unit. Reaction time to all signals is measured in hundredths of a second by means of a stop watch which starts and stops with the start and stop of the signals.

The test results of 50 regularly-employed station operators of the company were checked against ratings given the men by two engineers directly responsible for their work and in constant touch with it. Each man was rated with respect to speed in carrying out orders, behavior under emergencies, caution, attention, and mental capacity. The ratings were repeated three separate times at one-month intervals to improve the reliability of the findings. The form used in the ratings is reproduced.



The test board was designed to measure an individual's reaction time, distribution of attention, learning ability, memory, emotional control, freedom and co-ordination of movement

Agreement between the ratings given by the two engineers and that determined from the combination of selection test and accompanying interview, given each of the 50 men tested, has been so close that it has been decided no further experimentation is necessary before utilizing the test as a selective measure. That the investigation has already paid for itself is freely admitted. The test has disclosed one man who was in a serious nervous condition unfitting him for service, and several others were found whose temporary removal from the job for treatment was considered advisable. Transfers and promotions have already been made on the basis of the selection and interview results. It is expected that the test will prove immensely valuable, not only in the reclassification and treatment of the remaining 50 station operators yet to be checked, but also in the selection of new men.

E.M.B.A. Educational Department

Rating of Station Operators

Date.....

Name .....Location.....Date Employed.....

Check one item, under each heading, which best describes the above station operator.

Speed in Carrying out Orders

—Very rapid.
—Rapid.
—Fair.
—Slow.
—Very slow.

Caution

—Very careful even to minor details.
—Usually careful, occasionally slips on minor matters.
—Occasionally cautioned.
—Careless, often cautioned.
—Reckless.

Mental Ability

—Superior intelligence. Thinks things out for himself.
—Good. Quickly grasps directions.
—Average. Follows orders, but needs specific instruction.
—Fair. Needs considerable supervision. Difficult to teach.
—Poor. Untrainable.

Behavior Under Emergency Conditions

—Excellent control under difficult conditions.
—Good control—never loses his head, but noticeably disturbed.
—Upset under unusual conditions, but sufficient control to regain composure quickly to carry out instructions.
—Rather easily upset. Becomes confused but can carry out direct instruction.
—Nervous, very easily confused, cannot be depended upon.

Attention

—Always alert and on the job. Puts self into job.
—Attentive. Carefully watches job. Passively rather than actively.
—Carries out routine but attention is somewhat divided.
—Mind wanders. Often not alert.
—Inattentive, negligent.

.....
Rater

This form facilitates rating individual substation operators in Milwaukee

Pullman Car on South Shore Line

ON FEB. 16, the Chicago, South Shore & South Bend Railroad used its first regular Pullman sleeping car, when it carried 35 members of the University of Illinois track team from South Bend, Ind., to Chicago in a special car attached to one of the hourly South Bend limited trains. At the conclusion of the meet, the sixteen-section sleeping car was ready at the terminal for the athletes to retire. It left South Bend at 4 a.m., attached to a Chicago limited train for Roosevelt Road, Chicago. According to officials of the company, this is one of the few instances in which a Pullman sleeper has been used in service on an electric railroad.

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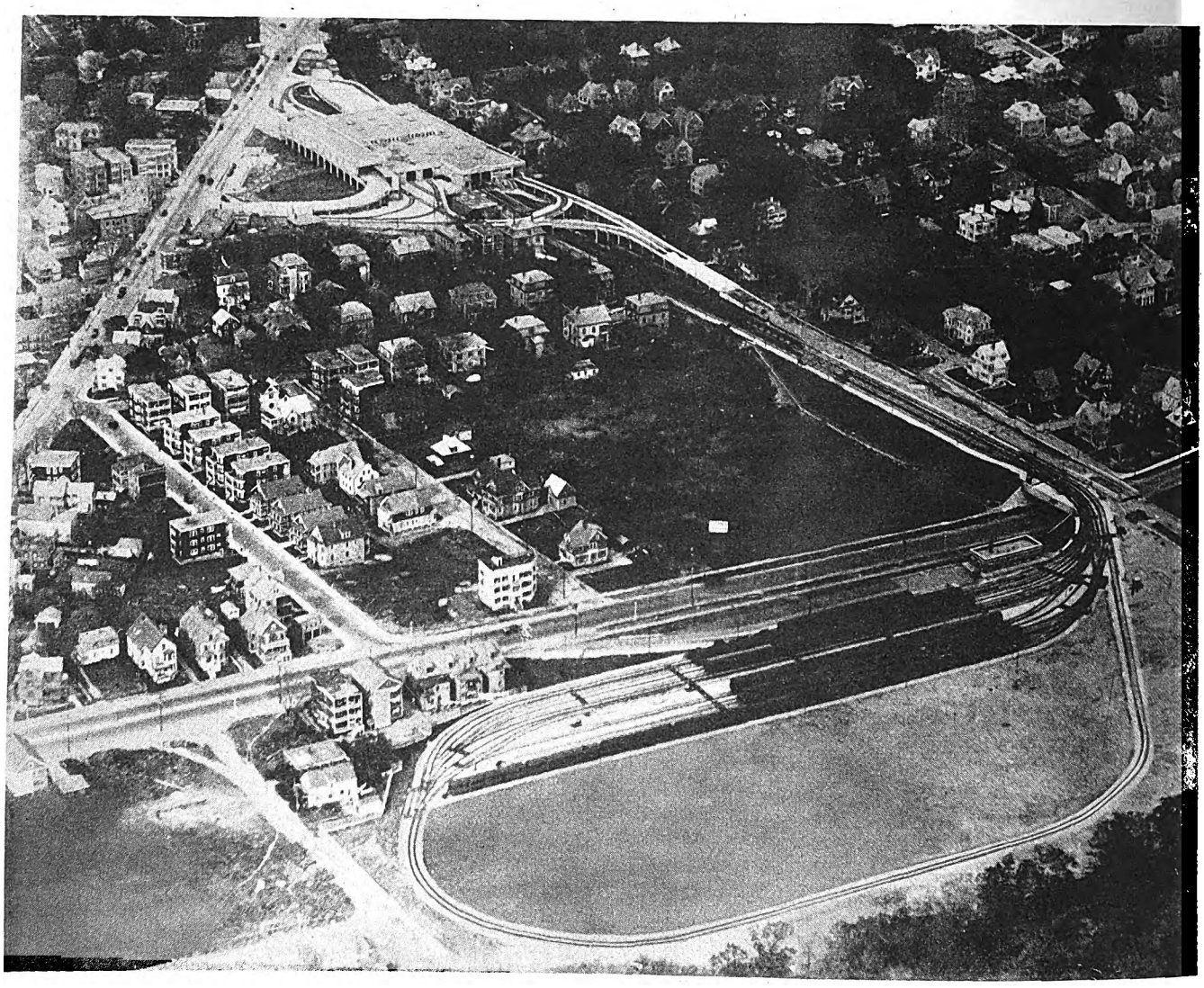
Large Car Yard

Designed for Dorchester Extension

Storage space now provided for 60 rapid transit cars. Additional tracks may be installed later. Complete yard signal system facilitates handling of large number of trains which end runs at this point



Aerial view of the terminus of the Dorchester Rapid Transit Extension, showing the Codman Street yard in the foreground and the Ashmont Street station beyond the yard

SOUTH of the Ashmont Station on the Dorchester Rapid Transit Extension of the Boston Elevated Railway is the new Codman Street yard. After trains terminate their runs at this station they continue south, either going to the by-pass track between Ashmont station and the Southern Artery, Codman Street, or continuing over the bridge spanning the Southern Artery to the Codman Street yard. If a train is to go back into service immediately the by-pass track only is used. If it is to be laid up, if additional cars are to be attached to the train, if the length of the train is to be reduced, or if inspection or other work is to be done in connection with it, the train goes to the yard.

The relay track south of Ashmont station is parallel to the two main-line tracks. Between the northbound and southbound track is a raised wooden platform installed for the purpose of allowing the train crew to change ends quickly and to facilitate the cleaning of the train that is to go back into service immediately. It is shown in the bottom illustration on page 364.

All of the switches and signals between Ashmont station and the entrance to the Codman Street yard are controlled from a tower, indicated as *Q* in the accompanying diagram of the yard. This section is well lighted by overhead illumination, and suitable plank walks have been provided so that the trainmen, inspec-

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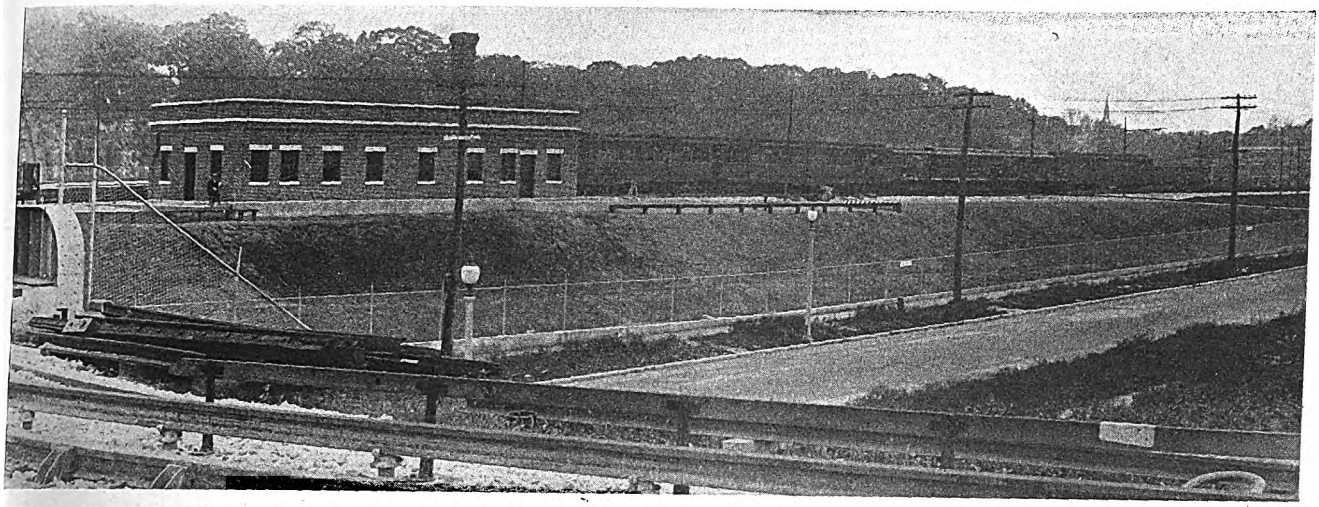


The yardmen's building, at the entrance to the yard, is used by the yardmen of the transportation department, the department of rolling stock and shops, and the trackwalkers, signal men and others of the maintenance department

tors and others can safely and readily walk between the yard and the station.

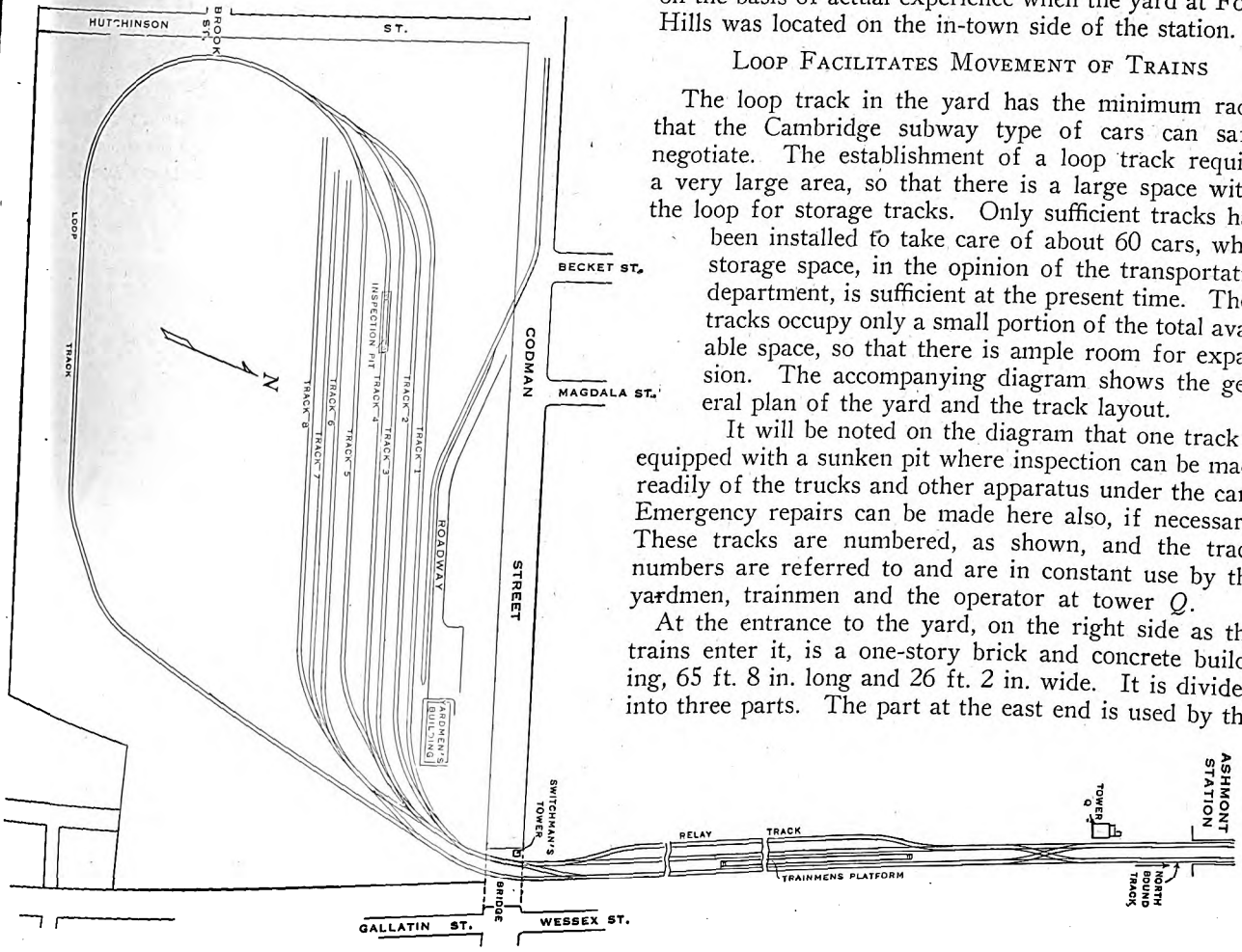
The Codman Street yard is located on a large tract of land containing about 1½ acres, just south of the new Southern Artery and west of the high-speed trolley tracks that will later lead to Mattapan. The yard was located here for three reasons: First, because the area available was sufficient; second, because practically all of the land was already owned by the city of Boston, this area having been used formerly as a stone quarry from which broken stone for the repair of the streets was obtained; third, it was located in the proper position south of, or beyond, the terminal station, which corresponds to the location of all storage yards on the rapid transit lines of the Boston Elevated Railway system. The company has found that for economical and efficient operation of rapid transit trains or cars the yard must be located beyond the terminal station. In recent studies for rapid transit facilities, suggestions have been made that terminal yards be located on the in-town side of the terminal station. The operating and engineering staffs of the Boston Elevated Railway, however, favor the other plan on the basis of actual experience when the yard at Forest Hills was located on the in-town side of the station.

Loop Facilitates Movement of Trains

The loop track in the yard has the minimum radius that the Cambridge subway type of cars can safely negotiate. The establishment of a loop track required a very large area, so that there is a large space within the loop for storage tracks. Only sufficient tracks have been installed to take care of about 60 cars, which storage space, in the opinion of the transportation department, is sufficient at the present time. These tracks occupy only a small portion of the total available space, so that there is ample room for expansion. The accompanying diagram shows the general plan of the yard and the track layout.

It will be noted on the diagram that one track is equipped with a sunken pit where inspection can be made readily of the trucks and other apparatus under the cars. Emergency repairs can be made here also, if necessary. These tracks are numbered, as shown, and the track numbers are referred to and are in constant use by the yardmen, trainmen and the operator at tower *Q*.

At the entrance to the yard, on the right side as the trains enter it, is a one-story brick and concrete building, 65 ft. 8 in. long and 26 ft. 2 in. wide. It is divided into three parts. The part at the east end is used by the



General plan of the Codman Street Yard and the tracks leading to the Ashmont Station

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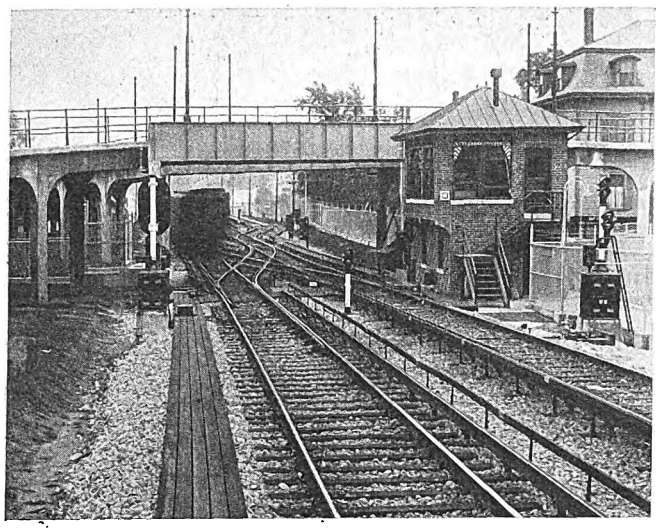
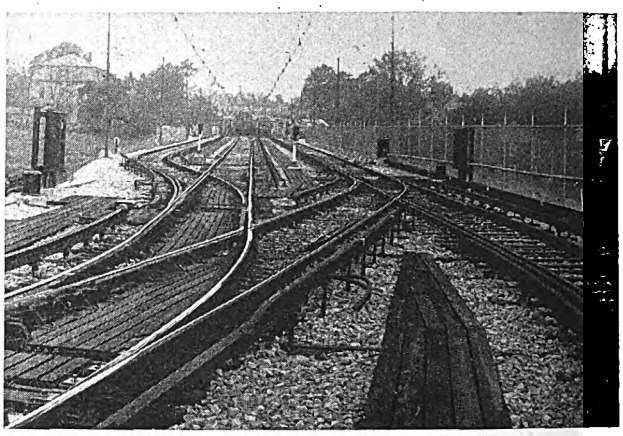


The interlocking tower of the complete yard signal system installed is shown at the right of this view

yardmen of the transportation department; the middle section is used by the department of rolling stock and shops, which will keep here certain material and tools for inspecting and making repairs to cars; and the west portion has been turned over to the maintenance department for the use of trackwalkers, signal men and others. The maintenance section will be used in winter for the use of additional men sent to the yard to remove snow and keep the switches open during snowstorms. The building is equipped with ample toilets and washing facilities. It is heated by steam, the heating plant being located in the basement at the west end.

From Dorchester Avenue to the Codman Street yard, a track has been installed in the center of the Southern Artery, leading into the yard, parallel to track No. 1, and terminating near the yardmen's building. Alongside this track is a driveway which is used for hauling material to, or taking it away from, the yard or the yardmen's building.

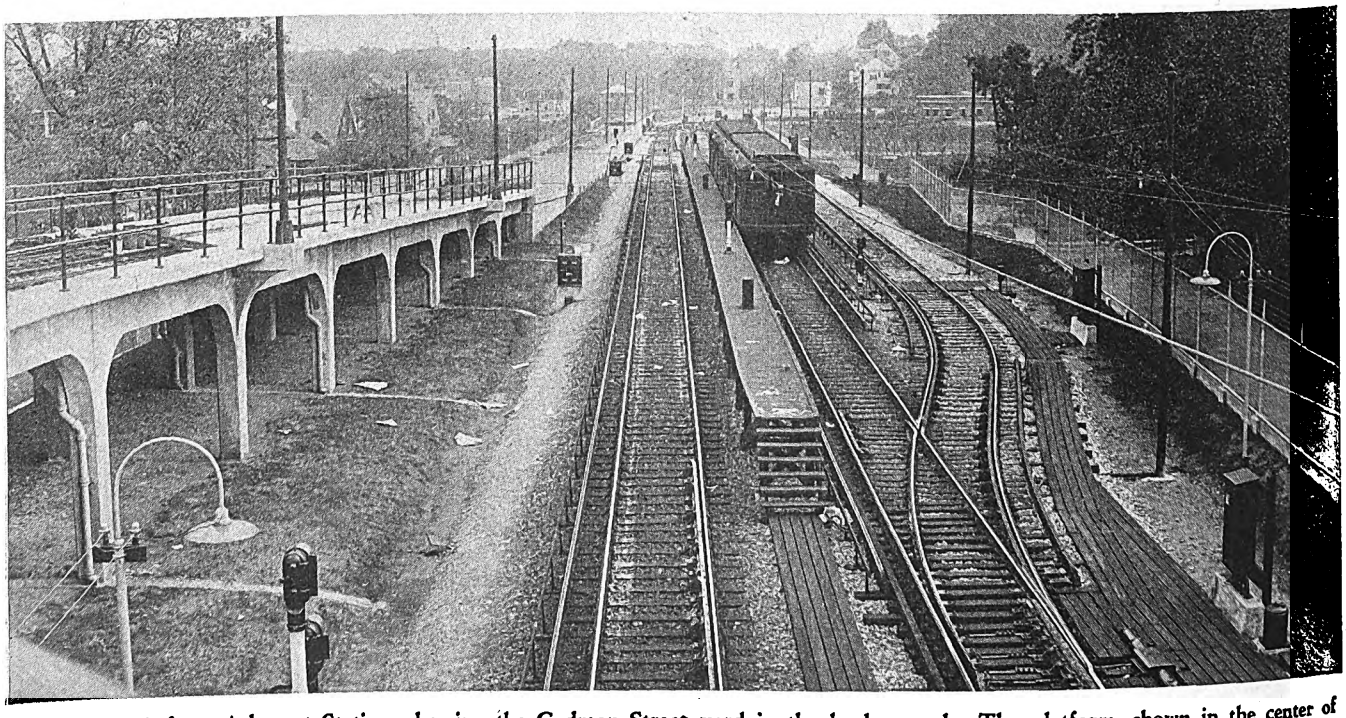
There is a system of inter-communication connecting tower *Q*, the yardmen's building and a small switchman's booth located near the Southern Artery Bridge. This is complete in every detail, the three locations being connected with both main line and inter-communicating telephones, call bells and a special annunciator system. The bell signals are used by the towerman in calling upon the yard force to put a relay train into road service, in notifying them when a road train is to be removed from service, etc. The annunciator is used by the yard-



Looking north from the yard. The track at the extreme left is the relay track, used for trains which are to go back into service immediately. Note the wooden platforms for the trainmen and trackwalkers

men to notify the towerman of required routes to be set up for train movements through the interlocking. Telephones are, of course, for securing and transmitting a variety of information, where greater detail is necessary than can be given by bell code or annunciators.

The annunciator in use was especially designed. It consists of push-button controls and miniature lights at both the yard building and switchman's booth, and with miniature indicating lights, cancelling buttons and buzzer at tower *Q*. In calling for a route to be set up, the



Looking south from Ashmont Station, showing the Codman Street yard in the background. The platform, shown in the center of this view, allows the trainmen to change ends quickly and facilitates the cleaning of cars

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yardman pushes the button at either the yardmen's building or the switchman's booth. This call is indicated at tower *Q* by both the light and audible signal. The corresponding light is also displayed at the originating point and continues to show until the route has been set and train movement made, after which it is cancelled by the towerman. By this method, accuracy on the part of both men is required. As both men have the indication of what was called for, disputes are avoided.

New Englanders Express Faith in Rail Transportation

Discussion at Providence meeting centered on problem of making transportation salable and importance of modern cars

THAT the electric railway is certain to be a permanent form of transportation and that steps should be taken to improve the equipment and make it more attractive to the public were the opinions advanced by members of the New England Street Railway Club who met at the Narragansett Hotel, Providence, R. I., on Feb. 21. The sessions were presided over by Walter C. Slade, president of the club and vice-president United Electric Railways, Providence, R. I.

The afternoon session was devoted entirely to the presentation and discussion of a paper by Henry S. Day, superintendent of equipment United Electric Railways, on the subject of modern electric cars for city service. Mr. Day pointed out that it is the job of the railway to hold the present patrons by giving good service and, as congestion increases, to sell the transportation product to as many automobile drivers as possible. "To hold the present riders," he said, "we must change the appearance and riding qualities of our trolley cars because the present-day rider is thinking in terms of the automobile." He discussed the newer types of cars that have been introduced and then concentrated on the present types of standard cars and what could be done to improve them. Mr. Day spoke of the desirability of reducing the weight of railway cars and pointed out that with aluminum it is possible to reduce the weight very materially without sacrificing durability or strength.

Mr. Day then reported the results of an extensive investigation that he and Mr. Webber of his company have made of the use of the lighter metal in cars. A tentative set of specifications for the construction of a car with body and trucks of aluminum has been prepared, the car being essentially a duplicate of the present lightweight cars in service in Providence. The standard steel car with a quadruple equipment of 35-hp. motors and K-control weighs 31,500 lb., according to Mr. Day. The same car, made of aluminum with leather upholstered seats and linoleum covered floors, equipped with four 25-hp. motors and K-control, he said, weighs approximately 23,000 lb. He stated further that stress diagrams indicate that the aluminum car is as strong as the steel car, and it does not appear that the maintenance of aluminum would differ materially from that of steel.

He also pointed out that the use of aluminum would allow the installation of heavier seats and flooring, thereby increasing riding comfort and decreasing noise, due to the changes in the floor construction. At the same time the total weight would be decreased by some 8,500 lb. which would result in a lower power consumption and lower cost of maintenance of the equipment.

In discussing Mr. Day's paper, W. J. McKee, president Osgood Bradley Car Company, brought out that 8,500 lb. can be saved in the frame of the car by substituting aluminum, 1,500 lb. in the trimmings and 1,700 lb. in the motor, making a total saving of approximately 11,700 lb. on a standard 40- to 44-passenger double-truck car.

A. H. Woollen, representing the Aluminum Company of America, spoke on the maintenance of cars made of aluminum, discussing it from all angles. He emphasized that holes and tears in side sheets could be effectively welded, if not too large, and that many parts could be straightened cold and most of them with a little application of heat. As advantages for aluminum in maintenance work, he named the lower total cost of maintenance, the lower cost for paint, the high corrosion resistance of the metal, the high scrap value of aluminum, being 20 to 25 per cent of the original cost, and the lightness of the metal for handling. He mentioned that the same maintenance equipment now installed in the shops could be used for aluminum and that with a little added expenditure for an electric furnace and a two-point pyrometer a shop could be completely equipped for handling the lighter metal.

Others who contributed in the afternoon discussion were Charles S. Johnson, Wason Manufacturing Company, Col. Alonzo R. Williams, United Electric Railways, and A. J. Manson, Westinghouse Electric & Manufacturing Company.

Dinner and Speaking Program at Evening Session

At the dinner held in the evening, Col. Alonzo R. Williams presided as toastmaster. The first speaker was Miles B. Lambert, sales manager transportation department, Westinghouse Electric & Manufacturing Company, who spoke on transportation problems and opportunities. He named five big problems with which the industry is now confronted: Traffic congestion, rate making, modernizing equipment, railway income and undermanning. He pointed out that opportunities exist for doing real service in solving many of the problems. "Although the electric railway industry is a basic one it is not thriving as the other utilities are," he stated, "and the railways should study their problems more intensively and consult outside help." Speaking of the traffic problem, Mr. Lambert suggested that the transportation companies take the lead in calling in outside help in studying the city problems and that they use their own organization, in public relations work, to gather facts and present them to the city officials. To solve the rate problem he suggested that the railways make a scientific study of the many factors that affect rates, rather than to continue with the usual cut-and-try method. Speaking on the modernization of equipment, he mentioned that car manufacturers have spent enormous sums to develop new cars, but that the operators were still hesitating in buying them. He mentioned that this delay possibly was due to a lack of confidence and suggested that a committee be appointed to study the car problem and to make definite recommendations.

"Weathering the Storm" was the subject of a lively paper by William B. Spencer, executive assistant to the vice-president and general manager United Electric Railways. Mr. Spencer answered the question "Have We

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Faith in the Trolley Car?" very emphatically in the affirmative. He referred to the trying period through which the trolley car has come and chided the would-be obituary writers of the electric railway industry. To use his own words, "As the storms of attempted competition, huge increased costs and gigantic economic obstacles rage on, the good old trolley car still remains, faithfully serving the community, virtually as its throbbing heart—its pulse of existence—a tribute to the courage, stamina and efficiency of the red-blooded street railway men who strive to carry on."

Mr. Spencer spoke at some length on the present-day traffic problem and urged that a thorough analysis be made of all vehicles using the streets to determine which are essential and which are non-essential. "It will easily be determined," he stated, "that the street car is the most economical in the use of street space, costs relatively nothing for the city to supervise, owing to its fixed location, and does bring to the central business district much of its money and is, therefore, responsible in a great degree for the city's prosperity. Common sense solving of the parking problem," he continued, "will do much to silence the unfair criticisms hurled at the street car as a means of blocking traffic and to establish clearly its priceless value to the community. The ballyhoo about street cars causing congestion must disappear."

Mr. Spencer also spoke of the place of the bus in the electric railway industry and outlined his company's policies with regard to the use of this vehicle. He also touched on other important factors that require attention, including a guaranteed seat service, faster speeds and public relations work. He spoke of the necessity of educating the public of the place of the street car in present-day transportation and pointed out that the attitude of the public actually is changing. In conclusion, he said, "The poor, much-abused street car has weathered the storms and is increasing in favor again every day."

The evening program was concluded by a highly interesting, instructive lecture and demonstration on "Making Light Audible," by John B. Taylor, consulting engineer General Electric Company.

Reducing Accidents by Organization

Trainmen on Capital Traction System in Washington hold meetings monthly to discuss best methods to promote safety work. Competition is encouraged for best records

ACCORDING to the belief of the Capital Traction Company, one of the best ways to interest and educate trainmen in the reduction of street accidents is to gather them together frequently, present accident statistics to them, show how accidents can be prevented and get them to tell each other of their experiences and to make suggestions for improvements that may occur to them. This point is brought out in the brief submitted in the Anthony N. Brady safety contest.

Safety conferences are held monthly at each of the five divisions of the company, with usually three in one day, so timed as to reach as many men as possible. The topics are selected to be of a practical nature. Recent topics include the following: "Collisions—where and how they occur," "Passenger accidents—how they happen and what they cost," "Safety devices and their limitations," "Safety means—their purpose and value," "A typical hearing on a collision."

No matter how well the times for these meetings may be arranged, they cannot reach more than half of the total number of men on the division, so other ways are employed to get the information to them. One is to make a hundred or more copies of the talk and distribute them among those not present. Another is to leave the charts at places where they can be explained by the superintendent or others who have attended. A third is to arrange personal interviews with those men who were not in attendance. Still another and perhaps the best way, in the opinion of the company, is to print a digest of the talk in the company publication, so that every trainman may get a copy.

Divisions Divided Into Groups of Ten

The method of organizing the safety teams is to divide the men of each division into crews of about ten car or coach operators each. The men in each division select a suitable number of men for captains, and they choose their teams from men in the division so that everyone is included. Score sheets are then prepared on which the names of these members appear with the daily total of points scored by each team. The basis of monthly comparison is 100,000 car-miles, with two points for accidents or complaints and ten points for each unreported accident. The company gives to each man at the end of each month a mimeographed sheet with the scores of all the teams, comment on the month's performance, a review of matters discussed at the previous safety conference and such general safety suggestions as will help to interest the men in the safety program.

In addition, since July 1, 1927, record cards have been kept for each individual trainman, and show all accidents with which he has been concerned during the year. On the top of each card removable green tabs were so placed to indicate by position the number of accidents recorded on the card. The records on file of each division were then put in the hands of the superintendent of that division and the men were advised to study their records and note the location of their tab on the card compared with those on the other cards.

To maintain keen rivalry between the divisions, President Hanna offered a neat safety banner to be awarded each month to the division (cars only) having the best safety record per 1,000 car-miles operated. Although this banner has twice been won by the Seventh Street division, the margin was narrow and the interest aroused in all divisions has been very helpful in keeping the idea of safety permanently in the minds of the trainmen.

To enable the various safety captains to get acquainted with each other and with the officials of the company, monthly meetings are held in the assembly room of one of the carhouses, and two men from each safety team are invited to attend. Thus, in the course of ten months all of the trainmen have an opportunity to meet the company officials. Through these meetings the company officials are kept in closer touch with the safety work, the men have another point of contact with the safety campaign, they are encouraged to express themselves, and every month they have another helpful topic for discussion with their fellow workmen.

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Practical Ideas *for the* Maintenance Man

Testing Insulation to Prevent Equipment Failures

INSULATION tests are now made at regular intervals on cars of the Des Moines City Railway, Des Moines, Iowa. The company operates cars from two carhouses, the larger one with approximately 100, and the smaller one with about 40. Test instruments are installed only in the larger carhouse, and cars from the smaller car division are tested as they come to the general shop for maintenance repairs. The equipment used in making these tests includes a Weston 600-volt direct-current voltmeter of 80,000 ohms internal resistance. This has been calibrated to read in megohms so that the insulation values are read directly for the electrical circuits. The procedure used in making routine insulation tests consists of placing a piece of fiber under the ground finger of the K-35 controller of four-motor equipments. The circuit breaker on the car is opened and the voltmeter leads are attached across from the trolley to the various controller terminals. If the voltmeter needle registers less than 25 volts on the 600-volt scale a further investigation of car circuits is considered necessary, inasmuch as this reading indicates an insulation resistance of 2 megohms or better. However, if a voltmeter reading of more than 25 volts is obtained, the individual car circuits are checked to locate the one having the low insulation resistance.

In the varied testing experience of the Des Moines Railway, the trouble is located most frequently in the car resistors, especially if the tests are being made during the wet seasons of the year. Motor fields, armatures and cables also come in for their share of the faults found by the insulation test and many that would cause serious trouble in service are weeded out and so are prevented from giving trouble.

Where segregation of the individual circuits for further tests is necessary, the tester works from the reverse points of the controller to secure readings for each motor, armature and field separately. If the weak point still remains unlocated brushes are lifted from the brush-holders and voltmeter leads are applied directly across the armatures of the motors and fields so as to test each part separately.

So far, 125 cars have been tested by this method. Half of these readings on the voltmeter indicated a condition that required correction. Four armatures with weak insulation were located and repaired. Three of these were repaired by simply redipping and baking.

Form 291—11-1-28—1M

Car No._____

Insulation Test

Date_____, 19____

Over All

Resistance No. 1_____
" No. 2_____
" No. 3_____

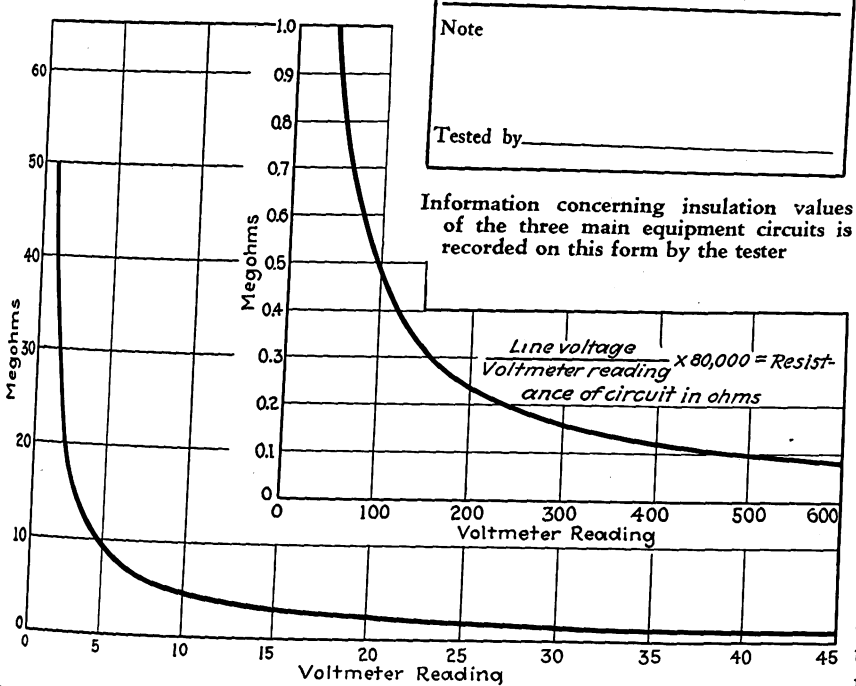
Armature No. 1_____
" No. 2_____
" No. 3_____
" No. 4_____

Field No. 1_____
" No. 2_____
" No. 3_____
" No. 4_____

Note

Tested by_____

Information concerning insulation values of the three main equipment circuits is recorded on this form by the tester



Voltmeter readings are translated into megohms by means of the calibration curves shown. The larger of these is simply an expansion of the low scale portion

Form 292 11 8 28 300

Insulation Test Car No. 154

Date	Over All	Resistance			Armature				Field				NOTES
		1	2	3	1	2	3	4	1	2	3	4	

A complete history of insulation tests and equipment repairs for each car on the system is kept in permanent file form on this card record

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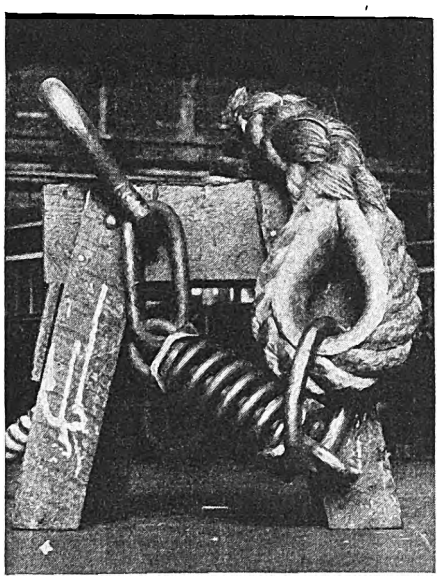
Tow Rope With Compression Spring

NO MATTER how carefully a fleet of buses is maintained or what precautions are taken to avoid accidents, some will need towing. The Surface Transportation Company, a subsidiary of the Third Avenue Railway, New York, N. Y.,



This tow rope has been found very useful for moving disabled buses

experienced towing trouble, due to the breakage of tow lines when the towing machine took up the slack too rapidly. The tow line shown in the accompanying illustration was designed to prevent this destruction. It is a rope 2½ in. in diameter with a 2½x6-in. eye spliced on either end. One eye is fitted with a ring 5 in. in diameter, made of ⅞-in. round iron together with a hook made of 1½-in. material. The other end is provided with a compression spring with the necessary supporting links and a hook. The link fastened to the splicing eye is elliptical in shape and is 6 in. wide at its widest point. It is made of ⅞-in. round iron and is about 7 in. long. The link to which the hook is fastened is made of the same material and has inside dimensions of 2½x7 in. The hook is made from 1½-in. material and has an opening of 2½x5¼ in. The compression spring is 8½ in. long, 4½ in. outside diameter and is made from ¾-in. material. It is designed with seven turns and the spacing between turns is $\frac{9}{16}$ in. The spring seats consists of two ½-in. plates 4½ in. square. They have, on each corner, a spring guide prong ¾ in. long.

These plates are designed with four $1\frac{5}{16}$-in. holes drilled diametrically opposite. Two ⅞-in. U-bolts having an inside diameter of 2¼ in. are passed through the spring and spring supporting plates in opposite directions and the ends riveted to the plates. The spring apparatus is about 16 in. long over the ends of the U-bolts in the full release position. The force of the jerk in taking up the slack of the rope is dissipated in the compressor of the spring, thereby preventing the breaking of the rope.

Bumpers for Cars Reduce Collision Damages*

By E. M. Lunda
Superintendent of Shops and Equipment, Grand Rapids Railroad, Grand Rapids, Mich.

TO PREVENT damages to cars from side-swiping and collisions, the cars of the Grand Rapids Railroad are equipped with front and side bumpers. They have been in use over a year, and serious damage has been prevented on several occasions. The side bumpers run the entire length of the car and are constructed of 2-in. steel pipe. This has tapered ends with 1½-in. offset. They are held out from the car sides with four oak blocks. The front bumpers are made in three sections. The end sec-

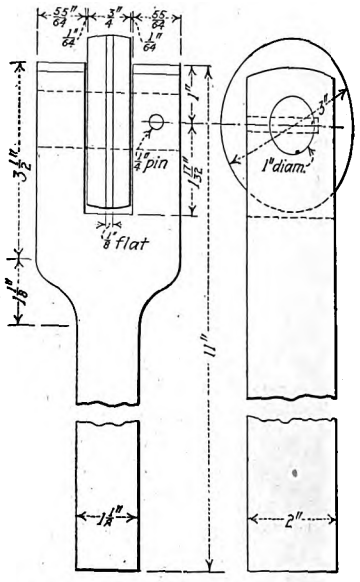
Pipe bumpers on sides and ends of cars prevent damage

tions are made of 2-in. pipe curved to conform to the channel bumper and spaced 3½ in. from it. The center section is of cast steel and has an opening to permit the draw bar to pass through it. The cast-steel construction is a safety feature for, in case of an accident, it will break and prevent the frame being distorted. The cost of a new center is only $2.

**Submitted in* Electric Railway Journal *Prize Contest.*

Polishing Tool for Journals

EVEN though a bearing is packed properly and the correct grade and quantity of oil is used, operation will be unsatisfactory if the bearing surfaces are not perfect. This will cause an increase in maintenance expense and service interruptions.



This polishing tool has been found to be very efficient

Great care is exercised in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y., to see that all bearings are in good condition. Not only must all axle and journal-bearing fits be turned accurately but the fits must be polished highly before they are acceptable for service. This polishing is done by a polishing tool designed and constructed by Machinist James A. Collins.

The tool consists of a hardened steel wheel supported by a steel holder. The wheel is made from tool steel and has a diameter of 3 in. It is ¾ in. thick. The polishing surface is rounded except for ⅛ in. in the center. The wheel is mounted on a 1-in. shaft which is fastened to the jaws by a ¼-in. pin. The holder is made of 2½x2-in. stock and is 11 in. long.

The 2½-in. side is narrowed to 1⅛ in. at a point 3½ in. from the end of the jaw. The axle supports are $\frac{55}{64}$ in. wide, and the wheel slot $\frac{3}{4}$ in., leaving $\frac{1}{64}$-in. clearance on either side of the wheel. This tool is mounted in the lathe tool rest so that the wheel comes in contact with the revolving axle fits. The wheel rolling on the oiled surface of the axle fit produces a highly polished surface which reduces lubricating expense.

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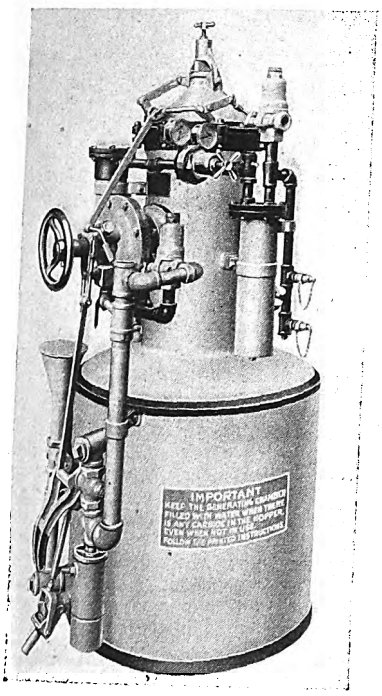
New Offerings of

Useful Equipment

Medium Pressure-Type Acetylene Generators

THREE medium pressure-type acetylene generators for welding and cutting have been placed on the market by the Oxweld Acetylene Company, New York, N. Y. The type MP-2 is built in two sizes having 50 and 100 lb. carbide capacity, respectively. The type MP-3 is of 300 lb. capacity.



Improved type of acetylene generator

The type MP-2 generator is similar to a previous design in construction and operation. The feed mechanism has been redesigned to make the carbide shut-off more positive. A new method is used to stop the carbide feed positively, in case the diaphragm breaks or zero pressure exists in the generator due to any other cause. A new regulator, the type R-40, is furnished instead of the line regulator formerly used. This regulator is of the stem type, having a large stem and seat to provide ample capacity, and is equipped with two gages. One of these indicates the pressure in the generator and the other the pressure in the delivery line.

The hydraulic back pressure valve, which has been simplified, and the filter are of seamless steel tubing assembled by bronze-welding and then galvanized. This construction is more sturdy than that previously employed. The vertical pipe, leading downward to the back pressure valve and extending below the surface of the water, is fitted with an angle check valve. In case back pressure is exerted, water will be forced up the vertical pipe causing the check valve to close and preventing the possibility of back pressure or flash reaching the interior of the generator.

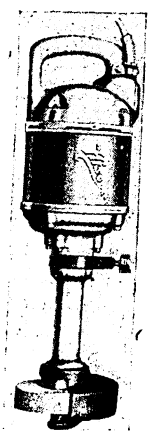
The two relief valves, one mounted on the hydraulic back pressure valve and the other directly connected to the generator, are of new design, have larger capacity and are less liable to leak than the older devices. A desirable feature consists of interference levers which unseat the relief valves every time the generator is recharged. This arrangement automatically prevents the relief valves from sticking, should they be called upon to function. Since the relief valve on the hydraulic back pressure valve opens only momentarily, no acetylene from the line is lost during recharging. A conveniently placed clean-out door renders the feed mechanism parts accessible and easy to clean without dismantling the generator.

The type MP-3 generator has been placed on the market to meet the demand for a pressure-type generator of large capacity that will supply gas with a minimum pressure fluctuation and with minimum expense for maintenance. The feed is driven by a motor actuated by a weight. A diaphragm pressure control is used in connection with the motor to regulate the feed and maintain proper pressure in the generator. The feed shaft bearing is protected by a dust-proof cover which protects it from carbide dust. Two charging doors facilitate filling the hopper. For maximum durability, some gears are made of bronze and Monel metal and certain shafts are of special alloys. The brake control on the motor is positive in action and does not require frequent adjustment once it is set.

A clean-out door is provided which permits cleaning the carbide feed disk without removing the generator top. The filter can be repacked, if necessary, without breaking any adjustment of interference or relief valves. This operation is performed by removal of the top plate. The hydraulic back pressure valve is arranged so that it is always filled with water before the generator itself is entirely filled. An overflow-level check plug has been provided in order that the operator may check the water level at any time.

The feed motor is rendered inoperative, if zero pressure exists in the generator because of a pronounced leak or any other contingency. The operating pressure can be changed by turning the adjusting nut on the feed control. During normal operation the set pressure will not vary more than about 1 lb. The type MP-3 generator consists essentially of two sections, the lower being a cylindrical shell, the upper a shell in the shape of a truncated cone. The bottom is dished for maximum strength. All seams are bronze welded, both inside and out. The overall height is slightly over 120 in. and the height to the top of the generator shell is 104 in. The diameter of the shell is 42½ in. The shipping weight is 2,300 lb.

Portable Grinder and Buffer



New type of grinder and buffer

CONVENIENCE of control is made possible in a new ½-hp. portable grinder and buffer, announced by the Hisey-Wolf Machine Company, Cincinnati, Ohio, by a two-pole switch located at the grip handle. A specially designed compound wound motor for direct current is provided. The cast steel wheel guard is adjustable and can be placed at an angle most convenient for the operator. The end cover is readily removable and affords quick renewal of grinding wheels, when these become worn out.

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News of the Industry

New Rapid Transit Measure for Boston

A new Boston Elevated bill, based on the so-called Harriman $50,000,000 rapid transit extension measure but containing several changes intended to meet objections raised by Mayor Nichols, was placed before the legislative committee on metropolitan affairs on Feb. 25. The new bill seems likely to reopen the entire question and according to the Boston News Bureau additional hearings may be necessary. It was drafted under the direction of Frank S. Deland, corporation counsel for Boston.

Unlike the old bill, two parts of which would have become effective even if stockholders of the road had rejected a third part, the new bill stands or falls in its entirety. The most important change is that while the old bill set up a metropolitan transit council which was a factor in name only the new bill makes this council the all-important agency in carrying out rapid transit extensions provided in the measure.

Another entirely new provision is that every ten years there shall be a readjustment of the proportioning of the cost between the car-rider and the taxpayer. If trustees and members of the council fail to agree, either party may then apply to the Supreme Judicial Court for the appointment of three suitable persons as arbitrators.

The new bill contains a section, to which Mr. Harriman is reported as being strongly opposed, whereby depreciation shall be set aside by trustees only as approved by the State Department of Public Utilities.

Ten-Cent Cash Fare in Columbus

C. C. Slater, general manager Columbus Railway, Power & Light Company, Columbus, Ohio, has notified Columbus Council that cash fare will be 10 cents. Tickets will be 35 cents for five. The fare has been 6 cents or five tickets for 25 cents.

These advances, according to Mr. Slater, will increase the revenue of the railway lines by $1,039,487 a year. Counterbalancing the fare increase, rates for electric current will be cut to 6 cents a kilowatt hour starting March 10. The present rate is 7 cents.

This, Mr. Slater said, would reduce revenues from this source $312,360 a year. Another cut made recently, he said, reduced revenue from sale of current $780,070 a year, making a total reduction of $1,092,430 a year.

Cars have been operated for three years without a franchise. Unless some legal course not apparent on the surface is discovered, it appeared the city can choose between two courses:

Accept the fare increase and open negotiations for a new franchise, making the best possible deal for fares.

Order the cars from the street and make other arrangements for transportation service.

Councilman Worley, a member of the public utilities committee of the Council, said:

> If it is possible for the rail-light company to fix fares to suit itself the company has a great deal more power than it should have, and I am in favor of putting in a complete bus system.

This expression of opinion is, however, regarded as the extreme view. More reasonable counsel is expected to prevail.

One-Man Car Inquiry in Indiana

An investigation to determine whether one-man street cars are less safe than the two-man crew types will be held by the Indiana Public Service Commission. The complaint was made by an Indianapolis resident. James P. Tretton, superintendent, Indianapolis Street Railway, said the experience of the company had been that the one-man type of car was as safe, if not safer, than the two-man type.

Buffalo Report Completed

Experts employed by the Buffalo municipal authorities to make an exhaustive survey of service, operations and costs of the International Railway, Buffalo, within the city, have completed their report which will be used in opposition to the application of the railway company for a 10-cent local fare now pending in United States District Court at Buffalo before Judge John R. Hazel. The corps of experts were under the personal supervision of Col. Harold U. Wallace, former manager of the Detroit Municipal Railway.

The report lays particular stress upon the operation of one-man cars on all local lines of the International Railway. According to it an adequate fare to be charged in Buffalo can be fairly determined only from a consideration of the properties used in the local service contrasted with receipts and expenditures. Interurban and other services, the report says, have no bearing on the proper Buffalo rate.

The reports have been filed with Federal Judge John R. Hazel as part of the city's application for a United States District Court order demanding segregation of the railway company's properties before the suit is brought to trial.

New York's Transit Policy Produces Congestion

Daniel L. Turner, consulting engineer for the New York Transit Commission, told 200 members of the Municipal Art Society of New York, at their annual luncheon recently that only one-third of the metropolitan area was served by rapid transit facilities.

He said the experience of the last 40 years showed that population always followed development of transit facilities, instead of the reverse. He expressed amazement that this principle was not fully understood after almost 100 years of street railway transit.

Mr. Turner said transit facilities must be furnished in advance of population and in the way that it is desired to develop the city. Unless that were done, he said, city planning would be largely futile. He added that despite the large amount of automobile traffic, the transit lines carried 75 per cent of the passengers and were consequently the controlling factor in city development. He is reported to have said:

> New York has not made the best use of its rapid transit facilities. There has been too much concentration of the lines, with consequent overlapping in the service area, particularly in the outlying boroughs. In 1925 new subway and elevated lines increased the net area served only about 41 square miles, through 111 route-miles have been constructed since 1904. One square mile of new area required nearly 3 miles of new rapid transit line. This is an extravagant use of rapid transit facilities.
>
> For this reason and because of the possibility of unlimited land use, the city's rapid transit policy produces congestion instead of relieving it. This results in a vicious circle. The city has been concentrating its new rapid transit lines too much in already overdeveloped areas.
>
> In 1925 there were 210 route-miles of track traversing the city, yet direct and convenient service is afforded to only about 97 square miles. The remaining 202 square miles has no direct facilities accessible to it. After building lines for 55 years, New York even now is serving only about one-third of the entire city area. Eighty-six per cent of the city population is concentrated in the 97 square miles and 14 per cent are spread over 202 square miles, all because population will follow rapid transit and the land can be developed in response to any population demand. The used area of New York City is no larger than Little Rock, Ark,

According to Mr. Turner the distributive influence of transit should be utilized to the utmost in these communities and thereby relieve congestion along rapid transit lines already overcrowded. If rapid transit is not furnished to New York's entire city area, the population cannot be distributed through the city's 200 square miles of unpopulated area.

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Terminable Permit Bill Advanced

The judiciary committee of the Missouri House of Representatives on Feb. 22 reported out favorably the terminable permit bill for common carriers, sponsored by the St. Louis Transportation Survey Commission as part of the program for obtaining a rapid transit system in St. Louis. It is the last of four bills sought by the St. Louis commission to be reported out favorably by the House committee. Three of the bills have been engrossed and are now on the calendar for third reading and passage.

Under an amendment suggested by the attorney for the People's Motorbus Company, St. Louis, the permit bill allows street railways, bus lines and other common carriers, operating prior to Jan. 1, 1929, to obtain a terminable permit for an unlimited period subject to cancellation for misuse and non-use without a public hearing on the merits of the application, once the carrier obtains the consent of the municipality affected for the surrender of franchise for the new permit.

Transportation and Engineering Topics on Illinois Program

Six addresses on specialized topics are announced on the tentative program for the railways division of the ninth annual joint convention of the Illinois State Electric, Illinois Electric Railways, and Illinois Gas Associations to be held in Springfield on March 14-15. Joint meetings will be held in the mornings and group meetings of the individual divisions in the afternoons.

Members of the Illinois Electric Railways Association will hear an address, "One-Man Operation in East St. Louis," by G. W. Welsh, vice-president East St. Louis & Suburban Railway, East St. Louis, Ill., after which there will be general discussion.

W. C. Wheeler, engineer of equipment Chicago Surface Lines, will discuss "Late Trends in Car Equipment," and A. W. Baumgarten, Chicago & Joliet Electric Railway, will talk on "Mercury Arc Rectifiers as Applied to Electric Railway Service."

"Co-Ordination of Rail and Bus Service" will be the topic of Emil A. Roehry, general manager St. Louis Electric Terminal Railway. H. O. Crews, supervisor of public relations Chicago Surface Lines, will talk on "Visualizing Transportation Problems." As an added feature "Safe Highways," a film release of the Chicago Surface Lines, will be shown.

Parking—A Serious Menace in Baltimore

An active part is being taken by the United Railways & Electric Company, Baltimore, in an effort to prohibit parking on some of the downtown streets of the city. The movement was started when two fires reached serious proportions because parked automobiles prevented the firemen from getting their apparatus into position for service immediately. An ordinance prohibiting the parking has been introduced in the City Council at the request of the fire department officials and the railway as well as other interests is backing the measure.

Unification in Grand Rapids

Move advanced under which railway, bus and taxi services would be brought together

ANOTHER step has been taken toward the consolidation of street railway, bus and taxicab services in Grand Rapids, Mich., under the control of the Grand Rapids Railroad for the purpose of reducing congestion and meeting new demands for additional transportation. Through L. J. DeLamarter, vice-president and general manager, the railway has formally and favorably replied to the recent recommendations of G. J. Wagner, city consulting engineer, that the company be authorized to carry out his suggestions to augment the present rail system with bus and taxicab service.

Mr. DeLamarter says that he realizes the congestion in the downtown districts and that extensions to service must be made in the future, but that increased revenues must be assured or the city government will face a problem of subsidy to maintain mass transportation facilities. He believes, however, that with the continuation of co-operation from the city that has existed, and with protection to the railway as long as the service is rendered satisfactorily, the railway would be justified in investing in a taxicab line and extending its bus systems.

The proposed taxicab service would be created to supplement the regular rail service, as suggested in the Wagner report. Mr. DeLamarter said:

It is obvious, however, that the interest of the public would be ill served if the proposed special service should be exposed to loss from future ruinous competition from other taxicab companies. This company should be in a position substantially to cover this whole field of transportation or it should not be entered.

When the City Commission adopted the Wagner recommendations in December that body assured the railway a broad policy of operation and if this were carried through there would be no difficulty from more cab companies than exist now. In commenting on this phase of the situation, Mr. DeLamarter's reply states:

Rights of present operating taxicab companies, of course, should be essentially preserved.

Mr. DeLamarter's reply stated that, if the railway is authorized to operate a taxicab system, it should not be legislated against as to such reasonable maximum or minimum fare as may be required to meet conditons now unforeseen but that may arise. Peak load services of the railway will be covered well by the additional buses, while heavy capital investments will be required by the new units of bus and taxicab services. Mr. DeLamarter states that he believes both will prove great aids to the present rail system.

In dealing with the tax situation, the reply states that it is recognized throughout the country that having the railways furnish capital for tracks and paving and also requiring them to pay taxes on both track and equipment have militated against their successful operation. Relief from having to invest in pavement between rails is asked by the railway. Since this change can be effected only by charter amendment, the company asked that the question be placed before the voters.

The commission has announced that it will take time to study the general manager's suggestions and recommendations.

Interurban Will Supply Service in Springfield

Organization of an entirely new company to operate street cars and buses in Springfield, Ohio, is contemplated by the Cincinnati, Hamilton & Dayton Railway, which plans to acquire the Springfield Railway.

Should the plan go through, it is intended to have the Springfield Railway permit the new organization to operate cars over a portion of the narrow gage track now used by the city street cars, in addition to giving city service over the standard gage trackage of the Indiana, Columbus & Eastern system within the corporation limits.

These plans were divulged in the reply of Thomas Conway, Jr., president of the interurban line, to a telegram sent him by Springfield officials asking whether the plans of the Cincinnati, Hamilton & Dayton in regard to the local transportation system would necessarily hold up the improvement of E. High Street, proposed to be carried out by this year. Mr. Conway stated that his plans would not interfere with the proposed improvements.

The city of Springfield has advertised for proposals to furnish a transportation system for the city. Among the bidders who have submitted proposals are the Twin Coach Corporation, Kent, Ohio; The City Rapid Transit Lines, Newark, Ohio; Alexander S. Drescher, Brooklyn, N. Y.; and Cincinnati, Hamilton & Dayton Railway.

Reduced Rates for Sacramento School Children

As the result of informal negotiations conducted by the Railroad Commission, the Pacific Gas & Electric Company, which operates the railway lines in Sacramento, will place in effect on March 20, 1929, school children's reduced rate tickets on the basis of eight rides for 25 cents, applying to *bona-fide* school children under 18 years of age, and attending schools of grade no more advanced than the high school. At the present time this privilege is extended only to children of thirteen years or under.

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Oldest Aircraft Paper Acquired

Aviation, weekly founded twelve years ago by Major Lester D. Gardner, bought by McGraw-Hill

AVIATION, the oldest aeronautical magazine in the United States, published weekly, has been acquired from the Aviation Publishing Company, New York, by the McGraw-Hill Publishing Company, Inc. Devoted to the field of aviation in all its phases, the weekly was established twelve years ago by Major Lester D. Gardner, until recently president of the Aeronautical Chamber of Commerce and now president of Aeronautical Industries, Inc. Under the new owners, who now publish 25 engineering, industrial and business papers, the field of the publication will continue to include aircraft manufacturers, engine and parts makers, airports, distributors and others who are professionally engaged in aeronautics.

Aviation fits in well with the other papers of the McGraw-Hill group, which covers the five major branches of engineering—civil, electrical, mechanical, mining and chemical. Several of these papers have long been closely concerned with various aspects of the progress of aviation. ELECTRIC RAILWAY JOURNAL and *Bus Transportation* have been recording the development of this new agency of commercial transportation. *American Machinist* and *Factory and Industrial Management* have been encouraging high efficiency in manufacturing production. *Engineering News-Record* has given much attention to the civil engineering problems of airports, runways and structures. *Electrical World* has discussed the lighting of airways and airports, and also signal systems. *Chemical and Metallurgical Engineering* has contributed to the solving of many problems of weight, corrosion and wing surfacing. The *Magazine of Business* recently conducted a year's practical experiment in "Flying for Business," operating its own plane.

James H. McGraw, chairman of the board of the McGraw-Hill Publishing Company, said:

Aviation is now becoming a vital tool of modern business, and a new basic industry is in process of development. McGraw-Hill desires to contribute to the progress of aviation a publishing service that will provide every facility of modern industrial journalism to aid in the solution of its inherent problems.

We assume the publishing direction of *Aviation* with the conviction that the resources of the McGraw-Hill organization will bring new strength to this paper and practical benefits to the industry beyond the reach of a single publication. We enter this field only because it is clear that there is an opportunity to render a service that will advance the art of flying and its economic development. We are glad to welcome into our organization a group of men of the type responsible for the splendid record and fine prestige that *Aviation* now enjoys.

Publishing headquarters of *Aviation* will continue in New York. Earl D. Osborn, who has been publisher of the periodical for several years, will join the McGraw-Hill organization.

Eastern Massachusetts Would Amend Agreement

A subcommittee of the general conference board of unions, the members of which are employed by the Eastern Massachusetts Street Railway, Boston, Mass., have been told by the trustees of that company that the company cannot operate at a profit and pay the existing wage scale. The committee was asked to take a cut which would affect 1,500 employees. They were also asked to relinquish their rights to the arbitration of discipline cases.

The result of this conference between trustees and the committee leaves an understanding that it will be impossible for the Eastern Massachusetts to renew the present agreement. Further agreements then must be only under the condition that the men be willing to meet the company half way in revising wages.

COMING MEETINGS OF *Electric Railway and Allied Associations*

***March 12-14*—Oklahoma Utilities Association, annual meeting, Oklahoma City, Okla.**

***March 14-15*—Illinois Electric Railway Association, Hotel Abraham Lincoln, Springfield, Ill.**

***March 20*—Central Electric Traffic Association, Keenan Hotel, Fort Wayne, Ind.**

***May 1-3*—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

***May 13-15*—National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

***May 15*—Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.**

***June 5-7*—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

***June 21-22*—New York Electric Railway Association, Bluff Point, N. Y.**

***June 27-28*—Central Electric Railway Association, Michigan City, Ind.**

***Aug. 15-16*—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Court Dismisses Suit Against Seattle Municipal

Superior Judge J. F. Ronald on Feb. 15 rendered a decision giving the Seattle Municipal Railway a clean bill of health financially, and freeing it from threatened insolvency and default in its bonded obligations. The ruling is regarded as a complete victory for the sponsors of the Municipal Railway in the J. G. Von Herberg suit. Attorneys for Mr. Von Herberg, however, immediately served notice of appeal.

A few minutes after the decision of Judge Ronald, the city wired $1,062,225 to New York to meet principal and interest payments due on street railway purchase bonds. The payments had been held up by a temporary restraining order, which was dissolved by Judge Ronald's decision.

In dismissing the two-year old suit of Von Herberg as "without merit," Judge Ronald took the plaintiff to task for harassing the city by litigation, and praised the City Council and management of the system for efficient management, at the same time expressing confidence that the street railway, if unhampered by further litigation, would be able to pay off its debts and operate efficiently out of its revenues.

Judge Ronald held that the railway system is solvent; that the City Council has a right to loan it money from other utility funds; that the system is now in better condition than when purchased from the Puget Sound Power & Light Company ten years ago.

He pointed out that since the trial of a similar suit brought by S. B. Asia in January, 1922, the railway has reduced to $183,313 an operating deficit which at that time amounted to $1,500,000, besides meeting all installment payments when due and adding much to the system's value. Purchase payments, since the acquisition of the railway, he enumerated at $12,977,413 up to Dec. 31, 1928, in addition to $2,162,477 paid out for extensions and betterments, and $1,977,500 on other utility bonds and warrants, notwithstanding that the system has been compelled to charge off $1,479,356 for retirements and abandonments in the meantime. Furthermore, the court found, the railway fund, with the $800,000 loan from the Water Department, had on hand $1,200,000, and operating receipts amounting to about $16,000 a day, with which to meet obligations of $1,576,600 due this year.

In the course of the trial, testimony was introduced by the city to show that an annual saving of $440,000 in operating costs of the railway system will be made by an economy program already under way. Railway officials declared that the present equipment, while obsolete in design, can be continued in service indefinitely without excessive costs for repairs. An expert, who testified for Mr. Von Herberg, had represented the railway as rapidly approaching a physical collapse which could be averted only by excessive expenditures for rolling stock and track replacement.

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Interurban to Give Local Service in Newcastle

Abandonment of railway service in Newcastle, Ind., by the Terre Haute, Indianapolis & Eastern Traction Company, has been authorized by the Indiana Public Service Commission. The company was ordered, however, to give local service on the interurban line it operates into Newcastle at a fare of 5 cents within the city.

Reply Brief Filed in St. Louis Fare Case

The city of St. Louis, Mo., in a brief filed with the Cole County Circuit Court at Jefferson City on Feb. 21, renewed its attack on the decision of the Missouri Public Service Commission fixing a straight 8-cent fare in St. Louis effective last July 1.

The case was carried into the Circuit Court when the city asked for a review of the commission's decision. It was argued on Jan. 31, last. The attack in the brief centered on the $63,500,000 valuation allowed the company. The city contends that on a proper valuation the 8-cent fare is excessive.

Evidence on Chicago "L's" Plea for Permanent Injunction

Charles E. Thompson, vice-president Chicago Rapid Transit Company, testified recently before Roswell B. Mason, master in chancery, that he did not consider that the present 10-cent fare on the elevated system in Chicago is adequate to provide a fair return on the company's investment. Evidence is being heard by the master on a petition of the Rapid Transit Lines for a permanent injunction restraining the Illinois Commerce Commission from interfering with the 10-cent rate of fare established last fall.

Mr. Thompson pointed out that since the higher fare was put into effect 1928 revenues had fallen slightly below those of 1927, but that operating expenses also had decreased. On the basis of the state commission's valuation of $92,588,000 on the company's properties, he added, the company earned a return of only 3.33 per cent last year. He declared, however, that more seats were available now in proportion to passengers carried than under the former 8⅓-cent fare.

Suburban Towns Accept New Twin City Fare

Another step in settling the fare question for all divisions of the Twin City Rapid Transit Company, Minneapolis, Minn., is a stipulation ordered by the Councils of Stillwater, Minn., and Bayport, Minn., both on the Stillwater division of the Minneapolis & St. Paul Suburban Railroad, to be filed with the Minnesota Railroad & Warehouse Commission, providing for a cash fare of 10 cents and a token rate of 7½ cents. The question has already been settled for the Twin City divisions and a petition was pending before the commission for increased rates of fare in these two cities which have just ordered stipulations accepting the increased fare.

Ticket Rate Reduced in Ottawa

A reduction in fares has been announced by the Ottawa Electric Railway, Ottawa, Ont. The new schedule provides for seventeen tickets for $1, against sixteen under the old rate. The reduction does not affect the four-ticket strips, now sold at 25 cents, and single fares will continue on a basis of 7 cents. The 7-cent fare went into operation last August.

Preparing to Consider Louisville Plea

The increase in railway and bus fares in Louisville, Ky., asked by the Louisville Railway, is expected to be handled by the Board of Public Works soon. The company seeks a 10-cent cash fare, but has left the matter of a possible bulk sale rate open for the purpose of experiment. Meanwhile the Public Utilities Bureau has reported on the appraisal of the property of the company.

Among business and financial men the feeling is that the company will get an increase. In fact, the impression prevails that the company proposal will receive a measure of consideration fully in keeping with the spirit in which the company's plea was advanced.

Rehearing of Elgin Fares Asked

A petition asking a rehearing of the Illinois Commerce Commission order, authorizing an increase in commutation rates on the Chicago, Aurora & Elgin Railroad, has been filed with the commission by a group of the company's patrons residing in Wheaton, Ill. The new rates became effective on Jan. 23. They are slightly higher than those of competing steam railroads between Chicago and west suburban points.

Approval by the commission of the railroad's application for an increase in fares was based upon the estimate of commission engineers that the railroad had earned a return of only 3.4 per cent for the year ended July 31, 1928. The commission also found that the company had expended $1,800,000 for improvements which had not been financed through the issuance of securities and "which under proper earning conditions it is entitled to capitalize."

In view of this situation and the fact that wages of all trainmen had recently been advanced, the commission held that an increase in rates was necessary to give the public the service to which it is entitled, permitting the company to earn sufficient return to attract new capital.

Wage Increase Granted in Indianapolis

A wage increase of 4 cents an hour to all motormen and conductors has been announced by officials of the Indianapolis Street Railway, Indianapolis, Ind., effective from Feb. 24. The increase was granted voluntarily and will add approximately $120,000 to the 1929 payroll. Increases will be granted in other departments.

A minimum wage for beginners of 44 cents an hour, increasing 1 cent an hour a year to a maximum of 49 cents an hour for operators of two-man cars is provided. A minimum of 49 cents an hour for beginners, increasing 1 cent a year to a maximum of 54 cents is provided for operators of one-man cars. The last wage increase was 3 cents an hour in 1927.

James P. Tretton, general superintendent, said that with a net decrease in operating expenses during 1928 of $120,000, the company was able to raise the wages of its men as it had promised. A further saving in 1929 is desired for needed repairs and the cordial co-operation of employees has been asked to make this possible, since the company would regret a circumstance that might require it to file a petition for increased fares.

An increase of 5 cents an hour to drivers of buses of the People's Motor Coach Company, a subsidiary of the Indianapolis Street Railway, has been announced. The increase was effective on Feb. 24. It will make the scale for coach drivers the same as that of drivers for the Indianapolis Street Railway buses.

The present scale of the coach company drivers is from 40 to 45 cents an hour. Under the terms of the announcement it will be increased to 45 to 50 cents an hour. The wage scale of drivers of the buses for the railway will remain the same.

Fare Increase Ahead in Portland

With two more community clubs petitioning for additional bus service, W. H. Lines, vice-president Portland Electric Power Company, Portland, Ore., has told the City Commissioners and the Council that not only can the company not grant this request, but that it is possible an increase in fare may be necessary to care for lines already running unless returns become more satisfactory. Mr. Lines pointed out that the buses are losing $125,000 a year now, and that for some time the company had been considering an appeal to the Public Service Commission which would relieve the situation. Mayor Baker told the community clubs that the Council would do what it could to assist in arranging for service by a private operator, but he indicated that he would do so only if an arrangement could be worked out that would not interfere with service already being given in the vicinity by the Portland Electric Power Company.

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Recent Bus Developments

Interstate Bill Not Likely to Pass

Adjournment of Congress without action on the Parker bill to regulate interstate bus traffic was regarded as likely on Feb. 27. Uncertainty on the part of the interstate commerce committee of the House, to which the bill was referred, and the crowded state of the legislative calendar made it seem useless to try to bring the measure up on the floor in the few remaining days of the session. Whether there will be an opportunity of getting a vote on the bill during the extra session is still undetermined. There is an element in the committee that believes that the measure goes too far in its regulation.

Further Delay in Equitable Proceeding

The Equitable Coach Company, New York, is expected by city transit experts to let its franchise lapse on April 1, the time limit set by the Board of Estimate early this month. On Feb. 27 the company asked the Board of Estimate for permission to withdraw applications to amend its franchise in such manner as to make possible the B. M. T. merger and the operation of Manhattan buses by a new corporation. This request, which probably would be granted as a matter of course, would result in a delay of at least eighteen months in putting buses on the city streets, even if the Equitable succeeds in getting Transit Commission approval within the time limit set.

The New York *Times* sees the company forced with a demand for legislative inquiry into the circumstances under which it obtained its bus franchise nearly two years ago, threatened by a suit by the B. M. T. for breach of its contract to merge Brooklyn and Queens bus routes with trolley lines, and confronted with stubborn resistance from traction groups when it again seeks the Transit Commission approval, without which bus operation is impossible.

Line in St. Louis Suspended Temporarily

The St. Louis Public Service Company on Jan. 7 received from the Circuit Court for Cole County an order directing it temporarily to suspend operations of its bus line between Maplewood and Kirkwood, Mo., via the Manchester and Big Bend roads. This line was opened by the railway a few months ago after residents of the districts served had complained to the Missouri Public Service Commission regarding the character of service being offered by the De Luxe Bus Line which had been operating over the same routes.

At the time a state permit for the bus line was granted to the St. Louis Public Service Company, the De Luxe Line was ordered to suspend operations. This it refused to do, appealing to the Circuit Court for relief. In the meanwhile the De Luxe company readjusted its schedules.

Taxi War in Louisville

Wild-cat operation of twenty-five cents cabs brings drastic regulation. Ordinance contested

A NEW ordinance has gone into effect at Louisville, Ky., regulating cabs, and forcing them to carry insurance or bond to protect the public and property, operate with meters and regulate the employment of drivers. The measure stipulates the maximum fare that may be charged. The ordinance will materially increase operating costs for all cab companies. The Louisville Taxicab Company will carry a bond, but will write its own insurance. Some of the small companies will not be able to secure bond, and insurance rates are very high. Many that have been buying cabs on time are expected to drop out.

Situation Had Become Intolerable

All in all, however, it seems very likely now that a situation which had grown to be intolerable will soon be corrected. For years Louisville had a taxicab company which operated good equipment at rates comparing favorably with rates of well conducted companies in other large cities. In the fall of last year, however, Columbus, Ohio, interests came in with a 25-cent cab company, offering to haul at the rate of 25 cents for 2 miles, with additional mileage at the rate of 12½ cents a mile. Another company came in from Ohio with a rate of anywhere within the city for 25 cents, but later changed this to three miles for 25 cents, or 8⅓ cents a mile, with additional mileage at 10 cents a mile. Then some small companies formed. The Louisville Taxicab & Transfer Company met the competition and added more than 100 light cars. From a total of about 200 cabs in use, some part time, the number jumped to about 400 or 450 cabs, all carrying four passengers for one fare, and at rates of 8⅓ to 12 cents a mile.

A few days ago the Dodds Twenty-five Cent Cab Company filed a voluntary petition in bankruptcy with 57 claims pending against it for accidents. None of the other companies, with the exception of the Louisville Taxicab & Transfer Company, the old line company, has been able to comply with the law. About the time the cabs were to be ordered off the streets, an injunction was asked, pending investigation of the legality of the new ordinance. Enforcement of the law is held up pending decision in this suit.

Passes for Maryland Interurban Buses House to House Canvass

Use of the weekly pass in six varieties was started on Monday, Dec. 31, 1928, by the Cumberland & Westernport Transit Company. Most of the passes replace a reduced-rate ticket book which consisted of twelve (two a day) tickets and a Sunday pass. These tickets were good only over one of three routes terminating respectively at Cumberland, at the Kelly-Springfield tire plant and at the Celanese plant, both of which are just outside of Cumberland but on different highways.

The passes sell for $1.50 up to $5, according to distance, and are also available on all three routes. In some cases they cost even less than the former ticket books.

The company has decided to try the pass in an effort to combat more successfully the practice of auto-owning workmen selling rides to their comrades. As this competition is between their homes and the two plants as a rule, the passes include riding privileges to Cumberland as well. An intensive house-to-house canvass is being made under the direction of D. D. Price, general manager. Fifty-six passes were sold in the first week, which contained a holiday. At the expiration of the third week the sale had been more than doubled despite the handicap of the influenza epidemic.

Would Incorporate South Side Motor Coach

Petition of the Beech Grove Traction Company, Indianapolis, Ind., for authority to buy the South Side Motor Coach Company, a competing bus line, for $22,500 has been filed with the Indiana Public Service Commission. In the petition the company states its plan to incorporate the bus company as the South Side Motor Coach Corporation. Eight buses, which originally cost about $40,000, constitute the principal equipment of the company. The railway plans to spend $17,500 for new equipment and $10,000 for new buildings.

New Regulatory Measure Likely for Rochester Taxis

City Manager Stephen B. Story, Rochester, N. Y., on investigation of the complaint by James F. Hamilton, president of the New York State Railways, that the 25- and 35-cent taxis are violating city ordinances, said that doubtless a new ordinance regulating taxi fares would be drafted. He found that the rules of the city safety department fixing fares was not being enforced. The rates fixed by the department call for 30 cents for the first ⅓ mile and 40 cents for the first ⅔ mile, with a charge of 10 cents for each third of a mile thereafter. The city manager classed the 25- and 35-cent taxis as "trippers" within the scope of the

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jitney law, but not subject to city regulation at present. Mr. Story said that what will come is a new ordinance that will fix the rates of metered cabs and also "tripper taxis."

Nighthawk Taxis May Cruise in Worcester

The Worcester, Mass., license board has decided to permit taxicabs to cruise without restraint between the hours of midnight and 6 a.m. There had been a rule prohibiting such solicitation on the grounds that it interfered with railway traffic since the Worcester Consolidated Street Railway had established all-night service on a few of its lines.

Nashville-Old Hickory Service by Railway

Service of the Tennessee Transportation Company, subsidiary of the Nashville Railway & Light Company, Nashville, Tenn., and operator throughout Nashville, has just been expanded to take over buses to and from Old Hickory, co-ordinating them with Nashville street cars and motor coaches.

Hourly service is being furnished, reaching Old Hickory now by way of Donelson. It is understood that the Gallatin Pike will also be used when the new river bridge is opened.

Free transfers are issued either from street car or city motor coach to the Old Hickory coach, thus linking Nashville and Old Hickory closer than they have ever been.

The purpose was to make the Old Hickory fare 50 cents per trip, but at the present time, reduced rates are being offered through the use of commutation books. Transfers are acceptable at the Union Bus Terminal on Commerce Street. Twelve rides to Old Hickory or back sell for only $3. Twelve rides from Nashville to Donelson, or from Donelson to Old Hickory, sell for only $2.

Permission for the expansion of this service was granted the Tennessee Transportation Company by the State Railroad & Public Utilities Commission.

New Service on Winsted Run

Buses replaced cars on the Winsted-Torrington, Conn., line of the Connecticut Company on Jan. 13. Seven of the ten trolleys used on the line are to be scrapped. The other three have been sent to Waterbury to be used on that division. The bus line schedule calls for buses to leave Waterbury for Winsted at fifteen minutes after the hour from 7:15 a.m. to 6:15 p.m. and another trip at 8:15 p.m. Buses will leave Torrington for Winsted ten minutes after the hour from 6:10 a.m. until 10:10 p.m. Buses will leave Winsted for Torrington on the hour from 6 a.m. until 10 p.m.

Substitution in Ohio

Thirty-six-mile interurban of Northern Ohio Company to give way to railway's buses and trucks

APPLICATION has been filed by the Northern Ohio Power & Light Company, Akron, Ohio, with the Ohio Public Utility Commission for abandonment of its interurban car line from Massillon to Uhrichsville, Ohio, a distance of 36 miles. A. C. Blinn, vice-president and general manager, signed the plea. The hearing has been set for April 2, and the necessary legal notices have been published. The company plans to substitute bus and truck service for its present rail lines between Massillon and Uhrichsville.

Line in Use Twenty-five Years

Interurban cars have been operated over the line continuously since the road was completed 25 years ago, serving the cities and villages of Navarre, Justus, Beach City, Strasburg, Dover, New Philadelphia, Midvale and Uhrichsville among other places.

In its petition the company declares that the tracks are located for a portion of the distance upon the highway, for a part on private right-of-way and for part upon city streets; that service was pursuant to certain franchises; that all of these franchises have expired except with the village of Navarre and that the tracks are being maintained by sufferance.

In view of this, the right is asked to cease all interurban operation between the entrance to the Massillon State Hospital and the southern terminus in Uhrichsville. In addition the company sets up the plea that the loss from operation of the line has been increasing from year to year; that there is sufficient transportation service for the convenience and necessity of the public between Massillon and Uhrichsville and continuance of interurban service is unnecessary; that there has been proposed, and in process of designing and building, public road improvement which will require removal and replacement of track requiring capital investments so heavy as to make continued operation economically unsound.

History of Company Reviewed

This interurban was built in sections. The companies that went to make it up were known as the Canton-New Philadelphia Railway and the Tuscarawas Traction Company. They, with the Canton-Akron Railway, were united under the name of the Canton-Akron Consolidated Railway. In 1906 this company was taken over by the Northern Ohio Traction Company, which in turn was absorbed by the Northern Ohio Traction & Light Company. Two years ago the name was changed and operation continued by the Northern Ohio Power & Light Company.

Nine months ago the interurban line between Canton and Akron was abandoned and bus service substituted. The Cleveland-Akron-Canton Bus Company, a subsidiary of Northern Ohio Power & Light, has been granted the right to operate an interurban bus line through the cities and towns served by the railway.

Extension of Los Angeles Service

The Los Angeles Railway Corporation and Pacific Electric Railway have filed a joint application for a certificate of public convenience and necessity to operate motor coach service temporarily, under the name of Los Angeles Motor Coach Company, between the terminus at Santa Monica Boulevard and Wilshire Boulevard, and a proposed terminus at the University Drive entrance to the University of California, southern branch, in the city of Los Angeles, as an extension of present motor coach service.

Flat Rate Taxis Opposed in Springfield, Mass.

Petitions for permits to operate taxicabs at flat rates of 35 to 50 cents a ride for any distance within city limits, presented to the municipal transportation board of Springfield, Mass., are opposed by the Springfield Street Railway and also by some of the larger cab concerns.

Rights Sought by Omaha Company

A committee of three has been appointed by Mayor Dahlman of Omaha, Neb., to consider two applications made to the City Council for bus line extensions on the part of the Omaha & Council Bluffs Street Railway. J. N. Shannahan, president of the railway, had 29 similar petitions for bus lines as well as two for rail extensions on file. These petitions have also been turned over to the special committee which will investigate the existing conditions.

If the facts found by the committee warrant an extension or an introduction of rail or bus lines, service will be given in accordance with the policy of the railway to provide the city transportation in the best possible manner. Mr. Shannahan voiced this sentiment when he said:

> You have given us the monopoly of local transportation service and we are bound to serve the city.

It is estimated that the initial cost for the bus lines for which rights are sought would be $274,000 and the initial cost of the rail extensions asked would be $71,000.

Experimental Service by San José

The San José Railroad has applied to the Railroad Commission for authority to abandon its passenger bus service on Morton Avenue to Tillman Avenue and along Tillman Avenue to Park Avenue in Hanchett Park, Cal. Permission is also asked to establish an experimental bus service for one year between the intersection of Martin Avenue and The Alameda, San José, and the intersection of The Alameda and Hedding Street.

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Financial *and* Corporate

Smaller Net in Baltimore

United Railways & Electric Company earned only $1.36 a share in 1928, but conditions are improving

SURPLUS earnings of the United Railways & Electric Company, Baltimore, in 1928 equaled $1.36 a share on the outstanding common stock. This compares with $1.66 a share in 1927 and $2.47 a share in 1926. The calculations are based on preliminary figures and do not take into consideration annual adjustments at the closing of books at the end of either year.

The company's gross earnings in December showed a substantial increase in response to the increased fare. This increase, allowed by the Public Service Commission, from a fare rate of three for a quarter to four for 35 cents, represented an increase of only 45/100 of a cent. This, it was thought, and so far has proved, to be insufficient to provide for the increased depreciation ordered at the same time by the commission.

While the company benefited to the extent of putting aside for depreciation $136,555 in 1928 compared with $70,000 in December, 1927, the net result to surplus for December, 1928, was $65,879 as against a surplus of $91,678 in 1927. This surplus represents income over and above all interest charges, including interest on income bonds.

For the twelve months of 1928, before annual adjustments at the closing of books for the year, the statement shows gross passenger revenues of $16,060,894, or an increase of $104,880, over the year 1927. A statement says:

Annual adjustments at the end of the year frequently make a substantial change in the net income from that shown in the preliminary statement. The present statement, however, shows the 1928 net as $558,393 after payment of all interest, including income bond interest. This was about $123,000 less than in 1927.

Increased operating expenses for the year were $249,595. This was due to increased depreciation, the higher wage scale that went into effect this year, and other small items.

STATEMENT OF EARNINGS OF THE UNITED RAILWAYS & ELECTRIC COMPANY, BALTIMORE

	1928	1927	Increase	Decrease	Per Cent
Passenger revenue	$16,060,894	$15,956,013	$104,880	.....	.66
Other revenue	212,912	233,727	.....	$20,815	8.91
Total	$16,273,806	$16,189,741	$84,064	.....	.52
Operating expenses:					
Way and structures	$872,703	$841,535	$31,167	.....	3.70
Equipment	917,315	907,550	9,765	.....	1.08
Power	1,421,823	1,387,832	33,991	.....	2.45
Conducting transportation	5,158,662	5,143,117	15,545	.....	.30
Traffic	25,594	15,474	10,120	.....	65.40
General and miscellaneous	1,606,048	1,535,354	70,693	.....	4.60
Transportation for Investment-Cr	*6,919	*16,025	9,106	.....	56.82
	9,995,228	9,814,839	180,389	.....	1.84
Depreciation	878,693	809,487	69,206	.....	8.55
Total	$10,873,921	$10,624,326	$249,595	.....	2.35
Net operating revenue	5,399,884	5,565,415	.....	165,530	2.97
Taxes	1,578,782	1,593,143	.....	14,361	.90
Operating income	3,821,102	3,972,271	.....	151,169	3.81
Non-operating income	150,823	159,230	.....	8,406	5.28
Gross income	3,971,926	4,131,502	.....	159,575	3.86
Fixed charges	2,853,532	2,889,315	.....	35,782	1.24
Remainder	1,118,393	1,242,187	.....	123,793	9.97
Interest on income bonds	560,000	560,000	.....	.....	.....
Net income	$558,393	$682,187	.....	123,793	18.15
Car-miles	33,013,320	33,979,657	.....	966,337	2.84
Seat-miles	1,561,348,818	1,592,238,132	.....	30,889,314	1.94
Revenue passengers	$200,466,304	$218,714,410	.....	$18,248,106	8.34
Transfer passengers	$82,997,639	$89,039,613	.....	$6,041,974	6.79
Revenue passengers per car-mile	6.0766	6.4440	.....	.3674	.....
Maintenance cost per car-mile	.0554	.0524	.0030	.....	.....
Depreciation cost per car-mile	.0266	.0238	.0028	.....	.....

*Credit.

NOTE:—Increase in rates of fare, effective at midnight Feb. 12, 1928, from 8—7½ cts. for adults and 4 cts. for children to 9—8½ cts. for adults and 5 cts. for children, without change in commutation or school ticket rates. Further increase to 10—8½ cts. for adults became effective Dec. 1, 1928.

For the month of February, revenues and expenses were for 29 days in 1928, as compared with 28 days in 1927. Expenses for 1928 are at increased wage over 1927—2% effective Jan. 1st and additional 2% effective Feb. 12.

NET INCOME OF UNITED RAILWAYS & ELECTRIC COMPANY BY MONTHS

	1928	1927	Increase	Decrease	Per Cent
January	$18,366	$72,128	.....	$53,761	74.54
February	18,769	27,590	.....	8,820	31.97
March	63,255	81,509	.....	18,254	22.40
April	37,535	61,000	.....	23,465	38.47
May	61,738	63,529	.....	1,791	2.82
June	30,009	41,721	.....	11,711	28.07
July	34,506	36,370	.....	1,863	5.12
August	20,453	20,849	.....	395	1.90
September	39,034	38,691	$342.82	.....	.89
October	92,584	72,738	19,845.87	.....	27.28
November	76,260	74,379	1,881.12	.....	2.53
December	65,879	91,678	.....	25,798	28.14
	$558,393	$682,187	.....	$123,793	18.15

Dividends Resumed by Twin City Company

The Twin City Rapid Transit Company, Minneapolis, Minn., has resumed dividends on the common stock by the declaration of a quarterly dividend of $1, payable on April 1 to stock of record March 12. The last previous dividend was $1 quarterly, paid July 2, 1928.

Warren-Jamestown Line May Be Abandoned

Abandonment of the Warren & Jamestown Street Railway line between Warren, Pa., and Jamestown, N. Y., is expected. The line, which is 21 miles long, was opened in 1902 and has maintained hourly service in each direction for the greater part of that time. Of late, however, the opening of bus service between the two towns by the West Ridge Transportation Company has materially cut down the railway's revenue and a meeting of officials, at a hearing for approval of a franchise for the bus company, brought that the railway would surely make application for abandonment shortly.

Increase in Capital Stock of Jamaica Central

Jamaica Central Railways, Long Island City, N. Y., has filed a certificate in the office of the secretary of state increasing the number of shares of its capital stock from 2,000 to 12,000 shares, no par value.

Lower Net Income on Brooklyn-Manhattan

Total operating revenues of the Brooklyn-Manhattan Transit System, Brooklyn, N. Y., for the six months' period ended Dec. 31, 1928, were $24,135,351 against $23,617,381. Operating expenses increased from $15,378,210 to $15,710,730. After the consideration of total income deductions, the net income was $3,106,141 for the six months' period ended Dec. 31, 1928, and $3,123,306 for the 1927 period.

Another Income Bond Payment

Directors of Third Avenue Railway, New York, have declared an interest payment of 1¼ per cent on the adjustment mortgage 50-year 5 per cent income bonds, payable April 1, 1929. Similar payment was made Oct. 1, 1928. Total arrears on the issue is 31½ per cent.

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Local Business Men Added to Omaha Board

Seven new directors were elected at the annual meeting of the stockholders of the Omaha & Council Bluffs Street Railway, Omaha, Neb., recently. All are prominent Omaha business men. The new directors are:

William Diesing, vice-president Cudahy Packing Company, and member of its Omaha branch; John W. Robbins, collector of customs for the Port of Omaha, realtor, and real estate investor; Arthur Metz, capitalist; P. F. Petersen, president P. F. Petersen Baking Company; Kirk Griggs, president Occidental Building & Loan Association; W. H. Schellberg, president Union Stockyards Company; and O. H. Barmettler, vice-president and general manager Iten Biscuit Company.

President Shannahan said:

In recommending to the stockholders additional names for the board of directors, I had in mind that settlement of the street railway problem in Omaha is of vital interest to the city as well as to the company.

When I asked the new members for the privilege of nominating them for election to the board, I told them they were being asked to perform a civic service. They agreed on that basis, and I am sure their counsel will be helpful to the city and to the company.

The other seven board members are: John A. Munroe, F. B. Johnson, J. N. Shannahan, Fred Hamilton, Louis C. Nash, W. A. Smith and Emmet Tinley.

Would Abandon Service in Independence

Permission to discontinue its city service in Independence is sought of the Public Service Commission in an application by the Kansas City Public Service Company. The plea says the local service in Independence has been operated at a loss for several years, estimated as ranging from $4,000 to $15,000 a year, because of a general decrease in patronage.

Small Municipal Line Shows Improvement

Gross income of the Athol & Orange Transportation Area, 6-mile municipally-owned railway, decreased in 1928 compared to the previous year, but as expenses were kept down a larger profit was shown than in 1927. The trustees report that the employees went through the year without a single accident to person or property.

Receipts from passengers totaled $41,522. Receipts from other sources brought the gross to $42,823. The largest expense was for power, $12,546. Other expenses included, way and structure, $5,898; equipment, $10,445; conducting transportation, $9,443; general and miscellaneous, $2,806; interest, $720; taxes, $204.

Receipts from passengers in 1927 totaled $43,692, or $2,169 more than in 1928. The 1927 receipts over expenses were $622 and the 1928 receipts over expenses, $750.

On the balance sheet the road and the equipment are listed at $21,318. Cash is shown as $8,490 and total assets are listed at $84,316.

Highest Return in Ten Years in Youngstown

Gross revenue of the Youngstown Municipal Railway, Youngstown, Ohio, increased 4.03 per cent in 1928, compared with 1927, although the total number of passengers carried decreased 1.12 per cent. In the year the mileage of car and bus operation decreased 1.38 per cent.

This reduction and other economies, together with the increase in fare effective on Feb. 27, 1928, brought an increase in the net balance with the result that the return to the company after all charges, including depreciation, was 5.48 per cent upon the agreed capital value under the ordinance, the highest return in the ten years of operation under the service-at-cost plan.

COMPARISON OF RETURNS AT YOUNGSTOWN FOR 1928 AND 1927

	1928	1927
Total passengers carried	30,996,943	31,345,360
Car and bus-miles operated	5,712,471	5,792,898
Gross revenue	$2,022,368	$1,943,897
Balance available, after all charges, for stipulated return	$246,173	$55,706
Agreed valuation under franchise	$4,490,297	$4,487,659
Per cent return on valuation	5.48	1.24

The improved showing of the Youngstown lines is attributable largely to the change in rate of fare which became effective on Feb. 27, 1928. Prior to that time the rate of fare had been 9 cents cash, seven tokens for 50 cents and 1 cent for a transfer. The rate of fare effective throughout the last ten months of the year was 10 cents cash, six tokens for 50 cents, $1.50 weekly pass and free transfers.

The Youngstown service-at-cost franchise went into effect on Jan. 16, 1919. It allows a 7 per cent return to the company upon the basis of the agreed capital value as defined by the ordinance. The actual return earned by years follows:

Year	Per Cent on Investment	Year	Per Cent on Investment
1919	2.73	1924	2.49
1920	3.81	1925	4.27
1921	1.16 loss	1926	4.48
1922	1.76	1927	1.24
1923	2.55	1928	5.48

Record Established in Toledo

January established an all-time record for the Community Traction Company, Toledo, showing total revenue of $370,560, an increase of $70,000 more than the similar month a year ago. After allowing for all reserves provided by the Milner ordinance, there was a net surplus of $20,833 available for the stabilizing fund. The deficit is now reduced to $1,126,375 and the new fare stabilizing fund stands at $85,864.

Passenger revenue in January was $351,802, or a gain of 24 per cent more than the similar month last year. Good employment conditions in Toledo industries, active business, severe weather with icy streets, and extension of the service of the company to provide better transportation facilities are all credited with contributing to the big gains. A total of 3,895,821 passengers was carried on street cars and 1,149,233 passengers on bus lines. The combined showing is nearly 1,000,000 passengers better than that for January last year.

Two of the new bus lines established on Jan. 1 made a profit and two others broke nearly even.

Finances of Eastern Massachusetts in Good Shape

About a fortnight ago the initial ten-year period of public operation of the Eastern Massachusetts Street Railway, Boston, Mass., came to an end. The feeling of the Boston News Bureau was that no account of the stewardship of the trustees would be complete without a reference to their achievements in the important matter of debt reduction. To that end the paper explained:

On Feb. 1, next, some $331,000 South Shore & Boston Street Railway 6s, extended, come due and will be paid off from treasury cash. Including this maturity, there will have been retired during the decade of public operation a total of $7,225,150 of bonds and equipment trust notes. This has all been done without recourse to new financing of any kind.

On Dec. 1, next, there will fall due an issue of $3,352,000 Lynn & Boston Railroad extended 6 per cent bonds. The road holds in its treasury 1,088,000 of these bonds, leaving the amount outstanding in the hands of the public $2,264,000. This maturity likewise will be taken care of without the necessity of refunding. At present, Eastern Massachusetts has $1,250,000 cash and has free, marketable securities or securities in reserve accounts in excess of the net amount of the Dec. 1 maturity. In other words, the road could pay off the bondholders today without touching its cash, and this makes no allowance of course for the reserves that will be accumulated between now and next Dec. 1 from operation of the property.

After the Lynn & Boston issue has disappeared from the balance sheet, Eastern Massachusetts will have outstanding bonds aggregating a principal amount of $19,936,447. There reposes in its own treasury $855,550 of these bonds, so that the net funded indebtedness in the hands of the public will be $19,080,897, all maturing on Jan. 1, 1948, or nearly nineteen years hence. Furthermore, it is a fact to be remarked upon that some $14,303,000 of this $19,000,000 odd total bears 4½ per cent interest. In other words, Eastern Massachusetts will have the use of a substantial bulk of capital for the next nineteen years at a rate that will make a favorable comparison with almost any other street railway.

The number of Eastern Massachusetts Street Railway common shares outstanding is 82,664. Earnings available for the common stock for 1928 were $1.55 a share.

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Legal Notes

KENTUCKY—*Depot May Be Abandoned Where No Longer Required by Public Needs, Provided No Contract Required Its Maintenance Forever.*

A railroad constructing a depot pursuant to a contract with an adjoining landowner which did not require the depot to be maintained for any particular time could abandon the depot when public interest no longer required it, regardless of the enhanced value of the land of the adjoining owner. [Johnson's Adm'x vs. Louisville & N. Ry., 11 S.W. (2d) 96.]

LOUISIANA—*A Girl Eleven Years and Nine Months of Age, Intelligent, Robust and Bright, Is Capable of Negligence.*

Plaintiff claimed $20,000 damages for the loss of love and society of his child and for the pain and suffering he had endured because of her early death, and for the loss of support in his old age which he could have expected from his child. A jury awarded $12,000, a judgment which the court affirmed. On appeal the Court of Appeals ruled that recovery cannot be had against a street railway for injury to a pedestrian unless the railway was at fault. The court could perceive no negligence on the part of the company, rejecting the contention that the brakes of the car were not in good order and holding that fenders used on street cars for years would be considered to comply with the law unless proved inefficient. [Hargus vs. New Orleans Public Service, 118 So. 847.]

MICHIGAN—*Owner Must Be Compensated for Damages to Remaining Land Where Part of Land Is Taken for Highway.*

Michigan wanted to build a new highway. To do so it was deemed essential to acquire a part of the right-of-way of the Detroit, Grand Haven & Milwaukee Railway. Johnstone, Pohlmeyer and others sought to enjoin the defendants, claiming among other things that the relocation would seriously affect private residential estates. The principal question was whether, because of the proposed violation of the restrictions, the state must pay compensation to the owners of other lots in the subdivision, whose land is not actually and physically taken under the Constitution which prohibits private property being taken for public use without just compensation. The court ruled that although condemnation proceedings are conducted under Highway Law, Pub. Acts 1925, No. 352, and Pub. Acts 1927, No. 340, it is duty of commissioners to compensate the owner for what his landed interest will suffer from use proposed to be made of it by the railroad. [Johnstone vs. D., G. H. & M. Ry., 222 N.W., Rep. 325.]

NEW JERSEY—*Town Council May Not Revoke Bus Consent by Resolution Without Notice, Hearing and Approvel of Service Commission.*

The Town Council of Secaucus had previously passed a resolution revoking and rescinding municipal consent authorizing the Public Service Transportation Company to operate buses through the town. The Board of Public Utility Commissioners held this revocation to be unlawful and the court sustained this contention since the revocation had been brought about without notice and hearing and without the approval of the board. The position of the board was that the consents granted were necessary and proper for the public convenience and conserved the public interest. The Hudson County Bus Owners Association and others sought a writ of certiorari to review the order of the commission approving the application of the transportation company for a permit to operate between certain towns. The court held the plea to be without legal merit. [Hudson County Bus Owners Association vs. Board of Public Utility Commissioners, 143 Atl. Rep., 755.]

NEW JERSEY—*Negligence for Car to Hit Man Dismounting from Truck Standing Near Track.*

Where a motorman knew, or should have known, that a truck had stopped in front of his car close to the track, and with the mechanical arm out, he should have slowed his car down almost to a standstill, and should have anticipated that someone on the truck might get off on side nearest track. [Markowski vs. Public Service Ry., 143 A., 740.]

NEW YORK—*Power of Eminent Domain Is Inherent In Every Sovereign.*

This was a proceeding brought indirectly by the state to acquire title to, and possession of, certain property of the Fonda, Johnstown & Gloversville Railroad, a combined electric and steam railroad in Fulton County, the stated purpose being the construction of a dam and reservoir for the regulation of the flow of the waters of Sacandaga River, which lie within the territory of the Hudson River regulating district. Commissioners appointed to ascertain the compensation to be paid for the property taken rendered a report which was confirmed. After an informal oral discussion between representatives of the board and of the railroad, the board made a written offer of $550,000. The award in this proceeding was $1,442,130 for property which the railroad and the trustee under the mortgage securing an issue of bonds claimed to be worth more than $4,000,000. The board's offer was far less than the amount awarded, but in the opinion of the court was so much closer to the actual value than to the defendants' demand that no justification could be found in the charge that the board did not act in good faith. The trier of the facts found that the offer was bona fide, and that finding was fully supported. After the board's attempt to agree with the railroad ended unsuccessfully, any effort to agree with the holder of the mortgage would have been futile, and, therefore, was not required. When the state takes this property and makes adequate provision for its location elsewhere, it does nothing to regulate or to cause an abandonment. With the questions of abandonment and possible direct interference with interstate commerce eliminated from the case, the court held that the right to acquire and take possession of the property is clear. [Board of Hudson River District vs. Fonda, Johnstown & Gloversville R.R., 164 N.E. 541.]

NEW YORK—*Affirmation by Court of Appeals of a Judgment in Favor of the Plaintiff in an Action for Personal Injuries.*

Plaintiff, while driving a wagon on Military Road, Buffalo, was injured in a collision with one of defendant's street cars. The issue on appeal was whether payments advanced to an injured party by an insurance carrier, after formal written notice that the injured party had elected to sue the negligent third party, are to be regarded as payments of compensation where no award of compensation had ever been made nor a hearing had before the State Industrial Commission. [Sifkowitz vs. the International Railway, 164 N. E. 585.]

OHIO—*Interstate Certificate to Operate Buses Was Properly Revoked Where Violations of Commission's Rule Continued After the Owner Had Been Warned.*

The court found it difficult to see upon what theory the commission revoked the certificate in the interstate operation, and refused to revoke the certificate relating to the intrastate operations, except on the theory that it was inclined to be lenient with the operator in the first instance and only decided to be firm with him upon proof of his later violations. It was the opinion of the court that the commission did not err in revoking the interstate certificate, since on Dec. 12, 1928 (Detroit-Cincinnati Coach Line, Inc., vs. Public Utilities Commission, 119 Ohio St. 324, 164 N.E. 356), it ruled that the commission has the power to revoke an interstate certificate for flagrant violations of valid rules and conditions. The court felt, however, that it would be an anomalous situation if it should hold that the commission might revoke an interstate certificate while at the same time leaving in full force and effect an intrastate certificate covering the same route and involving substantially the same violations. In consequence it reversed the commission's ruling on this order. [Wheeling Traction Co. vs. Public Utility Commission, 164 N.E. 523.]

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Personal Items

A. Clint Spurr Honored in Wheeling

A. Clint Spurr, general manager of the Wheeling Traction Company, Wheeling, W. Va., was elected vice-president as well as general manager of the company and its subsidiary companies at a recent meeting of the board of directors. He was also given charge of the Wheeling Bridge Company. Mr. Spurr went to Wheeling as general manager in 1925 when he succeeded G. S. Wills, who left to take a similar post with another property in the East Liverpool district.

Early in his career Mr. Spurr entered the services of the Baltimore & Ohio Railroad with headquarters in Baltimore in the office of A. W. Thompson, vice-president. He remained with this outfit until the outbreak of the war. After his discharge from the Army, he became associated with Thomas Fitzgerald in consulting electric railway engineering work in Pittsburgh and remained with him for four years. When Mr. Fitzgerald became general manager and later vice-president of the Pittsburgh Railways, Mr. Spurr accepted the position of research manager for that company and worked indefatigably until his appointment as general manager at Wheeling.

Mr. Spurr was born in Valley City, N. D., in 1885. Later the family moved to Moundsville where he received his early education. Later he attended Linsly Institute for two years. He then entered Yale University where he received the degree of B.A. and LL.B.

C. J. Darrah Succeeds W. C. Shuck at Toledo

C. J. Darrah, who has been in the transfer department of the Community Traction Company, Toledo, Ohio, for nearly two years, has been named chief clerk of the transportation department to succeed the late William C. Shuck, according to an announcement by C. H. Forsgard, general superintendent.

J. E. Zimmermann Elected U.G.I. President

John E. Zimmermann was elected president of the United Gas Imrovement Company at a meeting of the board of directors on Feb. 27. Mr. Zimmermann has been chairman of the company's executive committee. He has agreed to assume the additional duties of the presidency "without obligation to continue the same for an indefinite period." Mr. Zimmermann will retain the chairmanship of the executive committee of the United Gas Improvement Company. He succeeds Arthur W. Thompson, to whom a six months' leave of absence was granted early in December and whose resignation was accepted last month. Mr. Thompson is now in Europe.

C. J. Curtaz Advanced

Made active manager of the Boston, Revere Beach & Lynn Railroad, the service of which he entered as a boy

FULL recognition came to Charles J. Curtaz for his long period of able and faithful service with the Boston, Revere Beach & Lynn Railroad, when he was recently designated acting manager of the company, effective on March 1. In addition to that office he will serve as assistant treasurer and clerk of the corporation, the latter office, under Massachusetts laws, corresponding to that of secretary.

C. J. Curtaz

Mr. Curtaz went to work for the railway as a mere lad. To be exact he was only fourteen years of age. He had attended the Boston public schools, but the fact that circumstance dictated that he seek work did not whet for a moment his desire for formal schooling more extended than it had been possible for him to obtain. So he attended the evening high schools, meanwhile and ever since adding to the meager equipment with which he started out to make his own way.

From that time in July, 1898, when he entered the service of the railroad, Mr. Curtaz unassumingly carried not only one Message to Garcia, but literally hundreds of them, as he served successively as clerk, cashier and accountant until Aug. 16, 1920, at which time he was made clerk of the corporation and assistant to the treasurer. Three and a half years later, on Jan. 24, 1923, he was appointed treasurer, in which capacity he served until Nov. 15, 1927. This was the date on which Hemphill & Wells arranged to take over the line and began to mature plans for equipping the road for electric operation, work that was completed in very fast time, the installation being fully described in the JOURNAL for Dec. 8, 1928.

At the time the road passed to the new owners, Mr. Curtaz was appointed assistant treasurer, retaining the office of clerk of the corporation. The new management soon found that this "old-timer" was in full accord with its up-to-date ideas. Like others in similar cases, Mr. Curtaz simply had not had the opportunity to prove his larger worth. In an age in which it seems at times that the showy, spectacular individual too often succeeds in having himself accepted on the basis of what he appears to be rather than what he is, it is the instances of recognition of men like Mr. Curtaz, who perform their work modestly but with real facility and dispatch, that hearten men in all walks of life who have achieved a real celerity in performing their duties that at times seems to becloud their capacity.

H. C. Truesdall Reappointed to Toledo Board

Henry C. Truesdall, vice-president Toledo Trust Company, has been reappointed by Mayor W. T. Jackson, of Toledo, Ohio, to the Board of Street Railway Control for the third term. He will serve six years.

Following Mr. Truesdall's appointment, the board reorganized and named W. W. Knight, chairman, and David H. Goodwillie, secretary. These three members have served together for the eight years that the Milner ordinance has been in effect and reappointment of Mr. Truesdall indicates that they will continue together for two more years. The problem of extension of the Milner grant will come up for settlement within the next two years, and it was deemed important to keep the original board intact.

Woman Executive at Alton Resigns

Miss Katherine Wilson, assistant to the vice-president Illinois Terminal Railway, a position which carries the duties and responsibilities of a general manager, has resigned. She was stationed at Alton, Ill., and for many years had concealed her sex in her correspondence by using the initials K.E., instead of her full name.

Born in Alton, Miss Wilson joined the railway as a stenographer in 1899, and worked under H. H. Ferguson, vice-president. At that time the 6-mile railroad served only one industry. Successively she became chief clerk and car accountant, the highest position the small road could then offer her. As years passed Mr. Ferguson came more and more to pass operating responsibilities to Miss Wilson and she was recognized as the manager. The road expanded to Formosa and Edwardsville and Miss Wilson's duties increased.

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Eight months ago the Illinois Power & Light Corporation purchased the 50-mile railroad and it was consolidated with the Illinois Traction System controlled by the same interests.

Both Vice-President Ferguson and Miss Wilson have announced their intention to retire from the organization.

Walter C. Loy Takes on New Duties in Chicago

Walter C. Loy, assistant general manager Shore Line Motor Coach Company, Hammond, Ind., has resigned to become associated with the Union Motor Coach Terminal Company, Chicago, as assistant general manager. Mr. Loy has been identified with traffic work in steam, electric railroad and motor coach enterprises for more than 25 years, the last three of which have been with the Shore Line Motor Coach Company.

Alba H. Warren With Houston Gas

Announcement has been made from the office of O. R. Seagraves, president, United Gas Company, parent company of the Houston Gas & Fuel Company, Houston, Tex., of the appointment of Alba H. Warren as vice-president and general manager of the latter company, succeeding W. A. Raymond.

Mr. Warren is leaving his present position as district manager of the Stone & Webster properties in Georgia and Florida, with headquarters at Savannah, Ga. He has been in the public utility business for 21 years. Among the positions he has held are the following: Manager Pensacola Electric Company at Pensacola, Fla., 1908-1913; manager Galveston Electric Company, 1913-1918; manager El Paso Electric Company, which did the lighting and railway business in El Paso, Juarez, Mexico, and surrounding communities, 1918-1925. In February, 1925, Mr. Warren was transferred to Savannah as manager for Stone & Webster of the Southeastern district.

J. J. Pelley Heads New Haven

John J. Pelley, president of the Central of Georgia Railway, was elected president of the New York, New Haven & Hartford Railroad, succeeding the late E. J. Pearson. He assumed his new duties on March 1 with that road and its subsidiaries. After serving in many capacities in the railroad field, Mr. Pelley in 1917 was appointed general superintendent to the Illinois Central, Southern lines, and general superintendent of the northern lines in 1919.

He was promoted to be general manager of the Illinois Central in 1923 and the next year he was made vice-president in charge of operation. In the fall of 1926 Mr. Pelley was elected president of the Central of Georgia. Mr. Pelley was born at Anna, Ill., in 1878. He attended the University of Illinois.

C. H. Copley Leaves Missouri Road

C. H. Copley has moved to New Haven, Conn., but has not decided on any new assignment. He resigned his position as general superintendent Springfield Traction Company, Springfield, Mo., some months ago. Since 1894 Mr. Copley has been engaged in electric railway work, first as motorman for the Winchester Avenue Railroad, West Haven, Conn. Later he was general superintendent of the Bellows Falls & Saxtons River Street Railway in Vermont. Before his affiliation with the Springfield Traction Company in 1917 he had served as construction foreman for C. W. Blakeslee & Sons, New Haven, and as superintendent of the Norwalk and the Stamford divisions of the Connecticut Company in Norwalk.

H. K. Bennett, formerly identified with safety work on the United Electric Railways, Providence, R. I., is serving as manager of the Providence council of the National Safety Council. Mr. Bennett resigned some months ago from the United Electric Railways, relinquishing the position as manager of the department of safety and publication.

W. H. Wright, secretary of the Georgia Power Company, Atlanta, Ga., has been appointed assistant to the president, according to an announcement made by Preston S. Arkwright, president. A native of Georgia, Mr. Wright entered the employ of the company in 1906 as secretary to H. M. Atkinson, chairman of the board of directors of the Georgia Railway & Power Company. These duties he held until 1916, when he was elected secretary of the company, the position he retained up to the present time.

Major Ewing E. Towles has resigned as assistant chief engineer for the Missouri Public Service Commission at Jefferson City, effective on March 1, to enter the operating end of the public utility field. He is a graduate of the Missouri University School of Engineering. He became assistant chief engineer for the commission in 1914, and was later granted a leave of absence to serve in the signal corps of the army during the World War.

W. Forbes, general manager of the Aberdeen Corporation Tramways, Scotland, has been unanimously recommended for appointment as general manager of the Cardiff Corporation Tramways in Wales. Mr. Forbes succeeds R. L. Horsfield, recently made general manager of the Leeds City Tramways. In his early years Mr. Forbes served with the once prominent firm of Westinghouse, Church, Kerr & Company, consulting and constructing engineers. This experience naturally has led to Mr. Forbes' maintaining a keen interest in American transportation practices.

J. P. Pulliam, vice-president of the Wisconsin Public Service Corporation, Milwaukee, has been elected a vice-president of the Wisconsin Securities Company. In addition to his new position he retains his former position as treasurer of the Wisconsin Securities Company.

OBITUARY

Harry O. Butler

Harry O. Butler, superintendent of transportation, St. Louis Public Service Company and for 40 years an employee of the company and its predecessors, died on Feb. 11. He started his railway career as a conductor on the old Olive Street cable line in 1889 and in 1896 was made a supervisor for the old Union Depot Railroad, which was later merged with other companies to form the St. Louis Transit Company, the predecessor of the United Railways, and its successor, the present St. Louis Public Service Company. The Union Depot Railroad was operated by John Scullin and associates. In 1897 Mr. Butler was made superintendent of the Grand Avenue line and in 1903 was placed in charge of the Grand and Bellefontaine lines. He continued in that capacity until 1913 when he was promoted to assistant superintendent of transportation. He was made superintendent of transportation in 1923.

R. E. Gallaher

Raphael Eccleton Gallaher, president of the New York Insulated Wire Company, died on Feb. 10. Mr. Gallaher was a pioneer in the wire and cable industry. In 1884 he organized the New York Insulated Wire Company, which is now a member of the Wire and Cable Section of the National Electrical Manufacturers Association. He held the position of secretary of his company from the time it was organized until 1927, when he became president. Mr. Gallaher was 78 years of age.

W. C. Shuck

William C. Shuck, who had served as chief clerk of the transportation department of the Community Traction Company, Toledo, Ohio, since 1919, died at Mercy Hospital there on Feb. 18, following a stroke of apoplexy suffered two days before. He was prominent in Masonic affairs in Toledo. He had formerly been employed for 22 years at the Toledo State Hospital. Mr. Shuck was born in Cumberland, Md., in 1875.

Jonas J. Burns, who aided in promoting the first electric railway in Goshen, Ind., and also the railway line, now part of the New York Central system between Goshen and Battle Creek, Mich., died recently. He was 78 years old.

J. W. Weitnauer, master mechanic Springfield Traction Company, Springfield, Mo., died recently. He had been with the company for 30 years, advancing from the position of motorman. Mr. Weitnauer was 54 years old.

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Equipment Orders Pending

Detroit may order 100 additional cars. $5,492,173 railway improvements to be made in Milwaukee. Montreal may place large car order. Public Service orders 288 buses

WITH THE delivery of 100 new street cars now commencing, the general manager of the Detroit Street Railway, Detroit, Mich., has been instructed to make a survey to determine whether 100 additional cars should not be ordered at once. This action was taken so that the department may not find itself with insufficient equipment when the employment conditions show further improvement during the summer months.

Delivery of the cars ordered last November from the Perley Thomas Car Company, High Point, N. C., has commenced and will continue at the rate of six or eight per week until the contract has expired. It is believed that if new cars are ordered they should be equipped with three doors in the center instead of two, thus facilitating loading and unloading.

Milwaukee Improvements

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., and its associated utilities in Winconsin and upper Michigan are planning to invest $17,339,211 in expanding and improving its public service facilities this year. The program is the most extensive the company has ever undertaken, the total budget exceeding that of 1928 by $3,356,567. Substantially the largest part of the expansion is planned for the Milwaukee area. The budget is divided among the various properties as follows: the Milwaukee Electric Railway & Light Company and the Wisconsin Electric Power Company, $12,668,486; The Wisconsin Gas & Electric Company $2,999,800; and the Wisconsin-Michigan Power Company, $1,670,938.

A total of $5,492,193 is provided for the improvement of the Milwaukee Electric Railway & Light Company's railway system. The provision of $1,250,000 for the prosecution of work on the west side rapid transit and subway projects are major single items in the program. Other items include $150,000 for the company's apportionment of the cost of the west side steam railroad grade separations and $127,000 for the construction of tracks on the new Sixteenth Street viaduct. Expansion of the boiler capacity, and auxiliary equipment at the Lakeside plant is to cost approximately $1,500,000. The Wisconsin Gas & Electric Company plans further expansion of its gas manufacturing and distributing system at a total cost of $1,678,191. The Wisconsin-Michigan Power Company will undertake extensive plant improvements and expansion of its transmission line facilities.

Borough President Byrne, of Brooklyn, has proposed that the Board of Estimate seek an agreement with the South Brooklyn Railway, Brooklyn, N. Y., for the transfer of its tracks from the private right-of-way along Shell Road to the middle of the street. By laying the tracks on both sides of the row of elevated pillars, which now fall in the middle of Shell Road, it is pointed out that the tracks across Shell Road from Gravesend Avenue would be less dangerous to traffic, and by using the Mall for the tracks, the city will not have to attempt the difficult task of compelling the railway to construct its present right-of-way to the legal grade at the intersections of the eastbound streets that have been mapped out.

The South Brooklyn Railway's private right-of-way crosses a number of eastbound streets which have been mapped out but which have not as yet been acquired by the city of New York. Where this right-of-way crosses these various streets, it is below grade and it is believed it will be a very difficult matter for the city to compel the railroad to conform its right-of-way to the legal grade at these intersections. It is believed that it cannot be done without the action of both the Board of Estimate and the State Transit Commission. A ruling by the latter body is said probably to result in a number of dangerous street crossings.

It is pointed out that the way to avoid such grade crossings is to transfer the railroad out of its private right-of-way to the center of Shell Road and to improve the highway with roadways on each side of the central Mall. A public hearing on the measure was set for March 12 by the Assembly judiciary committee.

Public Service Buys Buses

The Public Service Co-ordinated Transport, Newark, N. J., has just placed an order for 288 additional Yellow chassis and complete coaches, it was announced here today by H E. Listman, vice-president General Motors Truck Company. The order calls for 33 type Y, 29-passenger coaches; 93 Z-240 gas-mechanical chassis; 161 Z-240 gas-electric chasis and 1 type W.

Public Service Co-ordinated Transport is the largest operator of motor coaches in the United States.

The order just reported brings its total fleet to more than 2,000 coaches.

Montreal to Order Cars

It is understood that Montreal Tramways, Montreal, Que., will shortly place an order for 50 cars of modern design to replace equipment of an inferior type. The management also is said to be considering the placing of an additional order for a like number.

At an average cost per car of $20,000, this will mean an expenditure of about $1,000,000 by Montreal Tramways and possibly twice that amount if the management decides to go ahead with the larger program.

It has not been decided what manufacturer will get the initial order. In the last two or three years Montreal Tramways has spent large sums of money in maintaining its rolling stock in a high degree of efficiency and has been active in adopting the latest designs.

Construction in Oakland

Preparatory work for the widening of Foothill Boulevard is under way by the Key System Transit Company, Oakland, Cal. The company is setting back all the trolley guide wire poles on Foothill Boulevard from 35th Avenue to 42nd Avenue. This work precedes the paving work to be undertaken by the city and track reconstruction and paving work to be done by the railway.

The Key System Transit Company is also developing a number of more comfortable noiseless cars. A total of six cars have already been reconstructed and are now in operation for experimental purposes. Noise deadening, shock absorbing shims have been placed between the trucks of the cars and the car bodies and at the base of the air compressors. Deep cushioned individual seats have been installed and a new window sash arrangement affords spacious windows and greater vision for the passengers. A new carpet, buzzer system, and modern illumination are features on these cars.

There was a total of 105,705 lineal feet of track rebuilt during the year 1928 by the Kansas City Public Service Company, Kansas City, Mo. This exceeded the construction during the previous year which amounted to 102,231 lineal feet. During the year special work was installed at 30 different locations. In the rehabilitation of tangent track there was $303,373.75 expended for labor; for material, $557,065.35; making a total of $860,439.10. The installation of special work called for labor amounting to $88,608.71 and material charges of $237,974.08. the total expenditure for rehabilitation of tangent track and special work was $1,187,021.89.

The Chicago & Joliet Electric Railway, Joliet, Ill., will relocate a number of its car tracks and make several extensions to its lines during the coming spring. Bond elections are proposed in San Francisco to provide $1,000,000

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for the electrification of the old California cable line in that city. The British Columbia Electric Railway Vancouver, B. C., has let a contract for a $40,000 power distribution plant, having a capacity of 20,000 kw. The Ottawa Electric Railway, Ottawa, Ont., has ordered one 5/8-in. electric valve refacer.

The Louisville Railway, Louisville, Ky., has recently ordered 10,000 white oak ties; 15 miles of No. 00 copper trolley wire; 50,000 ft. of soft steel strand and 500 clinch ears. This company has also ordered miscellaneous car equipment and supplies amounting to approximately $10,000.

Britain Completing Large Suburban Electrification

The electrification on the central section of the Southern Railway of England is now nearly complete. On March 3 and 4, new electric train service will be brought into operation for the first time, and trains previously worked on the overhead wire system will be worked on the third-rail or direct current system, the standard method of Southern Railway electrification.

From this time the whole of the railway's electrified tracks will be worked by the third-rail system. "Overhead" trains will continue to run for a while on certain of these routes, but those will gradually disappear as the new rolling stock becomes available. With the opening of this, therefore, the whole of the railway's suburban electrification scheme of 875 miles, as authorized by its board of directors, will be complete.

The first stage under Southern Railway administration was opened in 1925, and each year there have been extensions and conversions, until the installation has reached a cost of £11,000,000. The service has been entirely rearranged and increased in some cases to as much as 200 per cent more than that previously given by steam. New signalling has been installed; stations have been rebuilt and platforms remodelled on a large scale, and further extensions of the electrified area are being considered by the company's experts.

Apart from the electrification of steam lines and the conversion to third-rail working, London business people will benefit by the opening of the railway's new through services from Wimbledon, Tooting, Beckenham, etc., to the city.

The introduction of these new and converted services has necessitated provision of 42 three-coach units and 22 two-coach trailer units, with seating accommodation for 2,352 first-class and 11,740 third-class passengers.

The electrification and conversion of the lines has necessitated many structural alterations and the lengthening of platforms at several stations. The new station at Epsom will be brought into use to serve both the Waterloo and Victoria trains.

New permanent way connections have been provided at the terminus at Victoria. The lines between Kent House Junction and Beckenham Junction have been widened to enable the new services from Beckenham Junction to Victoria to work into the new bay platform at Beckenham Junction without interfering with the main lines.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	Feb. 26, 1929
Metals—New York	
Copper electrolytic, cents per lb	18.45
Copper wire, cents per lb	20 875
Lead, cents per lb	7.10
Zinc, cents per lb	6.7
Tin, Straits, cents per lb	49.
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.425
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.35
Central, Ill., screenings, Chicago, net tons	1.05
Kansas screenings, Kansas City, net tons	1 70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$5 90
Weatherproof wire base, N.Y., cents per lb.	21.375
Cement, Chicago net prices, without bags	2 05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10 6
White lead in oil (100-lb. keg), N. Y., cents per lb	13.5
Turpentine (bbl. lots), N. Y., per gal	.6225

Booklet Issued on Simplified Coated Abrasives

Instead of 8,000 varieties of coated abrasive products, spot stocks will now be limited to 1,976, corresponding to an elimination of 75.3 per cent, the Department of Commerce announces through its division of simplified practice. According to the department, the printed government pamphlet is now available for purchase, through the Superintendent of Documents, Government Printing Office, Washington, D. C.

For years the quantity of sizes and varieties of coated abrasive products has been increasing at a rapid rate. Many thousands of varieties have been stocked and cataloged by the industry when actually only a certain portion of them have enjoyed a satisfactory turnover. This becomes a matter of considerable importance in view of the fact that the estimated annual output of the industry amounts to about $16,000,000. This over-diversification in manufacture led to the development of Simplified Practice Recommendation No. 89, Coated Abrasive Products. The industry fixed Jan. 1, 1929, for absorption of the obsolete varieties. A standing committee of the industry has been appointed which will have in its charge the periodical revision of this simplified practice program.

Mazda Lamp Prices Reduced

Mazda lamp prices were again reduced on March 1, 1929, on the 50 and 60-watt lamps of the standard line of inside frosted lamps, Gerard Swope, president General Electric Company, has announced. Price reductions were also made on all colored lamps except flame tints.

This is the twelfth time that Mazda lamp prices have been reduced since 1920. Present reduction of approximately 10 per cent brings the prices of these lamps to almost one-half of their 1914 prices.

The March 1 price reductions are as follows:

Lamp Size	Old Price Cents	New Price Cents
50-watt (A)	22	20
60-watt (A)	22	20
25-watt (colored)	30	25
40-watt (colored)	30	25

Building Construction Declines

After the value of construction contracts had reached a new high record for all time during 1928 at $6,628,286,000, which is 5 per cent above the total for 1927 and 10 per cent above that for 1925, the January building reports were received with mild disappointment in some circles. Construction contracts awarded in that month in 37 states east of the Rocky Mountains, according to the F. W. Dodge Corporation, amounted to $409,967,900, which is 4 per cent below the value of those awarded in January, 1928. The heaviest decline in contracts awarded in January was in the district composed of New York State and northern New Jersey, where there was a drop of 22 per cent from contracts awarded in the corresponding month in 1928. The total for the Pittsburgh district, on the other hand, was double that of January last year; while the Northwest district reported the second largest total for any January on record.

ADVERTISING LITERATURE

WAGNER ELECTRIC CORPORATION, St. Louis, Mo., has issued a new bulletin No. 158 on small vertical motors, covering all types, in ratings of ½ to 1½ hp. As illustrated by diagrams in this bulletin, a unique feature of these motors is that they all have the same flange or lug dimensions, making it possible for manufacturers and users of small motor-driven machinery to interchange motors of different types and ratings on the same mounting dimension.

CUTLER-HAMMER MANUFACTURING COMPANY, Milwaukee, Wis., has issued a booklet giving a photographic presentation of "Modern Metal Handling Methods" by using "Red Top" lifting magnets. Photographs are used almost entirely to show the application of magnets to the varied kinds of work in foundries, junk yards, steel plants and miscellaneous industries.

WAUKESHA MOTOR COMPANY, Waukesha, Wis., has issued a new book entitled "What's New With Waukesha," which describes new engines developed during the past year by that company. A large stationary engine, several sizes of transportation engines, and a number of completely equipped power plants are described.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL, *Publishing Director*

Volume 73 New York, Saturday, March 9, 1929 *Number 10*

Electric Railway Journal to Change Publishing Plan

EFFECTIVE with the last issue in March, ELECTRIC RAILWAY JOURNAL will change its plan of publication. Under the new program feature articles and display advertising will be concentrated into a bigger and stronger publication to be issued monthly instead of weekly as heretofore. The first appearance of the magazine in its new form will be the April number, which will also be the Annual Maintenance Number. Subsequent numbers will appear regularly on or about the first of each succeeding month.

The monthly publication will retain all of the best features of the present weekly, including news of the industry for the month, with the addition of many articles of broad research and survey types searching deeply into the fundamentals of the local transportation business.

RECOGNIZING the importance attached by the industry to the JOURNAL'S weekly news service, this feature will be continued as ELECTRIC RAILWAY JOURNAL NEWS, to be issued each Saturday except in those weeks in which the monthly appears. In this way, up-to-the-minute news of transportation developments and events will be published in handy form for busy executives. Every effort will be made to condense all of the essential news to save the reader's time, consistent with a presentation of important facts. Particular attention will be directed toward those classes of news in which executives and department heads are most interested.

The JOURNAL'S special services at the time of the annual convention, which have long been recognized as outstanding features contributing toward the success of the annual meeting, will be retained and improved. These include the Annual Convention Number, the Convention Report Number and the Convention Dailies issued during convention week. In a full year there will be 13 issues of the monthly, the extra issue being either the Annual Convention Number or the Report Number, depending on the time of the month at which the annual convention is held. This year, the Convention Number will appear about Sept. 15, following the regular September issue earlier in the month. The Report Number this year will be the regular October issue.

THUS, in taking this important step, ELECTRIC RAILWAY JOURNAL is like its industry, meeting changed conditions with new and improved methods. Just as it has been the railway executive's duty to interpret and if possible to anticipate the public's demand for changed standards of transportation service, so has the JOURNAL endeavored to meet the changing requirements of its readers and advertisers.

At this stage of the industry's development, in which great underlying questions of economics and policy overshadow in importance routine matters of operating practice, there is obviously less need for frequency of publication of feature material than of searching analysis, careful selection and thorough presentation. Nor does this hold true only of broad, fundamental questions of policy and management. In operation and maintenance as well, routine methods of various properties are quite widely and thoroughly disseminated. The average JOURNAL reader is less interested in the

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frequency with which operating and maintenance articles appear than in the thoroughness with which new practices and methods are analyzed and presented.

All of this makes the JOURNAL's new publishing plan both logical and desirable. Throughout the period of rapid technical changes and development of practices and methods, when timely publication was the important thing to its readers, the JOURNAL maintained its weekly basis. Now that the separation of current news from feature articles seems best suited to the needs of its readers, the JOURNAL, regardless of its long years of previous practice, does not hesitate to break with habit and precedent to meet changed conditions.

IN TAKING this step ELECTRIC RAILWAY JOURNAL pledges anew its faith in the basic soundness and broad possibilities of the local transportation industry. It will continue to point out the road toward improvement as it sees the light from careful study of many properties and consultation with the best minds in the industry. It will continue to attack fearlessly the competence of those who would write off the books this essential $6,000,000,000 industry which has made possible the development of modern cities as we know them today and which serves as the circulatory system vital to their existence.

It will continue to oppose visionary plans for the construction of multi-deck streets at public expense, while advocating intelligent allocation of present street space to maximum community usefulness. It will continue, likewise, to point out weaknesses within the industry and to criticize—constructively always—measures dictated by expediency rather than sound economics and forward-looking public policy. In short, the JOURNAL continues as its slogan those words applied to it not long ago by a prominent electric railway executive, himself one time a journalist—"A publication which lives for, not off, its industry."

The Country's Purpose Under Mr. Hoover

IT WAS not to be expected that President Hoover, in his inaugural address, would do more than suggest some of the subjects which will receive his attention first. As he said, the questions before the country are problems of progress to higher standards; they are not the problems of degeneration. The new administration is pledged among other things to the continuance of economy in public expenditure, the regulation of business to prevent domination in the community and the denial of ownership or operation of business by the government in competition with its citizens. He had quite a little to say about law enforcement. As for business, it has by co-operation made great progress in the advancement of service, in stability, in regularity of employment and in the correction of its own abuses. Such progress can continue only as long as business manifests its respect for law. Regulation of private enterprise and not government ownership or operation is the course rightly to be pursued in the relation of government to business. One passage in particular in his address looks to a great enlargement of manufacturing and commerce, probably in the hands of still bigger corporations, with which the government will not interfere, except to regulate the service and prices of public utilities, which are virtual monopolies. A special session of Congress is in prospect to deal with the agricultural relief and limited changes in the tariff.

As Edward N. Hurley, an astute observer but a Democrat, said, it is unfair continually to expect Mr. Hoover to pull rabbits out of hats. No matter what his earnest friends may say for him, Mr. Hoover is too well schooled to expect to attain the impossible. He knows that it is not possible so to arrange affairs that an incompetent man can continue in business and earn money. He knows that small businesses put together over night and sold to the public do not make big business enterprises. On the other hand, idle prosecution of business is less likely under him than it was even under Mr. Coolidge. In the Department of Commerce Mr. Hoover did a great deal to bring men together to work out their own problems. As President there is no reason why he should be any the less successful in work of this kind. Under him it is to be expected that public work will be carried out along engineering rather than political lines. As for the tariff there are few who know what they want and still fewer who would recognize what they wanted if they got it. This Mr. Hoover also knows, just as he knows that problems of economics are not settled by oratory. Mr. Hoover knows what his task means. He knows the responsibility it involves. He asks of his fellow citizens their tolerance, their aid and their co-operation. All of these he is entitled to receive.

Relieving Delay Caused by Traffic Signals

SELDOM has so clear a case against improperly arranged traffic signals been made out as is contained in the report prepared by Kelker, DeLeuw & Company on the operation of the Fourteenth Street line of the New York Railways. Though this report, abstracted elsewhere, treats particularly of street car movements the same principles are of equal force with respect to vehicles in general. The traffic signals in New York City were installed primarily to facilitate the movement of north-south traffic, which in general is considerably greater than the east-west traffic. However, all the signals on a single avenue are synchronized, the relative length of time allotted to the two directions presumably being determined by the proportion of movements at the maximum traffic point. Furthermore, in an effort to have a city-wide system, the movements on parallel north-south avenues have also been tied together, regardless of the fact that traffic conditions at many intersections differ from those at the maximum traffic point.

On Fourteenth Street the result has been to delay all traffic and cause traffic blockades throughout the entire day. For instance, the signal system limits the track capacity to 84 cars per hour, whereas to meet the demands in the maximum hour 103 cars are scheduled. Besides this, the cars must move across the intersections

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in bunches of six or seven, precluding good service.

One of the primary causes of these delays is the extreme length of the cycle, 220 seconds, of which 160 seconds is devoted to north-south movement and the remaining 80 seconds to east-west movement. It is pointed out in the report that merely by reducing the length of the cycle to 150 seconds, keeping the relative proportions of time the same, the delays will be so reduced that the scheduled cars can be operated in the maximum hour. It is also shown that this reduction in the length of cycle will not reduce the capacity of the street for vehicles, and in fact will increase materially the schedule speed for all traffic.

Experience in other cities would indicate that for an area so great as that covered in New York, bounded by 45th Street, Second Avenue, Canal Street and Seventh Avenue, any universal signal cycle must result in great delay. Much shorter cycles than 150 seconds would be found advantageous at some locations. It is evident that an intensive study will show that each intersection of each group should be considered independently and a traffic control devised that will give to each street the maximum capacity, which obviously is impossible with a city-wide co-ordinated system.

Rigid Legal Code Adopted in New York

REAL good has come of the inquiry into ambulance chasing in New York City. The practice had grown to a point where it had become insufferable. Some lawyers have been recommended for discipline, others have actually been disciplined, and still others, sensing the handwriting on the wall, have chosen to eliminate themselves from the profession. Best of all, however, the Appellate Division of the Supreme Court, First Department, has adopted rules applying to practitioners in New York and Bronx Counties, designed to end ambulance chasing. In short, the court has drafted rules intended to clean up the bar. Ambulance chasing is forbidden, as is also the solicitation of retainers. Settlement terms are fixed. The code adopted is rigid and embraces reforms urged by Justice Wasservogel with the single exception of the recommendation that perjury and subornation of perjury be punished as misdemeanor. Only those rules have been omitted from the new code which are regarded as requiring legislative action. To effect these reforms, bills were introduced in the Legislature. Although they were lost in committee their proponents are determined not to give up the fight for them.

As has been pointed out before in ELECTRIC RAILWAY JOURNAL, one of the astounding things brought out by the inquiry was the lack on the part of those arraigned for ambulance chasing of any realization of a real code of professional ethics. Many of the practices followed in the accident cases were most nefarious. The important point, however, is that the bar has started to clean up. It is reasonable to expect that as a result of all the recent agitation the recommendations will be adopted that have been made by William D. Guthrie, president of the New York Bar Association, and reiterated recently by Prof. I. Morris Wormser and others. Among other things suggested is a thorough inquiry into the character, background and environment of applicants for admission to the law schools. There is, of course, no way that would prove wholly effectual in keeping out of the profession men who are undesirable, but the raising of the requirements for admission to the law schools and for graduation will certainly tend to better the general standard. By and large, the overcrowding of the profession so apparent in New York is merely a reflection of a condition only slightly less true in other large centers of population. The lure of the metropolis appears to be equally as strong for the lawyer as it is for men in other lines. Almost in direct proportion as competition for cases became keener the standards of practice appear to have deteriorated.

Meeting the New Conditions in the New Way

SAMUEL KAHN, president of the Market Street Railway, San Francisco, Cal., has every right to speak about the key to the solution of the problems of the street railway. Certainly, his company, operating at a 5-cent fare under conditions in some instances competitive, has done many progressive things toward making its service attractive. It would almost seem that the company has run the complete gamut of devices so far designed to achieve this end. Some of the things the company has done Mr. Kahn has reviewed in *Byllesby Management* for January, 1929, but it is the spirit manifested in his remarks that is most reassuring.

Industrial conditions were not so good in San Francisco last year. Despite this the decline in business on the Market Street lines was proportionately less than that in any other major city, excepting, of course, the comparatively few cities such as Chicago and Cincinnati, where increases were scored. This record was made because the company left no stone unturned in its efforts to increase patronage through increased good will and closer conformity to the wishes of the riding public.

It went after business wherever crowds assembled. In some cases it was successful in bringing to San Francisco events which would increase riding on its lines. It smoothed out pavements where intersecting streets cross its tracks to please those who ride in automobiles, the very people it desires to have ride in its cars. It laid new crossings quieter than the old ones. It continued to install soft leather upholstered seats for the greater comfort of its patrons. It speeded up its cars. It eliminated slat flooring, a menace to the women with the high-heel shoes. It kept its buildings attractive in appearance by painting and repainting them. It reminded the people of San Francisco of the company's mission by losing no opportunity prominently to display the company's shield. These are merely a few of the things it did. They are very important, particularly in that they reflect the firm conviction of the management that continued growth in automobile competition is not the whole story of declining street railway revenues.

To some street railway men, long engaged in a monopoly business, it came as a shock to have to relearn that the history of business all over the world is replete with instances of industry being faced with changing commercial conditions. But it did not come as a shock to the San Francisco management. It had no new lesson to learn or no old lesson to relearn. Mr. Kahn and the men under him have proved by their work that they know that those industries which have maintained leadership, despite changing social conditions, are industries that have found ways of altering their products and commercial methods to conform to the new age. Few street railway systems have had to contend with conditions more adverse than those which have confronted the Market Street Railway, and certainly few systems have risen to the occasion with a greater degree of success.

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Long Traffic Cycles Cause Delays

Signals on Fourteenth Street, New York City, occasion serious interference with street car and vehicle movements and result in bunching of cars and poor service, according to report made by Kelker, DeLeuw & Company

DELETERIOUS effects of synchronized traffic signals with long cycles are shown in a recently released report to the New York Railways Corporation by Kelker, DeLeuw & Company, consulting engineers of Chicago, relative to the operation of the Fourteenth Street Line in New York City. The findings, which are based on a large number of observations, show that the running time of street cars in the zone between First Avenue and Eighth Avenue is increased by the existing system of traffic control from 32 per cent to 80 per cent, while individual trips required more than 100 per cent additional running time. By reason of the delays caused by traffic signals, a number of cars are detained or held in the zone between these streets, thereby being prevented from providing the service scheduled elsewhere on the line. The present operation and timing of traffic signals limits the track capacity to 84 cars per hour, whereas 103 cars are scheduled in the maximum hour. It is shown that by retaining the existing system of traffic control and simply reducing the signal cycle from 220 seconds to 150 seconds, the 103-car schedule can be operated through the signalled zone in an hour. Such a change in the signal cycle will not decrease the capacity of the north-south streets, nor will it reduce the distance which can now be travelled in an hour, nor diminish the over-all speed. It is also shown in the report that the existing method of traffic control could be replaced by other methods that would cause little or no delay to the crosstown street car traffic. Following is a resumé of the salient features of the report.

The major portion of the line is on Fourteenth Street, the route length being 3.33 miles, with a maximum running time of 53 minutes per round trip, and a minimum headway of 34 seconds. The movement of the cars between Second Avenue and Seventh Avenue is controlled by traffic signals at locations shown in the chart. All except the one on Second Avenue are operated on a signal cycle of north-south, 135 seconds and east-west, 75 seconds with dark periods of 5 seconds between each change. The total time is 220 seconds per cycle. Field observations showed that the average time allowed for north-south movements was 140 seconds, and for east-west movements, 80 seconds. The signal at Second Avenue has a 180-second cycle, 120 seconds north-south and 60 seconds east-west. The signals are all operated by hand from control towers and the timing is transferred by visual or audible signals to co-ordinate the various systems and their subdivisions.

All signals start at 8 a.m. and continue with the 220-second cycle until 7 p.m., when the time is changed to 120 seconds north-south and 55 seconds east-west.

Check of Traffic Shows Many Delays

Observations made at the various intersections of all vehicles entering at the principal corners showed that the maximum north-south traffic on any of the controlled avenues in any half-hour period was 729 vehicles at Seventh Avenue and 45th Street, with 260 vehicles east and west at the same point, or 35.7 per cent as many.

RANGE OF RUNNING TIME AND SIGNAL DELAYS ON FOURTEENTH STREET SURFACE CARS, NEW YORK CITY

Period	Actual Running Time—Minutes Eastbound	Actual Running Time—Minutes Westbound	Traffic Signal Delay—Minutes Eastbound	Traffic Signal Delay—Minutes Westbound
6-8 a.m.	6½–8½	7 – 9½	None	None
*8–9:30 a.m.	9 –16	12 –17½	2 – 6½	2½– 8
9:30 a.m.-5 p.m.	12 –18	12 –19	2 – 9½	3½– 9½
*5–7 p.m.	14 –18	15 –19	4 – 7	6 – 9½
†7–10 p.m.	8 –13	9½–15	1 – 5	2½– 8

*Rush hour periods. †North-south and east-west traffic signal intervals reduced to 120 and 55 seconds, respectively, at 7 p.m.

On Fourteenth Street, the maximum north-south traffic was 635 vehicles at Fourth Avenue, with maximum east-west traffic of 159 vehicles. The maximum east-west traffic in a half-hour period was 235 vehicles at Fifth Avenue, with the maximum north-south traffic 525 vehicles. However, at Sixth Avenue 222 vehicles moved north and south, with 186 east and west. From the foregoing it is clear that a uniform cycle for the area from 45th Street and Second Avenue to Canal Street on Seventh Avenue must result in a vast amount of delay to traffic movement. The figures also show the unbalanced traffic control conditions with which the operation of street cars on Fourteenth Street have to contend.

Checks show that, in general, fewer vehicles moved in the first 20-second period of the cycle than in the second or third 20-second period. This can be attributed, in part, to the time lost in starting the vehicles in the first period, and, in part, to the fact that the count was timed with the signal lights when, in many cases, the vehicles did not move until signalled by the traffic officer a number of seconds after the green lights

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came on. After the third and fourth 20-second period, the number of vehicles per 20-second period falls off somewhat, indicating that some of the time of the 140-second north-south signal interval is not being fully utilized because the volume of north or southbound traffic is not sufficient to utilize it.

A signal delay check was made by men riding the street cars and showed that the running time of cars closely approximated the schedule time before the traffic signals began to operate at 8 a.m. The schedule running time is seven minutes from 6 to 7 a.m., nine minutes from 7 a.m. to 7 p.m., and eight minutes after 7 p.m., and the range in the actual running time and total traffic signal delay was as shown in the table. The actual running time was as high as nineteen minutes, while the traffic signal delay was as high as 9½ minutes.

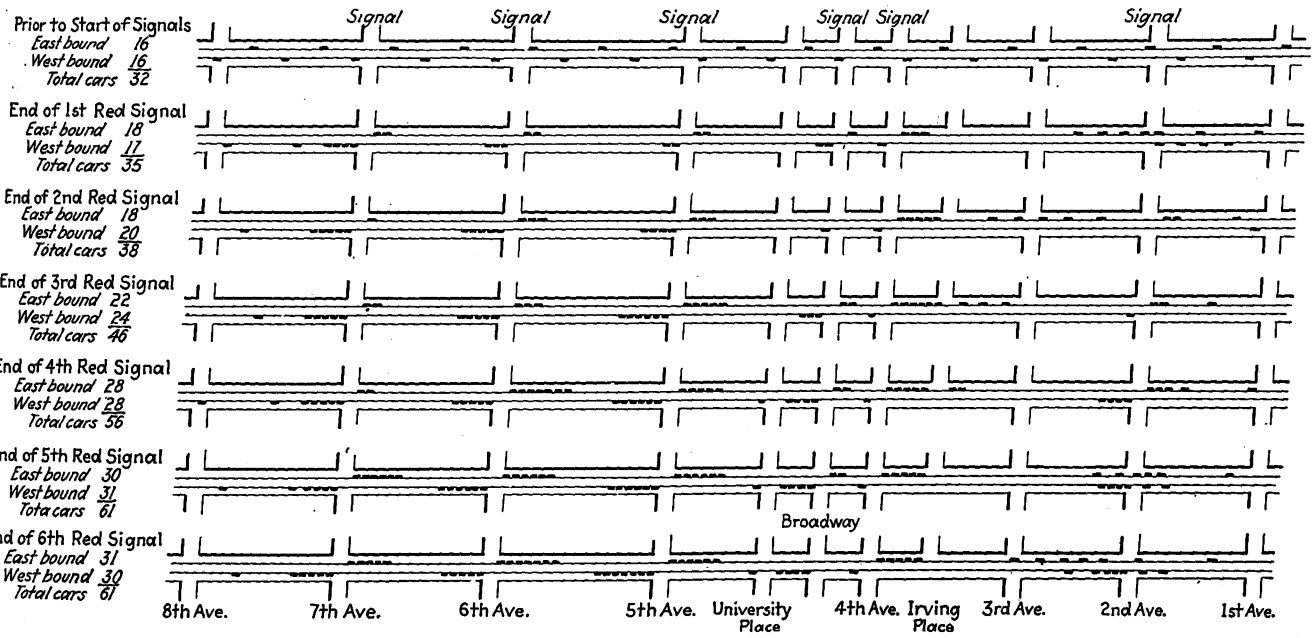
The actual number of cars in the zone closely approximated the number which should be there up to 8 a.m., after which the difference gradually became greater, until at 8:14 a.m. there were 26 cars on the westbound track between First and Seventh Avenues, whereas, based on the number entering the zone each half-hour period on the schedule running time, there should have been 13. On the eastbound track in the afternoon, there should have been 11 cars between Eighth and Second Avenues, while the check showed a total of 25.

The diagrams reproduced show the effect of the traffic signal cycles of 220 seconds on the operation of the street cars. With normal operation before the signals were put in use, there would be 32 cars on both tracks, or 16 on each track. The succeeding diagram showed the number and spacing of the cars at the end of each successive north-south (red) signal interval, until the maximum number has been accumulated. At the end of the sixth interval (22 minutes) operation is normal for signal control, at which time 61 cars are needed in the zone, or an increase of 29 cars. These diagrams also show the acute bunching of cars for meeting signal changes.

Counts made show that only 78 cars crossed Fourth Avenue eastbound in the maximum traffic hour, 5 to 6 p.m., and that the maximum number of cars moving on the signal cycle was eight, the average five, and the minimum, three. There were sixteen east-west signal intervals in the maximum hour. To operate 103 cars per hour with this number of signal intervals an average of slightly more than 6.4 cars would have to be moved in each signal interval in groups of six or seven each. Obviously, it is almost impossible to handle street car movements on the basis of six and seven-car berthing.

The first step to bring the track capacity up to the schedule or service requirements will be found in decreasing the average number of cars held by signals. A reduction of two cars per signal interval, 6.4 cars to an average of 4.4 cars, with the input of 103 cars per hour would give about 24 cycles per hour. Without changing the existing 2 to 1 ratio of north-south to east-west intervals the adoption of a 150-second cycle (24 per hour) recommends itself. The north-south traffic can be readily handled with the elimination of the "dark" signals, as there will be 40 additional seconds in each hour for north-south movements. With 95-second north-south intervals there would be more time in each hour for north-south traffic, and there would be 24 opportunities for vehicles to move and gain a fraction of a block while the north-south signal is red. On the present basis of sixteen cycles, a vehicle would travel 144 blocks per hour, and on the 24-cycle basis it would travel 168, an increase of about 16.7 per cent. The movement of all east and westbound traffic will likewise be facilitated, over-all speed will be increased, and delays diminished.

A more frequent movement of pedestrians across the avenue will be secured, and the serious reduction in the number of effective traffic lanes, due to pedestrians stepping out on roadways while awaiting signal change, will be diminished in a degree. The vehicular congestion on principal crosstown streets other than Fourteenth will be relieved, and the movement of street cars on the principal east-west streets will also be improved. The number of cars moving in a group will be reduced, so that there will be better loading conditions, better service given, and the number of cars operated through the zone in an hour can be increased about 15 per cent.



Effect of 220-second traffic signal cycles on movements of street cars on the Fourteenth Street line of the New York Railways

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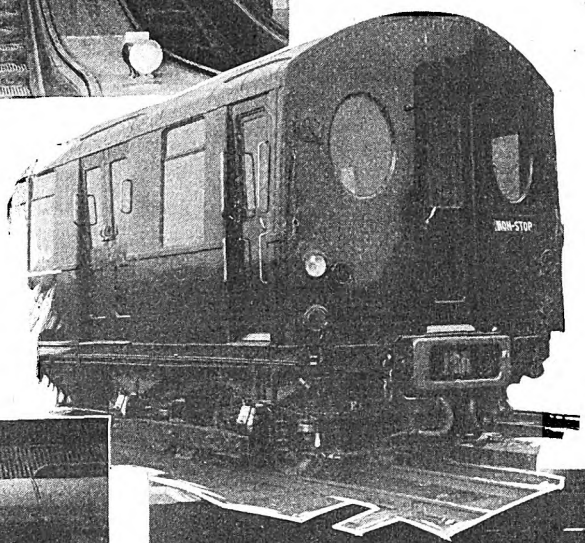
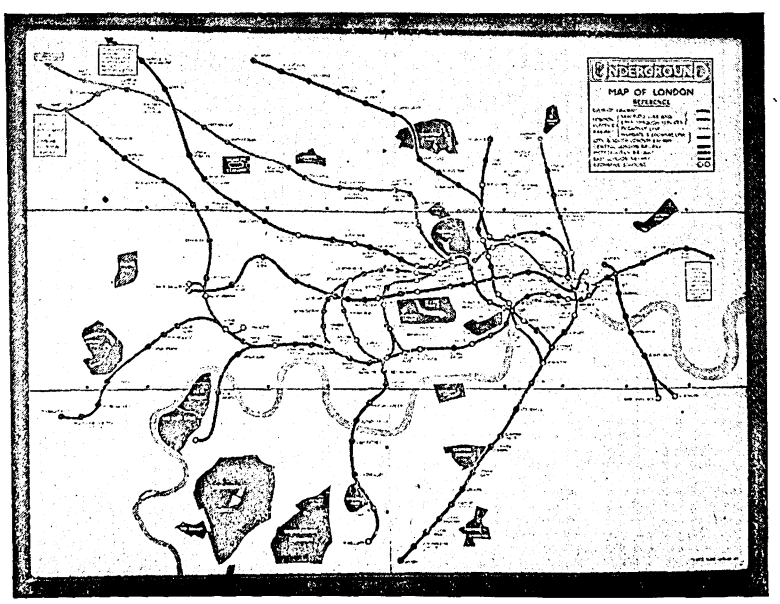
Helping the Patron on London's

MORE THAN three score escalators or moving stairways have helped to solve the problem of bodily transfer of passengers between various subway levels and the sidewalk. This escalator at Waterloo station benefits the many suburban passengers of the electrified Southern Railway.



DISTRICT RAILWAY (electrified open-cut) trains carry "Non-Stop" signs at the front when they are scheduled to skip a large number of stations.

DISTRICT RAILWAY non-stop trains carry alongside the center doors (on removable slats) a list of the stations at which these trains do *not* stop. Illuminated station boxes overhead have already given the passenger advance information as to the destination of the train.



THIS TYPE of illuminated overhead sign at stations shows the order of incoming trains by means of number and arrow indications.

BEFORE DECIDING on his ride, the prospective passenger can survey this 9 ft.x12 ft. wall map at leisure.

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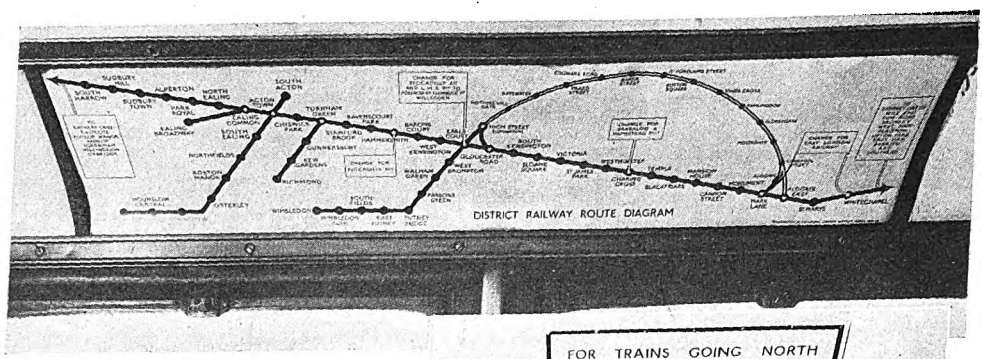
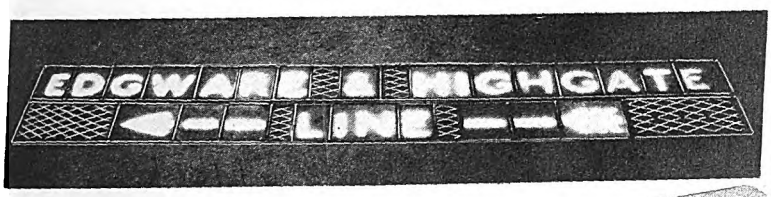
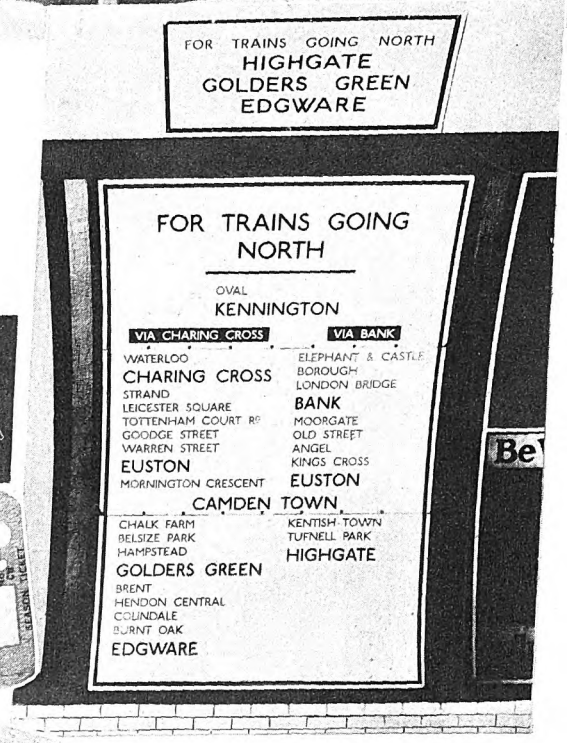
Underground

THE ILLUMINATED MAP, formerly hung from the ceiling of "tube" cars, is now being superseded by varnished cards which are carried over the side ventilator sash. This later style of map is shown in this illustration. Note the care given to showing transfer points whether to the company's own or to *foreign* lines.





ELECTRICALLY-LIGHTED SIGNS are sunk in the station platforms and tell the passenger the direction of the train he wishes to take.

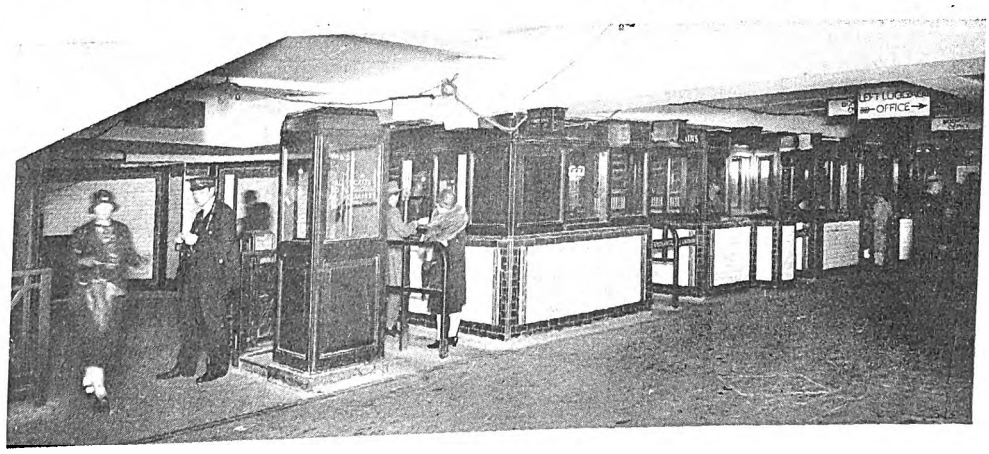


BEFORE A TRAIN obscures this 7 ft. x10 ft. sign which is attached to the wall of the station opposite the platform edge, the patron can satisfy himself that he is or is not on the right platform. Even if the train is in, he can see the main destinations on the higher 2 ft. 6 in.x5 ft. auxiliary sign.

A ONE-WEEK traffic check made in a normal winter week indicated that between 15 and 16 per cent of the rides were on weekly, monthly or quarterly passes (seasons).

AT MANY STATIONS, the ticket-using passengers are counted through practically noiseless passimeters, but the season ticket or passholder, as shown at the left, merely shows his pass and goes on.

THE CHANGE-MAKING delays associated with zone fares are reduced for pay-each-time passengers by the use of ticket-issuing machines. The later types also make change.



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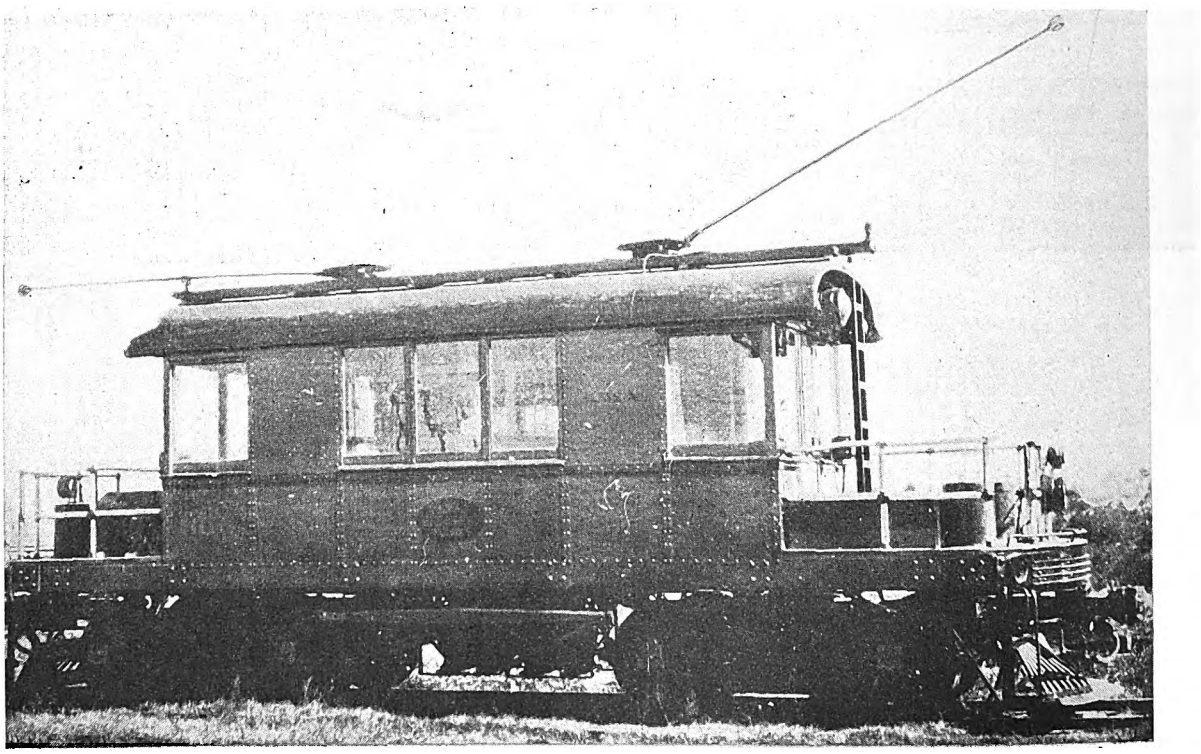
Freight Service

Instituted by Texas Electric Railway

Lines serving a rich agricultural and industrial section are carrying an increasing volume of freight. Equipment has been improved and terminal facilities added to accommodate shippers



Type of electric locomotive used by the Texas Electric Railway. Two are already in service while two more are under construction

ORIGINALLY chartered for giving passenger service only, the Texas Electric Railway, Dallas, Tex., saw the possibilities of handling freight in the rich district it serves and took steps early in 1928 to have the charter amended to permit it to engage in the freight business also. The amendment was made on April 11 and on May 1 the Texas Railroad Commission granted permission for the interurban to handle intrastate freight. The final move came on Nov. 17, when the Interstate Commerce Commission approved the company's rates on interstate shipments. By securing the co-operation of business men in the communities reached and arranging with five steam railroads for interchanging business, the railway had an immediate response when service was started. To accommodate the shippers the company added to and improved its physical facilities in many ways. Loading platforms were built at almost every town; passing tracks laid at several points; station facilities increased; two freight yards added; four new portable substations purchased, and two electric locomotives secured. The railway has benefited from the additions, for the volume of freight carried has increased steadily.

Since 1924 the passenger business of the Texas Electric Railway had been decreasing and losses in passenger revenue became so heavy that communities it served feared there would be a serious curtailment, or possible suspension, of the electric railway passenger service. Company officials, leading citizens of the communities served and numbers of security holders made a thorough analysis of the situation and decided that the company should enter the freight field. Traversing a busy agricultural and industrial section of north central Texas, the lines of the railway offered strategic freight connections for a number of railroads which had difficulty in gaining easy access to several of the larger cities. Because of this the steam railroads with which interchange business was possible, gave helpful assistance in furthering the plans to engage in the freight business.

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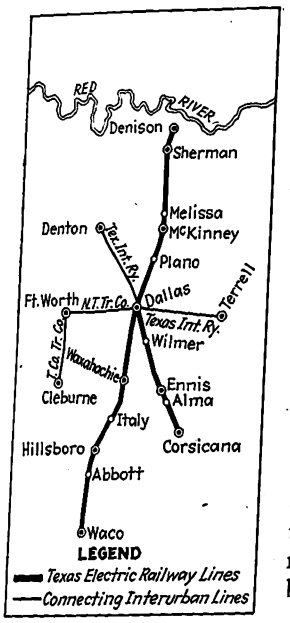


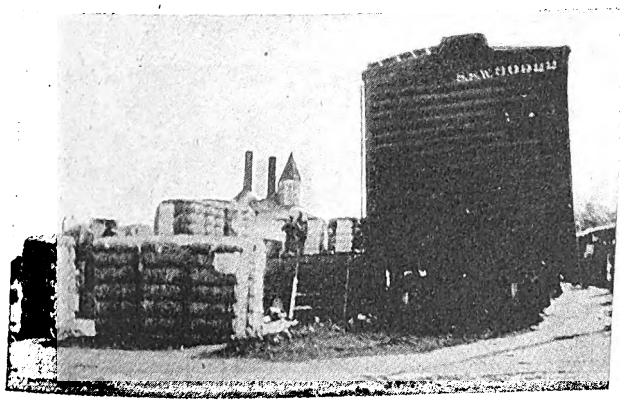
Lines of the Texas Electric Railway, centering at Dallas, reach Sherman and Denison on the north and Waco and Corsicana on the south. The system also is interconnected with interurbans reaching Fort Worth, Cleburne, Denton and Terrell

The system, with a total of 230 miles of track, centers at Dallas, lines radiating to Denison and Sherman on the north and to Waco and Corsicana on the south. Dallas is the largest inland cotton market in this country and the entire territory served is an important cotton-producing section. The cities and towns along its lines also are the marketing centers for large trade territories, and many manufacturing plants are adjacent to or near the railway's tracks. A number of textile mills are being established in the district and most of these will be served by the railway.

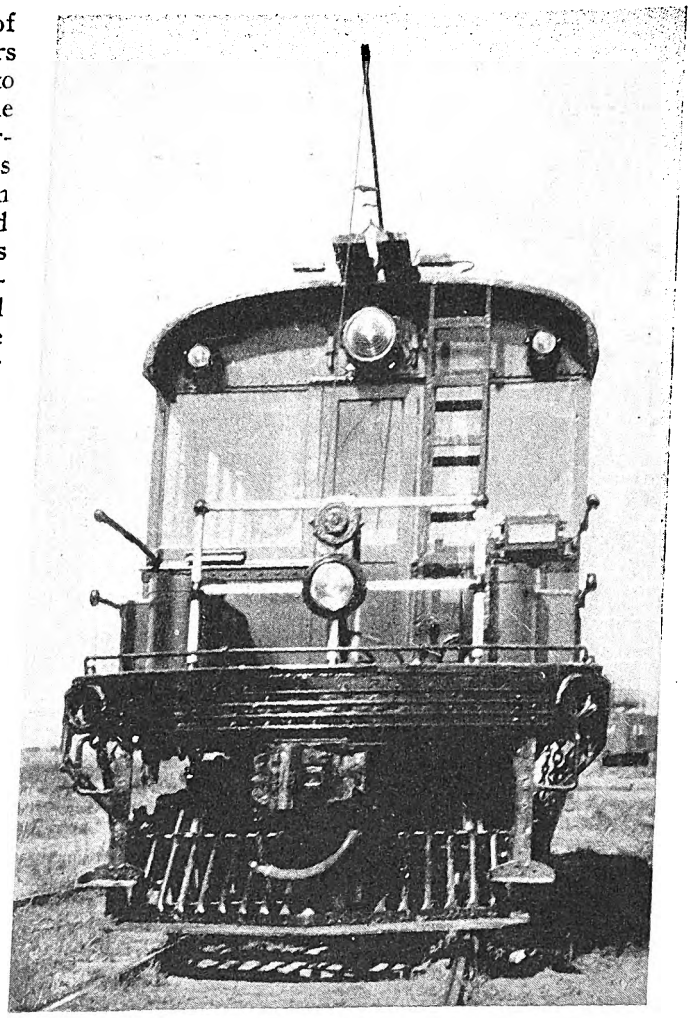
Before plans for the operation of freight service were completed, company officials, community leaders and stockholders made contacts with the principal sources of freight business along its lines and found practically all interests eager to co-operate. In numerous instances it was found that the new arrangement offered material economies to the shipper and greatly decreased the time required to reach the larger centers by existing freight carriers.

Loading Platforms Built and Terminals Improved

Plans to carry freight were rushed so as to take advantage of the movement of the 1928 cotton crop, which started in September. In almost every town, team tracks and cotton loading platforms were built. Numerous passing tracks also were built and station facilities were furnished which were comparable to those maintained by the steam roads. At Waco a complete freight yard, to accommodate twenty freight cars, is under construction. It will have adequate switching tracks, as well as tracks for loading, unloading and storing the cars. At Dallas a new yard to accommodate twelve cars has been built. The Dallas terminal is located near the center of the city at a most accessible point. A large freight station with adequate docks makes the Dallas terminal convenient for business houses in the wholesale and jobbing district where it is located.



Loading cotton, the principal commodity carried by the railway, on a specially constructed platform at Abbott, Tex.



Front view of the Class A electric locomotive used on the system

To provide for the movement of heavy traffic four additional substations of portable type have been built. They are mounted on steel flat cars and have General Electric equipment. One other new substation was installed. Two electric locomotives were built for the company and two additional locomotives are now under construction. Other equipment is being added as required.

Freight interchange tracks have been arranged with five steam railroads at twelve points, as follows: The Missouri, Kansas & Texas Railway, at Denison, Hillsboro, Waco and Kipling, south of Waxahachie; the Southern Pacific, at Melissa, Plano, Wilmer and Alma; the St. Louis & Southwestern, at Plano and Hillsboro; the Trinity & Brazos Valley at Waxahachie; and the International & Great Northern at Italy. Additional interchange tracks are to be built in the larger terminals at Waco, Corsicana, Sherman and Dallas. Industrial tracks have been built to factories along the interurban tracks and others are being built as rapidly as possible. Freight facilities have already been made available to many cotton mills and warehouses, cotton oil mills, brick manufacturing plants and miscellaneous industries. Active efforts also are under way for the location of new manufacturing plants along the company's tracks.

Under the schedule of through rates recently granted by the Interstate Commerce Commission, the Texas

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Electric Railway is in position to handle carload and l.c.l. shipments from the Middle West and Eastern states, moving by rail through St. Louis, Kansas City, Memphis, Shreveport and New Orleans. This business has been built up, since the rates were approved, to a point where a large proportion of the shipments now is interstate shipments of carload and l.c.l. lots.

The Electric Express & Baggage Company will continue to handle express service over the lines of the Texas Electric Railway, as in the past. This company also operates over the Texas Interurban Railway, serving Dallas, Terrell and Denton. Regular pick-up and store-door delivery service is maintained by this company.

The development of its freight business has not affected the Texas Electric Railway's passenger service. Regular hourly passenger service is maintained without interruption. A major portion of the freight movement is handled at night, thus causing a minimum of interference with the passenger cars.

The plans for engaging in freight business were inaugurated and carried out by the late Jack Beall, president of the company and J. P. Griffin, vice-president. A. E. Morris, formerly general freight and passenger agent Oklahoma Railway, has been named traffic manager, and M. R. Fewell, formerly general passenger agent Texas Electric Railway, has been made general passenger and freight agent. C. E. Lennon is the assistant general passenger and freight agent.

Employees of Augusta-Aiken Honored

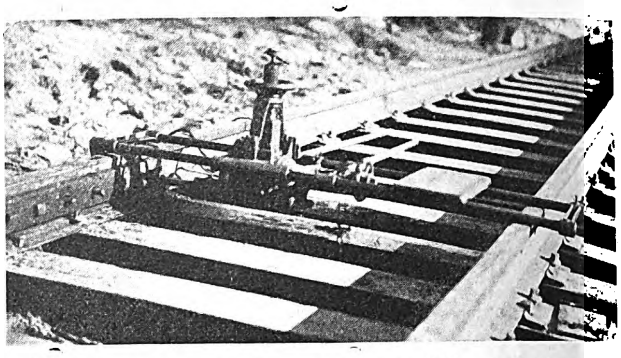
IN RECOGNITION of services rendered the public and the company and for long and faithful employment with the company, the Georgia Power Company, which recently acquired the properties of the Augusta-Aiken Railway & Electric Company, Augusta, Ga., has bestowed service badges upon 80 employees who have been with the Augusta company for ten years and upward. A banquet was tendered all employees at the Partridge Inn, attended by more than a score of prominent officials of the company.

Dresden Articulated Units

TWO articulated street car units have been built and are being tried at Dresden, Germany. They differ somewhat from each other, though each has three bodies. One of these was shown in an illustration appearing on page 23 of the Jan. 5 issue of this paper. One of the units consists of two end cars, each 29 ft. 6 in. over all and mounted on four wheels each, with a central compartment about 13 ft. 4 in. over all, supported by the end cars. The over-all length of this unit is 72 ft. 4 in.

The other design is 73 ft. 5½ in. over all, with the end cars 24 ft. 4 in., and the central car 24 ft. 9 in. in length. The method of support, however, is entirely different. In this second design the central unit is mounted on a single truck, and the outer end of each end unit is equipped with two wheels only, with a support swiveled from the central truck.

When empty each articulated unit weighs about 63,800 lb. It has a carrying capacity of 117 seated and standing passengers. In each train every axle is fitted with a motor, making four motors per articulated unit. They will be tried out first on heavy traffic interurban lines.



Bolt holes were reamed with an electric drill and 1⅛-in. reamer

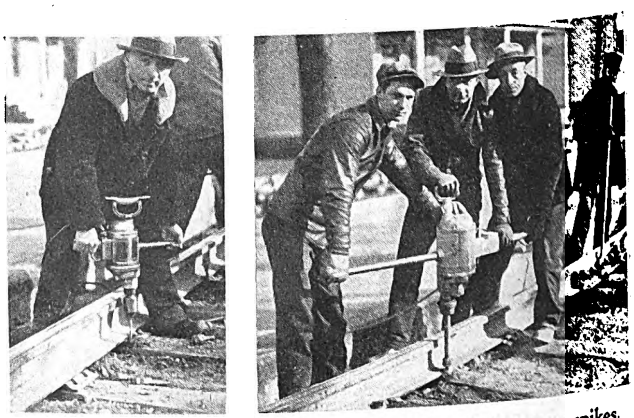
Building City Track for Heavy Cars

By JOHN F. HUBENTHAL,
Roadmaster Chicago, South Shore & South Bend Railroad

HEAVY trains, such as employed by a number of interurban railways, require track construction designed to withstand severe abuse with reasonable maintenance cost. These requirements are doubly necessary where such lines run through paved city streets. The Chicago, South Shore & South Bend Railroad has installed track in Michigan City, Ind., which is believed to meet these requirements. This track is constructed with section 13025 rail in 66-ft. lengths. The joints are of the Chicago, Milwaukee, St. Paul & Pacific Railroad type, 38 in. long, punched for six 1⅛-in. bolts spaced 5½ in. on centers, bolts being 1⅛x6½ in. using 1 5/32-in. Hi-Power lock washers. The tie plates are double shoulder inclined and the joint plates are shoulderless inclined, 40 in. long. Both are punched for screw spikes. The pavement used is Tarmac, penetration process, bituminous concrete.

Numerous construction obstacles were encountered on this installation. Due to lack of space all materials had to be unloaded beyond the curb line in places where permission to do so could be obtained, and then moved by truck to the locations needed. The work was performed by three separate crews. The large crew laying rail was followed by a smaller crew, to place and space the ties and the tie and joint plates, and by a surfacing crew, to surface and align the track.

Installation of a curb 4½ ft. on each side of the center of the track to a grade established by the city engineer was the first operation. This curb was 5x18 in., finished on the top, constructed in 20-ft. sections of concrete mixed in proportions of 1:2½:5. About ¼ in. was allowed be-



Holes were drilled with an electric drill and the screw spikes placed with a spike driver

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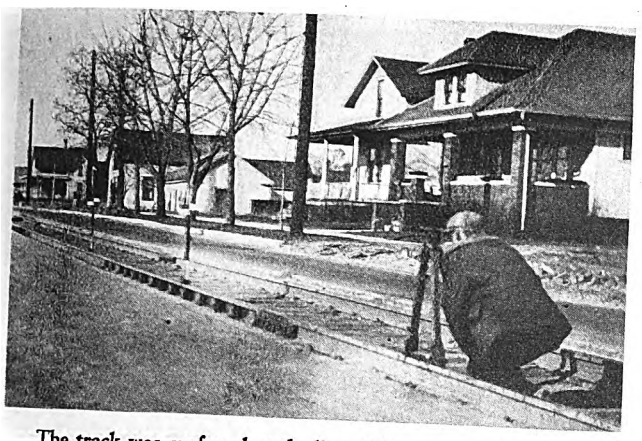


The track was surfaced and aligned by means of a Buff Railign instrument

The ties were tamped by the use of electric tamping machines

tween blocks for expansion. The joints were so constructed that one block would help support the adjacent block.

The large crew then laid the rail and installed the joints. As these joints were drive-fit it was necessary to have them in good surface and line, and drifted to equalize hole spacing, before attempting to install the bolts. If the holes did not line up so that the bolts could be driven without spoiling the threads the holes were reamed, an electric drill and $1\frac{1}{8}$ in. reamer being used for the purpose.

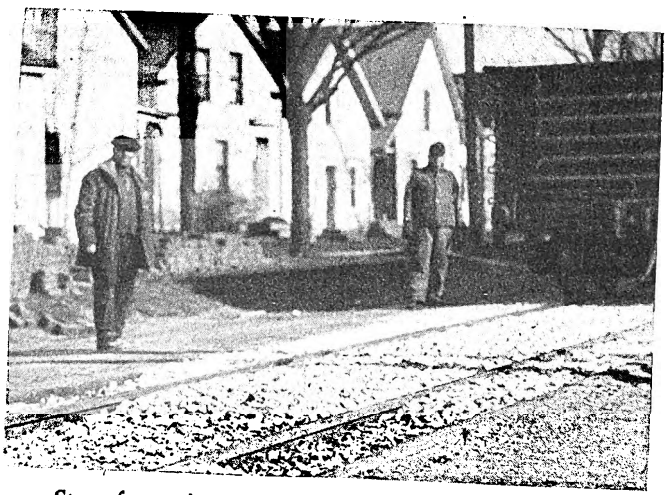
Immediately following this came the job of renewing and spacing the ties on 22-in. centers, or 36 ties to each 66-ft. section, with three joint supporting ties spaced slightly closer to give full bearing to the face plates. The tie and joint plates were spaced and temporarily spiked to gage with track spikes. The spike holes were then drilled and spikes driven by a No. 4 B spike driver. The same crew also tightened the bolts by tapping the head with a spike maul, while the nut was tightened with a wrench. This was done three times before the track was paved.

Then followed the crew which surfaced and aligned the track by using a Buff Railign instrument, operated by the foreman. The ties were tamped by the use of electric tamping machines. After the track was surfaced and aligned it was then backfilled with the gravel previously removed. This fill was installed in layers of 3 in. each and hand-rammed until it became thoroughly compact.

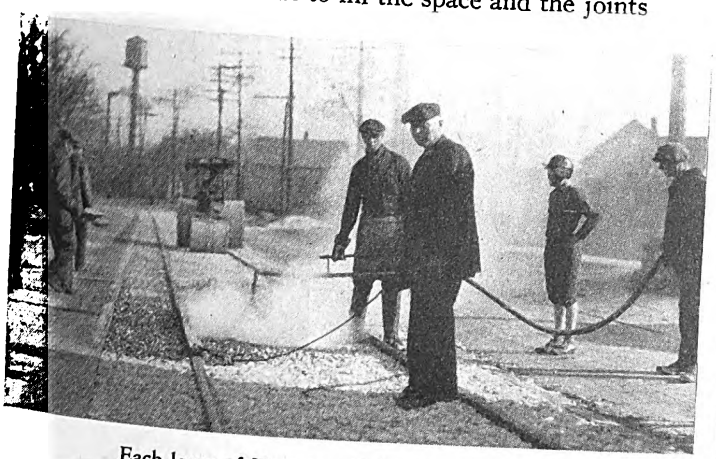
Joints were then cleaned with a wire brush in preparation for welding. The rails were heated with kerosene torches about 2 ft. on each side of the joints to close the expansion gap. If the rails failed to close with this heating an insert was made to fill the space and the joints seam-welded to the joint plates and ball of the rail. The rails were also electrically welded together and finished to a smooth surface with a grinder.

Because the rigidity of concrete paving was considered undesirable, macadam paving was used, and the Tarmac penetration process was selected. Four different grades of stone were used in this paving, namely, No. 4, No. 3, $\frac{1}{4}$-in. chips and screenings. They were installed in layers in the order mentioned, and between each layer Tarmac was applied under pressure.

The Tarmac was heated to a temperature varying from 280 deg. to 300 deg. After each layer was applied it was rolled with a gasoline driven roller. Precaution was taken to leave unrolled a strip approximately 4 in. inside of each rail, since this was to be tamped by the flange of the car wheels.



Stone for paving was unloaded from drop-bottom cars



Each layer of Tarmac which was spread under pressure was rolled to within 4 in. of the inside of each rail

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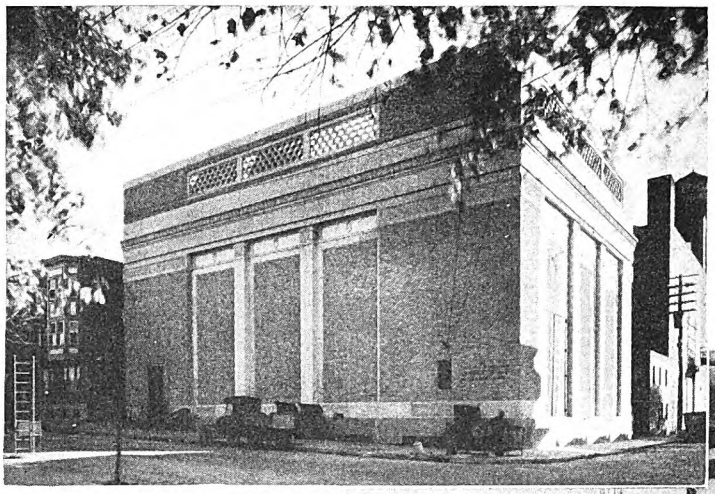
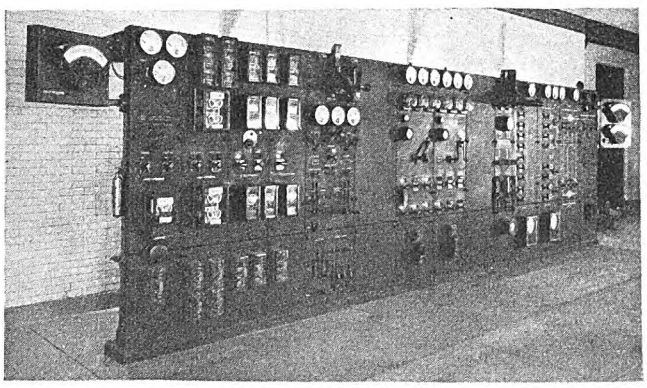
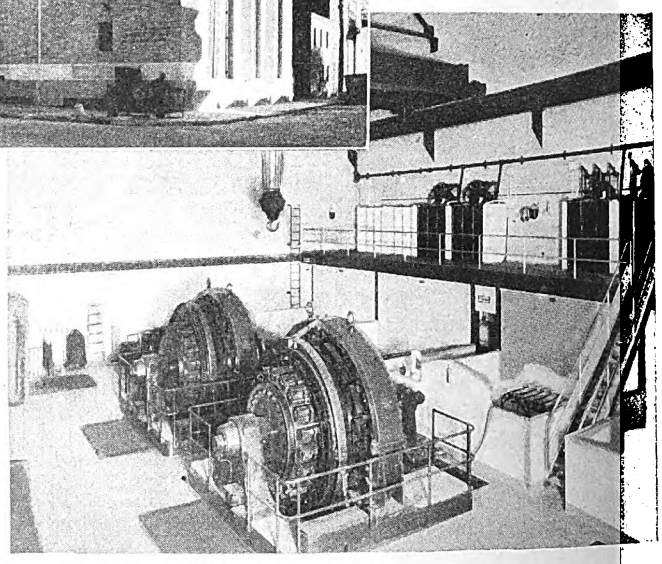
Views of Electrical Equipment for Philadelphia Subway



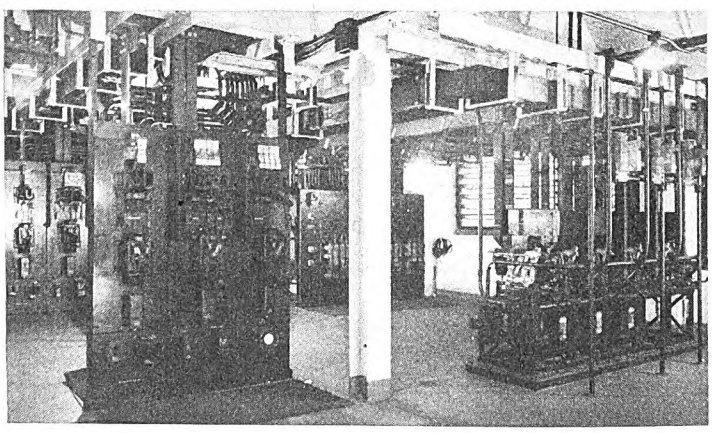
The architecture of this substation, typical of all three, makes the building a distinct asset to the neighborhood in which it is located. Station noise is minimized by making the building entirely closed



Main control switchboard of the Louden Street substation

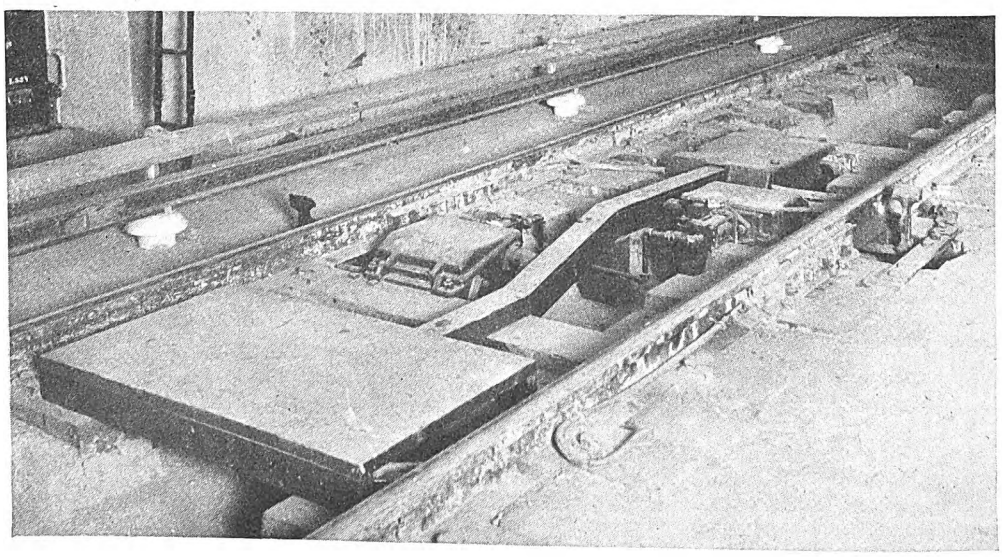


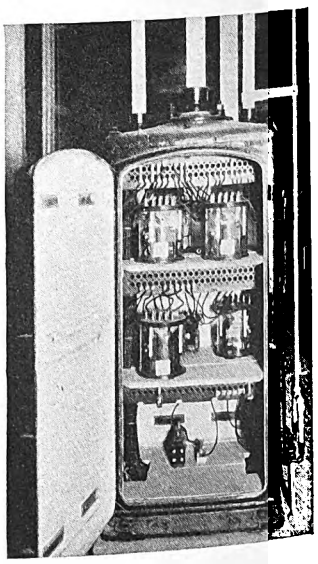
Interior of the Cumberland substation, showing the large synchronous converters. The transformers are housed in the pits at the right of the converters



Basement of the Cumberland substation. An individual converter switchboard may be seen at the left and a battery of high-speed circuit breakers at the right

Double automatic stop layout and impedance bonds. Both automatic and semi-automatic train stops have been provided to operate in connection with every automatic block signal and interlocking home signal





Instrument case, showing typical piping to the stop-valve magnets

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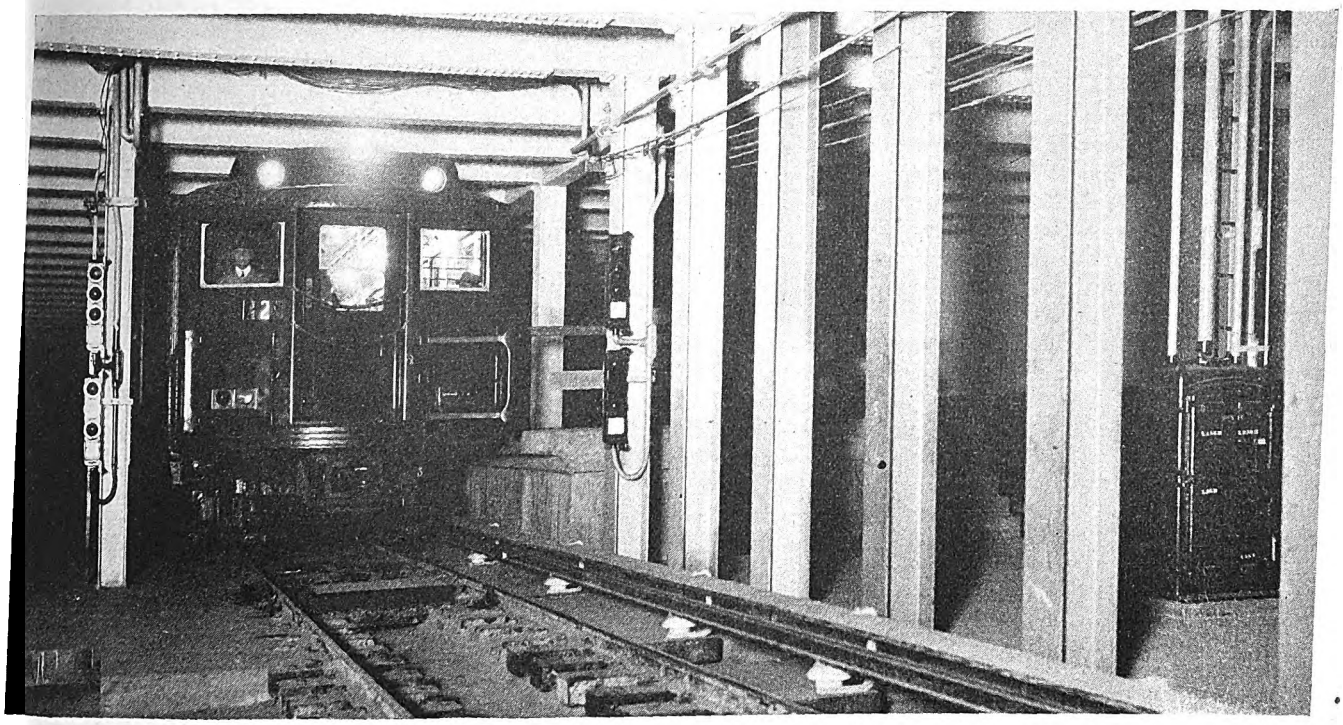
Electrical Equipment

Specially Designed for Philadelphia Subway

Two 3,000-kw., 60-cycle rotary converters have been installed in each of three soundproof substations. Distribution system utilizes a total of 75 miles of cable. Signals are electric color-light type and all switches are interlocked and electro-pneumatically operated



Signal location at Olney Avenue, showing the conduit run and the relative location of signals. Note the double case at the right and the method of running air line across track

In the Feb. 9 issue an article was published telling the relation of the Broad Street subway to the existing and the future transit facilities of the city, and giving operating and construction details. This was followed by an article in the Feb. 23 issue describing the 150 cars bought by the city. The last article of this series, giving details of the Fern Rock terminal and shops, will appear March 23.—EDITOR.

NUMEROUS noteworthy features have been included in the design of the power distribution system for the new Broad Street subway, constructed under the supervision of the Department of City Transit of Philadelphia and being operated by the Philadelphia Rapid Transit Company. Among these are the construction of the substations without windows; the scheme of natural ventilation for the removal of the air heated by the electrical equipment; the largest 60-cycle railway converters ever built; the remote manual control and interlocking of electric switches; the separation of high-voltage circuits and switching from the low-voltage direct-current circuits; location of all 600-volt circuits below the main floor; the bringing of underground cables directly to the switching equipment to which they connect; and the use of large oil cooled transformers within the buildings.

The signal system, too, has many interesting features. The salient ones are: Alternating current at 60 cycles for signals and interlockings, supplied by a system of duplicate feeders; the double-rail track circuits, except at interlockings and in the yard; overlap signal control; automatic three-position, color-light signals; electro-pneumatic automatic train stops; semi-automatic electrically-controlled block and interlocking signals; non-automatic electrically controlled dwarf and permissive signals; speed and time control signals; electro-pneumatic switch operating mechanism; impedance bonds and track connections; interlocking machines; and electro-pneumatic direct acting yard switches, operated from a control panel in a tower.

In the determination of substation capacities and locations, the ultimate power demand of the trains was used

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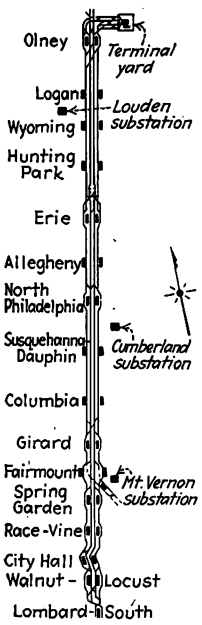
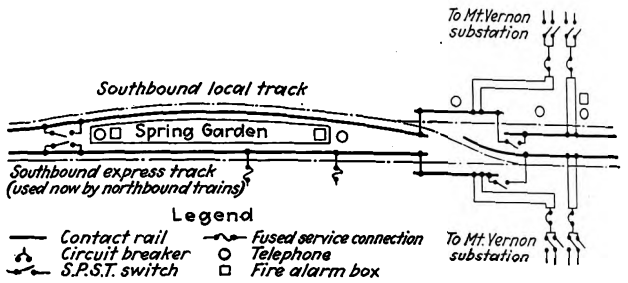


Three substations, spaced approximately 2 miles apart, serve the Broad Street subway

as a basis. Rush-hour operation was assumed to consist of eight-car trains running on two-minute headway on all four tracks, with northbound trains carrying an average load of 150 passengers per car (72,000 per hour) and southbound trains loaded to an average of 35 passengers per car. As northbound trains run against the average grade, the evening rush hours were used in determining the maximum substation loads.

With the above train operation, including coasting, which provided a 5 per cent speed margin, a schedule was developed assuming a loaded car weighing 68 tons accelerating at an average rate of 1.6 m.p.h.p.s. and braking at an average of 2.0 m.p.h.p.s., and train curves were drawn for an average run using characteristic curves of standard motors of various sizes. The results of these calculations fixed the motor requirements at approximately 400 hp. per car, and because of the obvious advantages of large motors it was decided to use two motors only on each car. Having determined the proper motor size, continuous train curves for northbound and southbound local and express trains were then drawn, assuming an average potential of 575 volts at the cars. Studies of various numbers and locations of substations were made from the power requirements as shown by these curves.

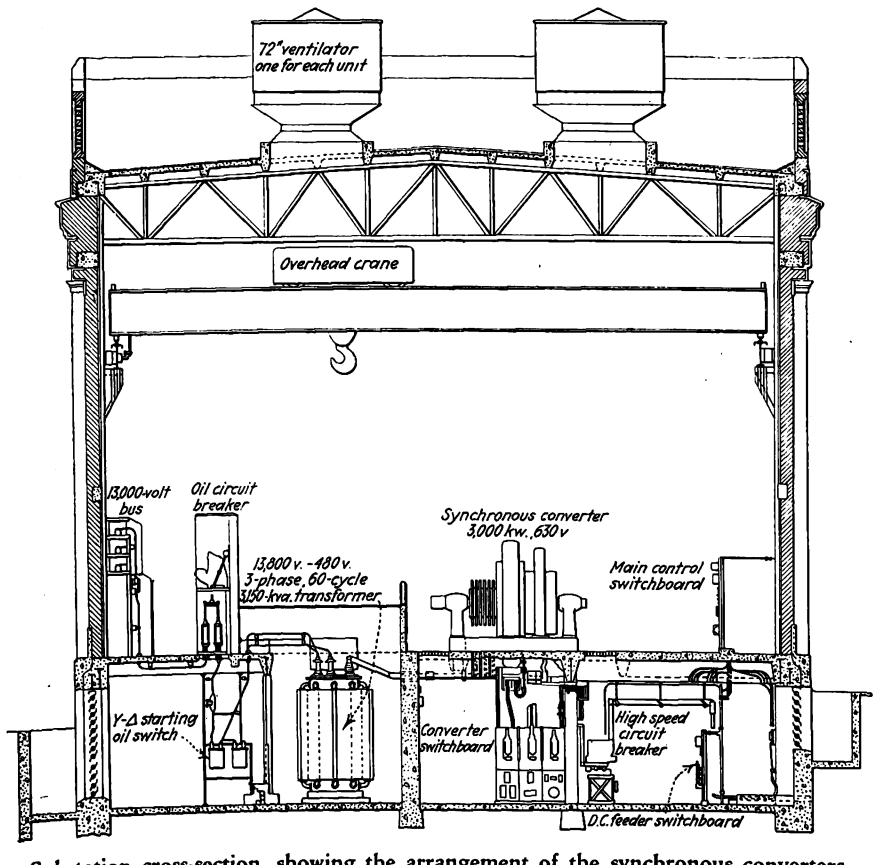
Past experience with a four-track subway rapid transit line, similar to the Broad Street subway, indicated that



Typical layout of contact rails at a station, and how they are fed by the substation cables

the feeder capacities and voltage drops during peak loads are within satisfactory limits when substations are spaced about two miles apart. The results of the power requirement studies for the Broad Street subway agreed with this experience. Considering the first section of the Broad Street subway with a branch on Ridge Avenue, it appeared logical to locate a substation near this junction and the Mount Vernon Street site was chosen. This substation carries the load of two-track initial operation from City Hall, a distance of approximately 4,400 ft., south, to the first sectionalizing joint, about a mile north of the substation. By the time traffic requires four-track operation through City Hall, the subway will be extended to South Street and another substation will be located in that vicinity.

The next substation to the north is located on Cumberland Street, approximately 10,000 ft. from Mount Vernon Street, or approximately 10,600 ft. between substations. The most northerly substation is on Louden Street, approximately 13,000 ft. from Cumberland, or approximately 13,600 ft. between substations. This station feeds the north section of the subway and also supplies the Fern Rock yard. The method used in calculating the loads on the substations made it possible to determine not only the load on each substation during the maximum hour, but also the peak loads on each track during any five-second period, either assuming all trains to be exactly on schedule or assuming certain trains to be late. Various "off schedule" combinations were tried, but it was decided to assume all trains exactly on schedule, and also that the peaks occurred simultaneously on all tracks, the improbability of the occurrence of the latter condition giving sufficient margin over the calculated load to care for the possible higher peaks within the five-second period. The substation loads, as calculated by the above method, were as follows:



Substation cross-section, showing the arrangement of the synchronous converters, transformers and other electrical equipment

	Maximum Hourly Load, Kw.	Momentary Peak Load, Kw.
Mount Vernon	9,700	21,600
Cumberland	9,500	21,700
Louden	9,500	20,500

Since the momentary peak loads are more than twice the maximum hour loads, and since the two-hour rating of synchronous converters is generally 150 per cent of the continuous rating, it is evident that the requirements called for converters having at least a five-second

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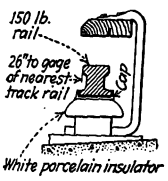
rating of 300 per cent of their continuous capacity. The converters installed have a continuous rating of 3,000 kw. with 150 per cent capacity for two hours, and 300 per cent for three minutes. The number of converters to be installed in each substation for the ultimate capacity of the subway will be four. This includes one spare in each station. For the initial two-track operation two converters have been installed in each substation. These will easily take care of the estimated loads for the year 1930, when the schedule has been assumed as six-car trains operating on a two-minute headway.

All Power Purchased

Power for the operation of the Broad Street subway is purchased from the Philadelphia Electric Company at 13,200 volts, three phase, 60 cycles. To minimize the danger of a complete shutdown of the subway due to loss of power, each substation is supplied directly from a different generating station and, since any two substations are sufficient to enable trains to continue in operation at reduced speed, the chances of a complete shutdown from this cause are extremely remote.

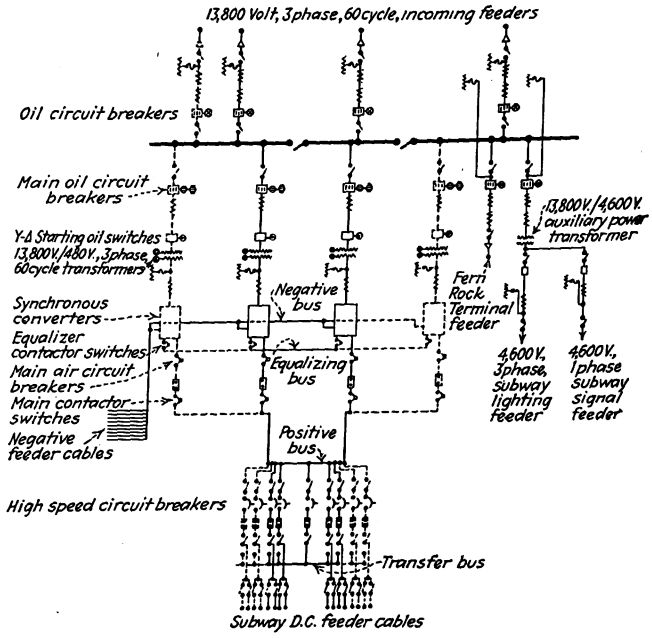


Cross-section of the 150-lb. over-running type of contact rail and the horizontal protecting board

The Louden substation is fed from the Richmond generating station; the Cumberland substation from the Hunting Park substation of the Philadelphia Electric Company, which is now supplied from Conowingo; and the Mount Vernon substation from the Delaware generating station. The power cables, both incoming and outgoing, are all in underground conduit, and the alternating current is, in every instance, carried over duplicate three-phase cables, either one of which is capable of carrying the normal two-track load.

On account of the location of the substations in residential districts, their architecture was given special attention. Noise is minimized by making the buildings entirely closed, except for the cold air louvers, and providing air spaces in the walls.

In the arrangement of the equipment in the substations, safety and ease of operation were sought, and, consequently, all power circuits were located below the level of the main floor. Each incoming alternating-current feeder is carried directly to disconnecting switches, then through an oil circuit breaker to other disconnecting switches, and then to the 13,200-volt alternating-current bus. Each converter transformer is fed from this bus through disconnecting switches, a main oil circuit breaker and star-delta starting switches. Copper bars from the transformer secondaries lead directly to the alternating-current ends of the synchronous converters. At the direct-current end of the converters, the negative is tied solid to the negative bus. The positive and equalizer connections are carried through circuit breakers or contactors on the converter switchboard, which is in the basement below, thence to their respective buses located adjacent to this switchboard. From the positive bus the contact rail feeder circuits are carried through high speed circuit breakers, then through disconnecting switch panels to the feeder cables which leave the building on the side opposite to the incoming alternating-current cables. All control and switching equipment was supplied by the General Electric Company, with the exception of the main direct-current circuit breakers, which were built by the I. T. E. Circuit Breaker Company.



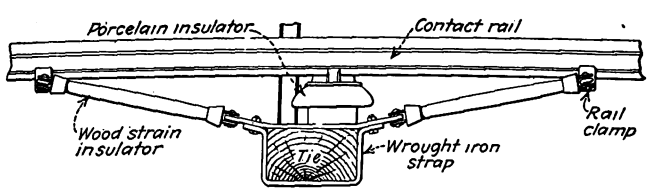
Wiring diagram for one of the stations. The solid lines show the present installation, while the broken lines represent equipment to be added later

The converters, built by the Allis-Chalmers Manufacturing Company, are compound-wound, 60-cycle, interpole machines and are the largest of this type ever built. These converters are started by star-delta switching of the high-tension windings of the transformers. All switching and starting operations are so interlocked as to make improper sequence impossible. In addition to their size, they have another unusual feature in the armature windings. These windings are of the so-called "frog-leg" type, which consists of a combination of lap and wave windings, thus eliminating the necessity for cross connections. The transformers supplying the converters are rated at 3,150 kva. at 13,800 volts and are three-phase, 60-cycle oil-cooled, the latter feature being a departure from the usual practice of using air-cooled transformers in similar installations. They were furnished by Allis-Chalmers Manufacturing Co.

Another unusual feature is the remote control of all switches in the power circuits. The operators do not handle any switches carrying train power current, as these switches are all located in the basement and controlled from the switchboard on the main floor.

Power Distribution Through Underground Conduits

Power is carried from the three substations to the subway in underground conduits. For initial two-track operation there are eight 2,000,000-circ.mil cables on the positive side and six 2,000,000-circ.mil cables on the negative side of the circuit from each substation. For the ultimate four-track operation the number of these cables will be doubled. When the subway structure was built, provision was made for these duplicate underground con-



The contact rails are anchored in 1,000-ft. sections with this type of anchor

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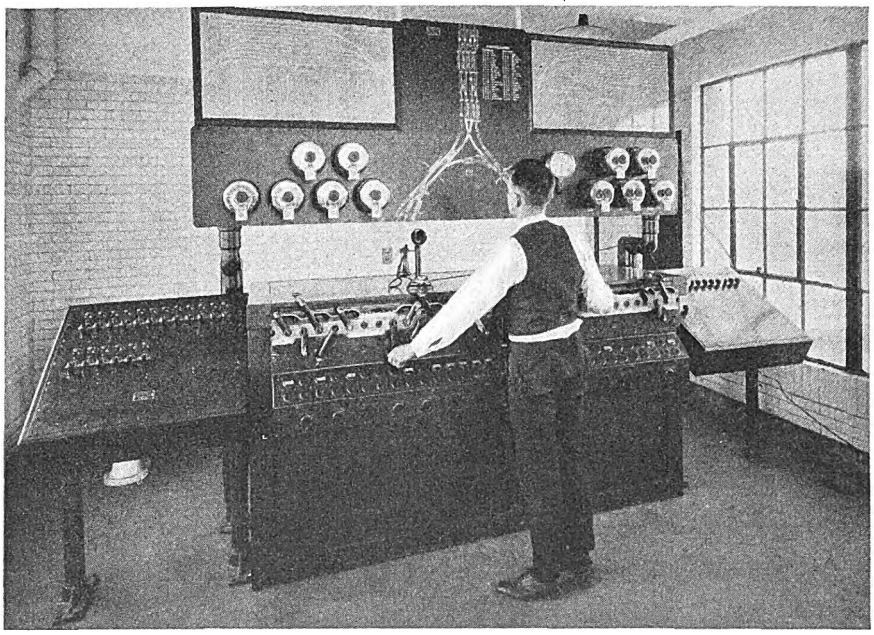


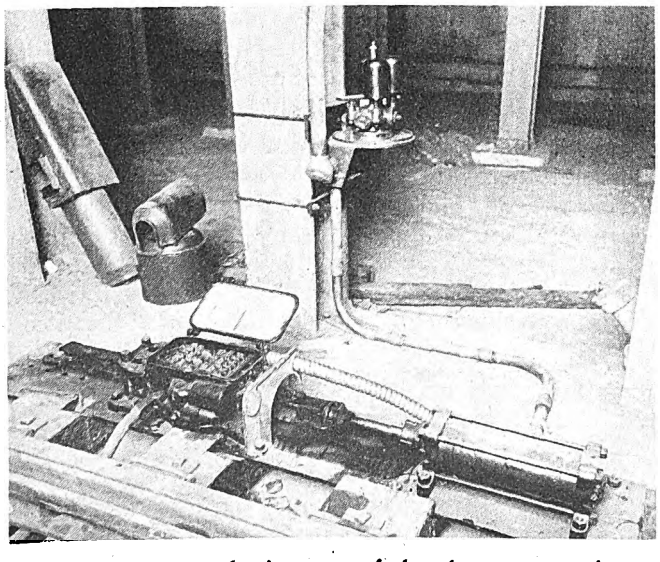
Interlocking machine at yard portal for switches on the main track. Note the control panel at each end for controlling yard switches, the track model showing the main track layout and framed charts on each end showing the respective yard layouts

duit lines with manholes communicating with the inside of the subway. Each section of this duplicate system is entirely isolated from the other, and for important services like lighting and signals, duplicate feeder cables have been installed. Paper-insulated, lead sheath protected cables, thoroughly fireproofed in the manholes, are used for all of the underground circuits. In the 6½ miles of subway, there are thirteen kinds of cable with an aggregate length of approximately 75 miles.

Switching rooms are provided in Broad Street at the streets on which the substations are located, and the positive cables from the substations are tied in with the contact rail through remote controlled circuit breakers located in these rooms in the subway retaining walls.

From the switching rooms two 2,000,000-circ.mil cables are run to each contact rail section. The contact rail is of the over-running type, in 39-ft. lengths, weighs 150 lb. per yard, is of special section and is made of soft steel composition having high conductivity, the ratio of steel to copper being 7 to 1. No cable feeders parallel to rails are used in either positive or negative circuits. The rail is carried on Ohio Brass white porcelain insulators mounted on long ties located at 9-ft. 9½-in. intervals and anchored in approximately 1,000-ft. sections, with expansion joints separating the sections. White glaze was adopted as an aid in checking foreign deposits on the insulators, which are a common cause of leaks. It was thought that this glaze would encourage maintainers to keep the insulators clean. The bonding of the contact rail is accomplished by bolting on two O-B solid copper fish-plates at each joint and by welding adjoining rail heads. The copper fish-plates are then soldered to the webs of the adjoining rails.

The return circuit in the subway is through 62-ft., 100-lb. running rails. Each joint is bonded with two Ohio Brass 250,000-circ.mil. gas-welded bonds, 13½ in. long. Due to the short lengths of the running and contact rail bonds and the high electrical efficiency of the welded and soldered connections to the rails, the conductivity of the entire circuit approximates that of continuous rail, thereby reducing to a minimum the voltage drop. The tracks are cross-bonded at each passenger station, and at the yard portals. In normal operation all sectionalizing and equalizing switches will be kept closed, thus tying the three substations solidly together through the contact rails. Sectionalizing switches are located at substation feed-ins, while equalizing switching points are midway between substations, at the portal and at City Hall. The breakers located at feed-in points are automatic opening, remote control closing, 3,000-amp. rating. Thus they will open on an overload or short circuit, but cannot be closed except by a substation operator.



Switch operating mechanisms are of the electro-pneumatic type with electrically-operated cut-off valves

Signal System of Latest Design

Electrical energy for the operation of the signal system is supplied from the Mount Vernon and Louden substations. The supply from the Louden Street substation may be considered an emergency source of energy. Normally the energy is taken from one set of feeders, but duplicate distribution cables are installed on either side of the subway structure and may be sectionalized at each substation. Sectionalizing switches are provided at each 4,600/110 volt distribution transformer location along the line and 110-volt automatic selector switches are installed so that, in event of failure of a feeder or local transformer, the signal load for that section will be automatically thrown over to the duplicate service and automatically restored to the original source when that line is again energized. The signal power requirements for the ultimate four-track installation total about 65 kva.

Studies were made of roadway, signal equipment and train-operating characteristics, so that signals might be located to provide maximum train capacity of tracks. These elements included profile and alignment of roadway, location of stations and interlocking plants, acceleration and braking rates, speed-time and time-distance curves, and the normal and maximum attainable speeds for each run for the equipment to be

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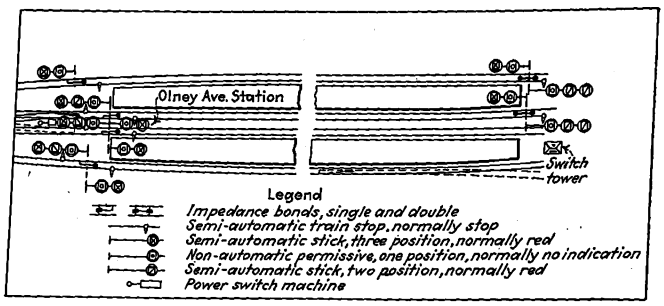
operated, as well as the visibility of the signals and the simplicity of the scheme of aspects displayed by them.

The signal locations or block spacings are laid out for eight-car trains operating on a two-minute headway, although the majority of spacings allow for somewhat less than 1½-minute headway, thus providing for a normal single-track capacity of approximately 23 eight-car trains on the line, operating at a round trip scheduled speed of 16½ m.p.h. In every instance the length of a block is 150 per cent of the emergency braking distance required by the train, at the maximum speed which can be obtained at that point.



Layout of signals, train stops, power switch machines and other controlling equipment at a typical station

Types of Signals and Track Equipment Installed

The automatic signals are from the Union Switch & Signal Company, and are the three-indication, color-light type, equipped with 5⅜-in. lenses of green yellow and red, and 14-volt, 5-watt lamps in duplicate. Home signals at interlocking plants are of the two and three-indication subway style, color-light type, with the same lens and lamp equipment, and displaying two or three lights in a vertical row to indicate which route is set up, and whether or not the track ahead is occupied. In all cases the caution control of a signal is carried in the two blocks in advance, so as to obtain "overlap control," providing for two red signals protecting the rear of a train at all times. A double-arm, interlocking signal, with a yellow permissive signal is used in locations where operation is in both directions.

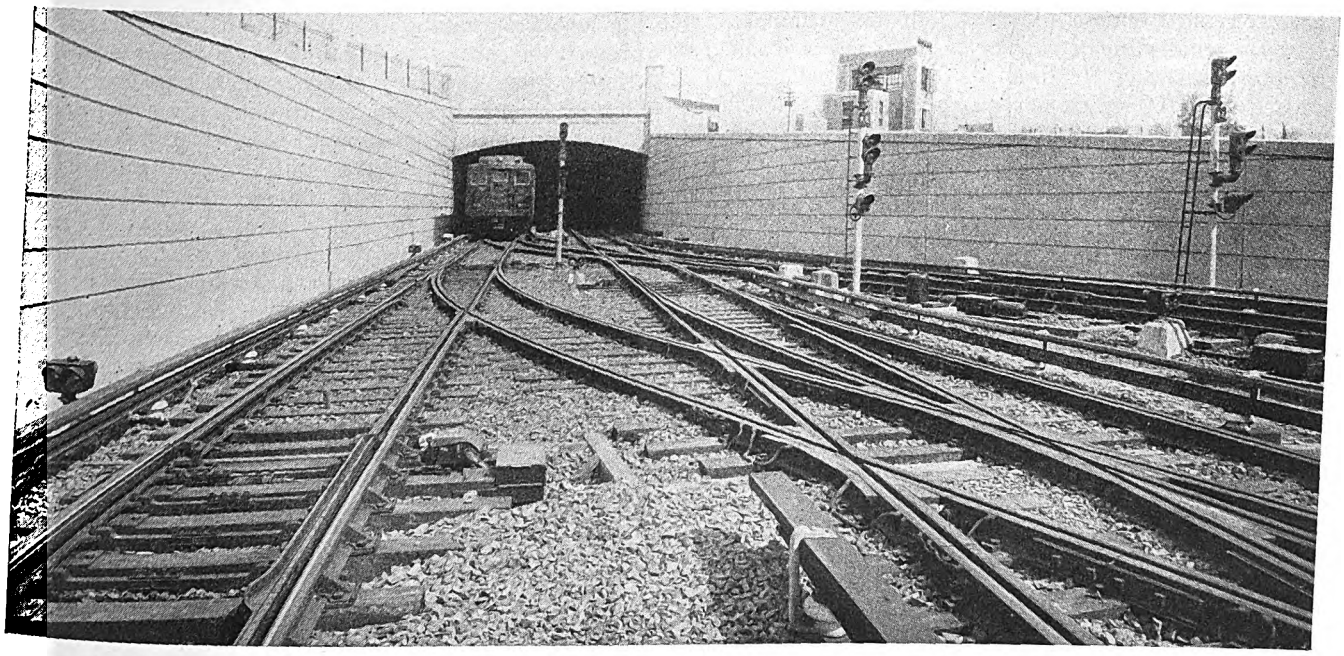
Speed control signals have been placed on the southbound track south of Olney Avenue, where a long 3-per cent down grade is encountered, on the southbound track leading off the upper deck at Erie Avenue to take care of a 3½-per cent grade, and at several other locations where curves make automatic speed control desirable.

Automatic and semi-automatic train stops have been installed to operate in connection with every automatic block signal and with interlocking home signals. The stops are of the trip type and are located on the left side of the track approximately opposite the signal with which it operates. A trip arm extends 2½ in. above the top of the running rail when in the engaging position, which is when the signal is displaying its most restrictive aspect. When in this position the trip arm will engage a trip cock located on the main air line on the cars, thus causing an emergency application of the brakes of the train which passes the stop. A push-button switch within reach of the motorman's cab is provided at each automatic stop, which is used to clear the trip arm when it is necessary for a train to pass a stop signal.

The automatic stop is of the electro-pneumatic type, controlled by an electrically-operated valve. Its operation is positive and in event of failure of electric or pneumatic power the trip arm assumes the engaging position, thus making the signal system safe.

All track circuits are a full block long except where cut sections are required and within interlocking plant limits. Alternating current is supplied at one end of each track circuit, the limits of which are established by insulated joints in the rails, by a 14-volt air-cooled transformer equipped with taps to permit fine voltage adjustment. The track relay is of the two-element, two-position vane type. Track connections are made through parkway type cables buried in the concrete with leads connected to the rail lugs of impedance bonds or the rail.

On double-rail track circuit sections of the system, impedance bonds with an iron core are provided to carry the propulsion current around the insulated rail joints. These bonds have a continuous carrying capacity per rail of 750 amp., 2,000 amp. for ten minutes, or 5,000 amp. for one minute. To avoid the use of a large number of impedance bonds on short track circuits at the large interlocking plants and in the terminal yard,



South portal at the terminal yard, showing the types of signals governing momevents into the subway proper

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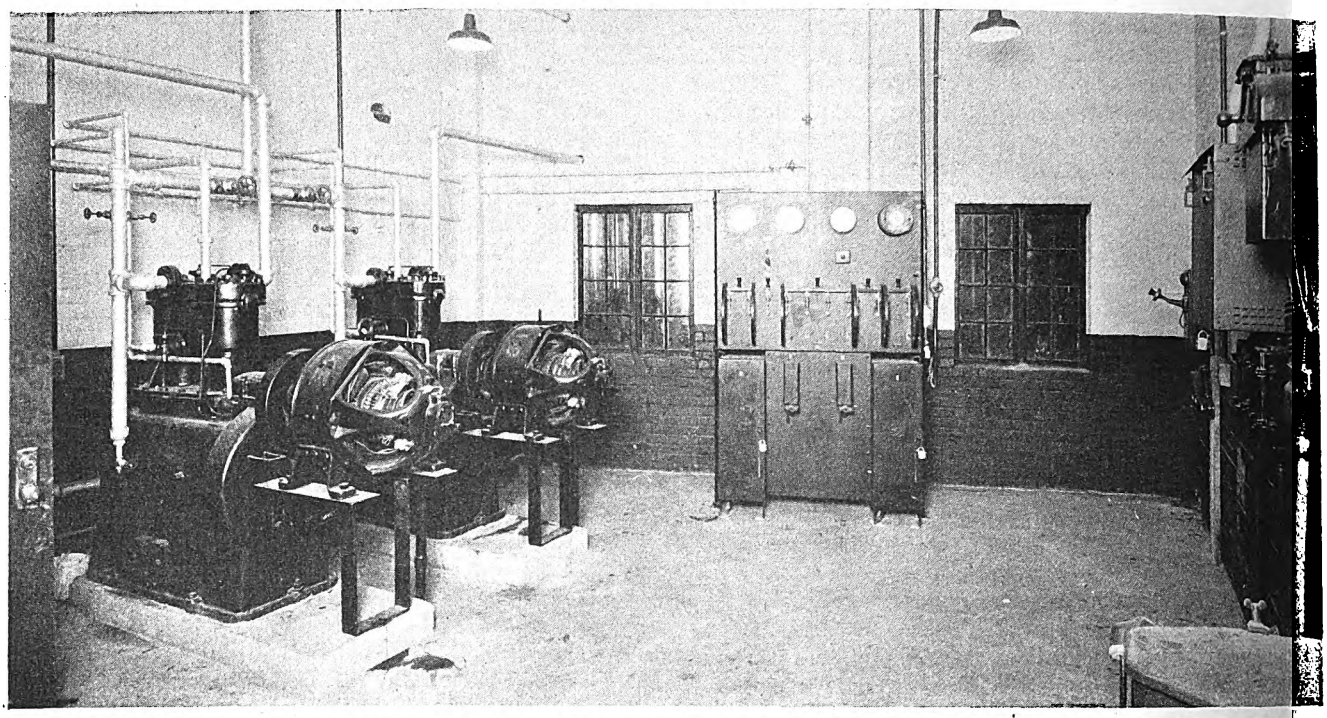

One of the six compressor rooms located on the system. This view shows the automatic transfer panel, the oil switches, transformers, control board for compressors, the governors immediately below the switches, the automatic starters at each end of the control board and the compressor piping

only one rail is used for the propulsion current and the other is bonded and insulated for the signal track circuit.

Signal control apparatus is housed in cast-iron boxes of 2, 4, 6, or 12-relay capacity located in the vicinity of the signal, controlled and connected to it by conductor cable in galvanized conduit. Signal control cables are run in a three-way duct bench on both sides of the subway.

The switch operating mechanisms are the Union Switch & Signal Company electro-pneumatic type with electrically-operated cut-off valves. Their operation is positive and a movement from normal to reverse can be made in 1½ seconds with air pressure as low as 75 per cent of normal. A means of operating them by hand is provided for emergency.

Compressor plants are located at Fairmount Avenue, Erie Avenue, Olney Avenue, and the terminal yard portal, each having a capacity of 75 cu.ft. of air per minute, excepting the one at the yard, which has a capacity of 100 cu.ft. per minute. All of these compressors are in duplicate and are driven by direct-current series-wound motors designed to operate from the 630-volt contact rail circuit. Each plant is equipped with condensers, main reservoir, and switch panel containing a watthour meter, ammeter, volmeter, air-pressure gage and various switches.

A 2-in. galvanized extra heavy wrought iron pipe is used for the main air line in the subway and yard. Suitable bends for expansion, auxiliary reservoirs for drainage, ¾-in. taps for switches at interlockings, etc., ½-in. taps for automatic train stops, and service taps for track repairs are included.

Six Interlocking Stations

The interlocking plants are located at six points on the system: at the City Hall, Spring Garden, Girard, Erie and Olney stations, and at the yard portal. The plants are pneumatically operated and electrically controlled. The power interlocking machines, built by the Union Switch & Signal Company, range in size from 7 to 75 levers. All of the machines, with the exception of that at City Hall which is temporary, have been provided with sufficient spare space for ultimate four-track operation. The levers are equipped with circuit controllers, indication magnets, electric locks, mechanical locking, and lever lights. The interlocking machine is inclosed in a metal case having separate removable panels for each section.

The position of trains is indicated to the tower man on a track model board, located above the machine, by means of spot lights marking the sections of track within the plant limits and adjacent thereto. A steel relay cabinet with glass-paneled doors is provided in each interlocking station for the purpose of housing such relays, transformers, etc., as may be required for each interlocking plant.

Mechanical locking is used in the interlocking machines, the levers operating in a predetermined order so as to prevent the setting up of conflicting routes or the clearing of opposing signals, and the switches are locked electrically by the presence of a train upon a given track circuit. The electro-pneumatic interlocking is so arranged that with normal operation it is not possible for the operator to set up routes and signals which will permit trains to come together.

In the terminal yard the track switches are electro-pneumatically operated and controlled from a tower in the yard entrance building. The switch mechanisms are not interlocked and depend upon air pressure to keep them in position. They are positive in operation and very rapid in movement, only one second being required for a movement from normal to reverse, or vice-versa. The control panel is equipped with spotlight indicators above each lever. Electrically lighted switch signals are provided to indicate the position of the switch and are controlled by a circuit controller which operates with the switch points. The wiring for the various controls is carried throughout the yard in treated trunking, supported every 7 ft. on concrete piers which also carry the 2-in. main air line.

Loud speaking stationary post telephones are located at

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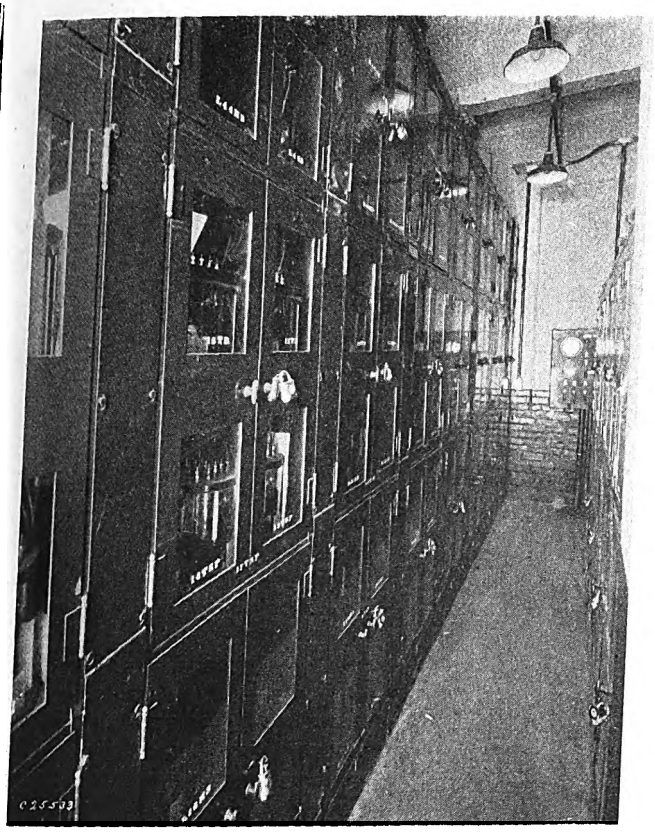

Three tiers of tower relay cabinets installed at the Olney station interlocking plant

each switch in the yard so that direct communication can be obtained between the motorman and the tower operator for the rapid movement and dispatching of trains.

Telephone and Fire Alarm Systems

Two telephone systems are installed in the subway, one for general purposes and another for operating the road. The general system consists of a 50-pair and a 110-pair telephone cable extending the length of the subway and terminating in a machine switching board at the administration building. The telephones in the cashier's booths at the stations, those in the shops and some of the telephones located on station platforms are connected to the general system.

The operating system consists of a 50-pair cable running the full length of the subway and terminating at a manually operated switchboard in the administration building. These telephones are located on station platforms, in interlocking towers, emergency exits, shop offices and in the dispatcher's office at the administration building. This system is used by the dispatchers for conveying the necessary information for operating the road.

The fire alarm cable forms a loop extending the full length of the subway and is tapped at all station areas. At each station there is a master box which is operated from any one of several auxiliary boxes in that area. Operation of the master box sounds the alarm by direct connection to the electrical bureau in City Hall. At the same time this information is relayed from the electrical bureau back to the administration building by another line in the fire alarm cable. In addition to these lines the fire alarm cable contains a direct line from the dispatcher's office in the administration building to the electrical bureau. Fire alarm boxes are installed at all emergency exits as well as at the stations.

Advertising Public Transportation

MANY electric railways in Massachusetts for some time past have been carrying on persistent campaigns looking toward increased patronage. The Worcester Consolidated Street Railway has completed an unusually successful year of advertising in the newspapers in its territory. Moreover, its publicity department provided news and the papers responded with editorials which, whether commendatory or not, attracted the attention of the public to riding—swiftly, cheaply and safely. The Eastern Massachusetts Street Railway has been running advertisements that are attractive, catchy and substantial. One of these reads: "This is the man from our town who is so wondrous wise; he rides electric cars to and from business. Thus—to work on time;—home on time; no hot words from the boss; no cold meals from the wife; a carefree, happy, thrifty life is his."

One company, the Massachusetts Northeastern Street Railway, specializes in advertisements mainly for its amusement park at Canobie Lake, N. H. The Fitchburg & Leominster Street Railway, which emerged from its second year of reorganization under its own resources on Jan. 1, has taken up the advertising program and has just finished its first year. Any change in running time or routes of electric cars is advertised before, during and after the change. The company sends its messages through the vicinity papers, through its Whalom Park Theater, through the amusement park at Whalom, and by means of other good-will advertising.

Many of the companies have made effective use of the advertising suggestions furnished to them by the American Electric Railway Association.

Transferable Pass in Vienna

Vienna four-day system pass developed for tourists

LIKE other European systems, the Vienna Municipal Tramways has a wide variety of fares, including passes. Hitherto these passes have been issued only with the picture of the purchaser and have been non-transferable. Last year, however, the management added a four-day, transferable pass which proved of particular value to visitors to the Schubert centenary. It proved so popular with the visitors that about 28,000 were sold during July, while ordinary sales run in hundreds each month.

The pass is good for four days and was sold at the low cost of 5 schillings (70 cents). This is the equivalent of eighteen standard fares (28 groschen or 3.92 cents). Buyers average about 30 trips per pass. This includes rides that would be considered "transfers" under American flat-fare systems. While Vienna is largely on a flat-fare basis, the management uses fare receipts which also serve as transfers.

With wider publicity, the four-day pass may prove popular with tourists because it insures them against the cost of mistakes in taking the wrong car.

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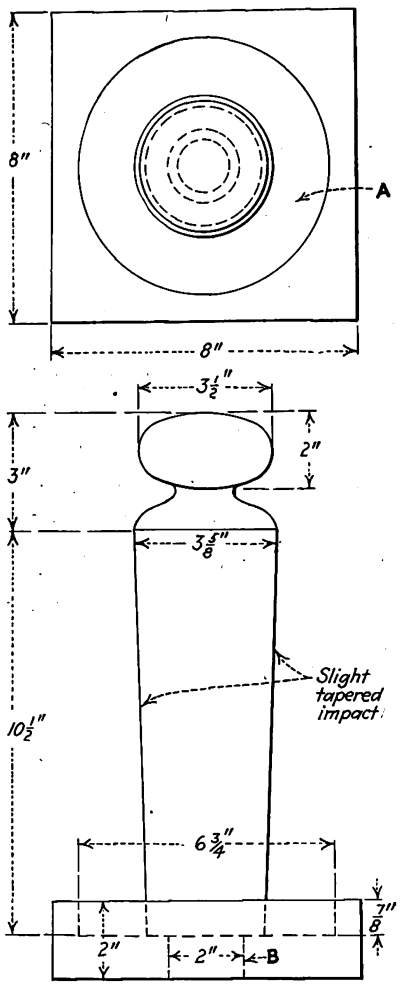
Maintenance Helps That Have Proved



Babbitting mold with self-aligning feature

Self-Aligning Armature Bearing Babbitt Mold

PRODUCTION has been increased and costs reduced in the shops of the Staten Island Rapid Transit Railway, Staten Island, N. Y., by the use of the self-aligning armature bearing babbitt mold shown in the accompanying illustration. The mold consists of a steel base 8 in. square and 2 in. thick. It is counterbored ⅞ in. deep and of such a diameter as to fit the bearing flange exactly. A hole is bored through the center of this counterbore of a diameter to permit the entrance of the core projection.

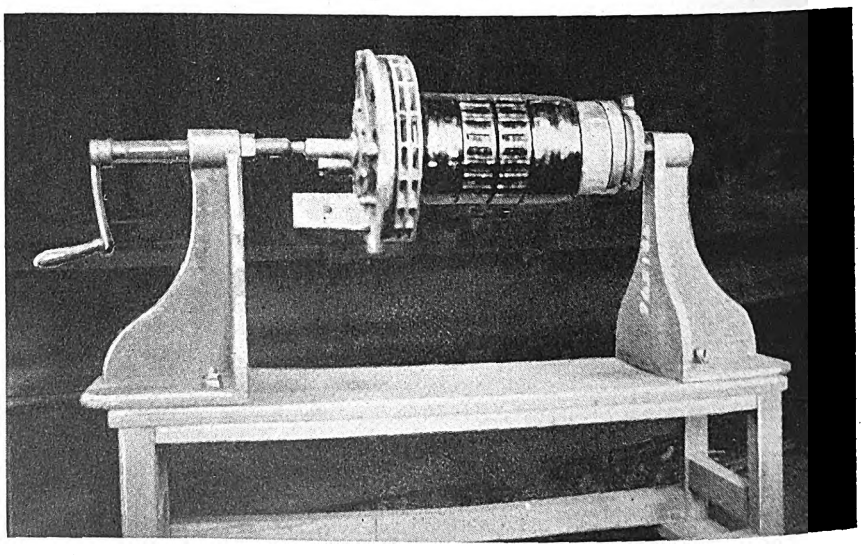
The core is made of steel and is 14⅝ in. over all. The 1⅛-in. projection is of a diameter to enter the hole in the base. The core has a diameter of 3⅝ in., 3 in. from the top. The sides are machined with a small taper for a distance of 10½ in. This taper permits easy removal from the bearing after the babbitt has been poured. The top has a semi-ball handle with a diameter of 3½ in. and is 2 in. high. The close fits prevent any lateral motion of the bearing or core. The bearing is placed in the mold with the flange in the counterbore of the base; then the core is placed inside with its projection in the bore. A galvanized iron plate designed to fit the bearing window accurately is equipped with two semicircular springs for snapping over the bearing. With the window closed, no further work is required and the bearing is ready for the babbitt.

Adjustable Armature Winding Stand*

By R. T. Chiles

Master Mechanic Cumberland County Power & Light Company, Portland, Me.

RAILWAYS that have armatures of different sizes find an adjustable winding stand to be a great convenience. Such a stand has been constructed in the shop of the Cumberland County Power & Light Company to accommodate armatures from the smallest air compressor type to the largest railway motor type used on the system. Two supporting brackets are fastened to a small work bench in such a manner that they can be moved back and forth quickly. The stand is equipped with casters so that it can be moved easily to any desired position in the winding room. Armatures are carried on their centers, with cone-pointed screws, which work through the end supports.



Armature winding stand as used in the shops of the Cumberland County Power & Light Company

Axle Tongs Solve Lifting Problem*

By Charles Herms

General Foreman San Diego Electric Railway, San Diego, Cal.

VARIOUS methods for lifting axles have been tried in the shops of the San Diego Electric Railway. Chains, hooks and rope slings were found unsatisfactory, inefficient and dangerous. The chain had a tendency to slip if the work was not balanced accurately, and required additional time of workmen to make certain that the work was balanced. Hooks had the same tendencies as the chains with the additional danger of losing the work altogether in case of a slip. Rope slings also required balancing of the work and had to be renewed at frequent intervals to safeguard them against breakage.

The problem has been solved quite effectively through the use of a special type of tongs. These are constructed so that they receive the largest diameter axle used, although on this system axles are of quite uniform diameter. The jaws are made long enough, so that should the axle be slightly less in diameter than the

**Submitted in* Electric Railway Journal *Prize Contest.*

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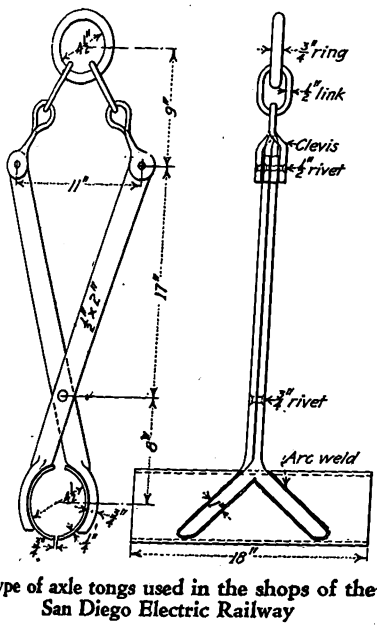
maximum for which the tongs have been designed, it will remain balanced, due to the length of the jaws and the side clamping effect. Clearance of ¾ in. is provided at the bottom of the jaws, so that the tongs can be placed several inches out of balance and still maintain equilibrium, and there is no possibility of slippage, due to the enormous leverage ratio provided.

Each arm of the tongs has a swivel clevis at the top and these are connected to a ring through links. The circular portion which surrounds the axle is 18 in. long.



Type of axle tongs used in the shops of the San Diego Electric Railway

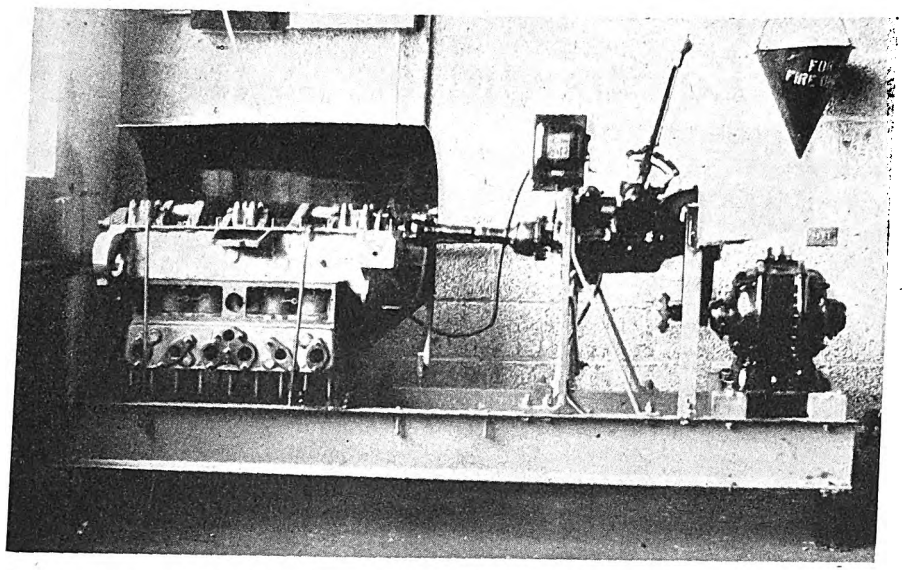
Limbering Up Bus Engines*

By C. B. Hall
Chief Clerk Mechanical Department Virginia Electric & Power Company, Norfolk, Va.

For burnishing and limbering up main and connecting rod bearings in assembled bus motors and air compressors, following general overhauling work of those units in the bus shops, the Virginia Electric & Power Company, Norfolk, Va., has built a convenient machine. A four-speed transmission was taken from a retired model 15 White bus and geared to a 5-hp. 220-volt alternating-current motor, which had previously been used in operating a ticket cutting machine in the cashier's office. These units, with a gear ratio of 7 to 1, were mounted and bolted to a frame made of 8-in. channel iron and 1x2-in. iron straps. An I-beam was cut to serve as blocks necessary to give the variation in height for accommodating different types of motor blocks.

A starter box was placed on top of the frame and a piece of No. 20 gage sheet iron was made into a hood to protect the shop walls and windows from flying oil and grease when the machine was in operation. The labor cost for the completed machine was $25. It has enabled the bus shop to do this kind of maintenance work in a most satisfactory manner.

*Submitted in Electric Railway Journal Prize Contest.



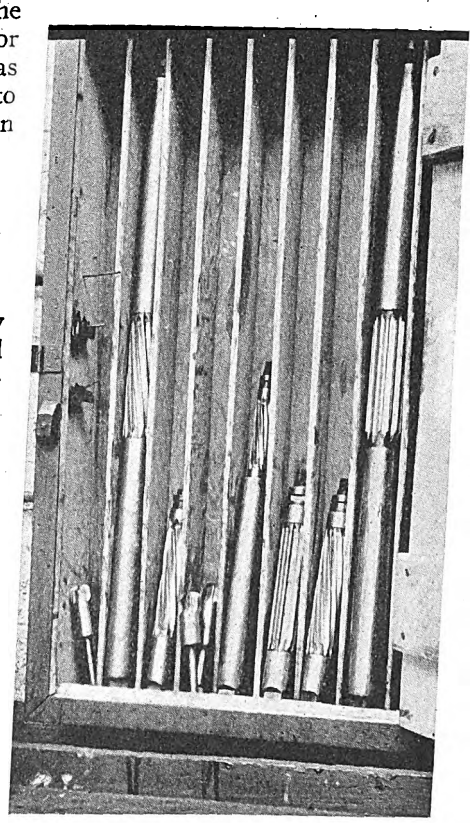
Tuning up a model 53 White bus motor with the burnishing machine made in the shop of the Virginia Electric & Power Company

Air Compressor Bearings Reamed

Air compressor bearings formerly were fitted by the scraping and filing method in the shop of the Richmond Railways, Staten Island, N. Y., until it was found that compressor maintenance expense was increasing because the bearings were fitted improperly. Often shaft distortion also caused considerable trouble. This resulted in serious road delays. A complete set of Pratt & Whitney reamers was purchased for reaming all bearings and wristpin bushings to a standard size in order to overcome this trouble.

The crankshaft bearings are now reamed to the exact size and are not provided with any adjustment. The connecting rod bearings are provided with seven 0.017-in. shims on either side and reamed to fit the shaft under those conditions. The general appearance of the reamers is shown in the accompanying illustration. The reamers are stored under lock and key in a special cabinet 24 in. wide, 41 in. high and 6 in. deep.

Since this method of fitting bearings has been adopted the usual bearing troubles have been eliminated. This has resulted in lowered maintenance costs, and the saving effected in fitting the bearings very soon paid for the cost of reamers.



Wooden cabinet for storing reamers in shop of Richmond Railways

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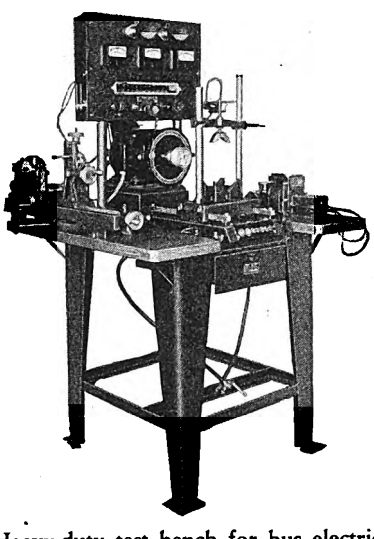
New Equipment for

Better Maintenance

Test Bench for Bus Equipment

EQUIPPED for testing all electrical apparatus of buses, a heavy-duty test bench is now being manufactured by the Burton & Rogers Manufacturing Company, Boston, Mass. This bench has a 3½-hp. variable speed main driving motor, an adjustable vise for holding all types of bus generators, a rotary spark



Heavy-duty test bench for bus electrical equipment

gap, a magneto testing fixture, a growler, a voltage regulator testing bracket, a tool for turning and undercutting commutators, a coil testing bracket, attachment for making starter torque tests, a control panel and an instrument panel on which are mounted a voltmeter, ammeter, and electrical tachometer, switches and an adjustable spark gap.

The main driving motor is of the reversible brush shifting type and has a speed range of from 100 to 4,000 r.p.m. It has sufficient power for a complete driving test over all speed ranges for any type of bus generator up to 1,000 watts. The generator under test is held in the vise directly in line with the driving motor and attachments are provided for the straight line drive of any type.

The voltage regulator bracket will mount all types of regulators. It is so constructed that the voltage regulator can be held in a horizontal position when it is necessary to make adjustments and turned quickly to the vertical position for testing without disconnecting any leads. The vise for holding magnetos is provided with speed adjusting pulleys and twelve built-in, high tension leads. The magnetos under test can be driven at any desired speed down to 20 r.p.m.

A coil testing bracket is furnished, equipped with an attachment for testing magneto armatures. A set of breaker points is built in for duplicating car operating conditions when making coil tests. A condenser is also built in this same circuit and can be used or not at the option of the operator according to the style of coil to be tested. Separate condenser tests are provided for by substitution of outside condensers for the panel condenser. A resistance is also furnished in the coil circuit to control battery voltage while coils are being tested.

Leads for all tests except the high tension leads are terminated in the terminal panel which is constructed in the front of the bench just under the holding vise. By this construction, possibility of leads being tangled up in moving parts is eliminated, and simplicity and convenience of operation is obtained. On the terminal panel there are positive and negative starter test leads through an 800-amp. shunt to the ammeter; positive and negative battery leads through a 40-amp. shunt to ammeter; positive and negative voltmeter leads direct to the voltmeter; positive and negative 80-amp. leads through an adjustable rheostat to ammeter; switch controlling battery current and switch for cutting in or out the condenser. The starter and carbon resistance leads are of screw type, while on the others lighter "rajah" connectors are used. On this terminal or control panel are also located the control knobs for coil and generator rheostats and the control for adjusting the speed of the driving motor.

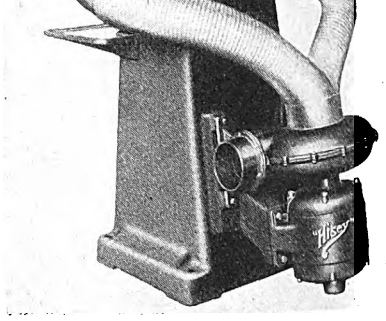
A 9-in. rotary spark gap is furnished for making operating tests on distributors. This gap has an adjustable setting for its zero. It is also equipped with an additional scale over one quarter the circumference that reads twice the distributor degrees. The bench is also equipped with a distributor holding attachment.

The armature reconditioning tool driven from the main driving motor will handle all types of armatures and can be used for turning down the commutator and undercutting the mica. A scroll chuck and steadyrest are supplied for handling centerless armatures. A torque arm and spring balance are used for testing starting motors, the current for this operation being supplied from the battery.

The growler has a double winding, is equipped with test prods, a meter for recording the flow of current in the windings of the armature and a double pole, double throw switch. The double winding makes it possible to test starting motor armatures as well as generator armatures.

Exhauster for Grinders, Buffers and Polishing

TO PROVIDE for efficient removal of dust from grinding, buffing and polishing operations, the Hisey-Wolf Machine Company, Cincinnati, Ohio, has announced an exhauster equipment which can be supplied for this company's machines. It is designed for grinders of 10-in., 12-in. and 14-in. wheel capacity and for buffing and polishing machines of 8-in., 10-in., 12-in. and 14-in. wheel capacity. The exhauster equipment is motor driven and the same automatic starter that provides for operating the tool controls the exhauster motor.



Grinder equipped with exhaust attachment

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News of the Industry

Fare Discussed in Milwaukee

Company would like to see rate structure adopted that would give promise of making railway self sustaining

AS THE result of a request made by Mayor Hoan, of Milwaukee, Wis., that the Milwaukee Electric Railway & Light Company extend its single-fare area to apply on all railway travel within the city limits, particularly the former city of North Milwaukee, recently annexed, a hearing was held before the Wisconsin Railroad Commission on Feb. 25 at which the company asked the commission to fix boundaries of a single-fare area, and fix rates which would put the city and suburban transportation system on a self-supporting basis.

The company stated that the investment in the railway has increased from $16,694,409 in 1920 to $28,263,980 in 1928. The deficit below the amount necessary for 7½ per cent return on the investment was stated to be $529,369 in 1920, $552,651 in 1921, $343,838 in 1922, $295,865 in 1923, $521,908 in 1924, $536,340 in 1925, $585,666 in 1926, $835,817 in 1927 and $691,089 in 1928.

Actual rate of return on the railway through the same period, the petition stated, ranged from 4.32 per cent in 1920 and 1927, the two lowest years, to 6.09 per cent in 1923, the highest year. In 1928 the rate of return was 5.05 per cent.

The deficit has been made up from electric department revenues. The company promises that, if standards of service and rates of fare to be prescribed are calculated to yield an increased return upon its railway and bus service, it will reduce electric rates by an amount not less than the estimated increase in railway revenues.

William A. Jackson, vice-president of the company, testified that under present rates regular riders are discriminated against, that the occasional rider should pay an increased fare, and that regular riders should pay the minimum rate possible. Statistics were submitted showing that, due to inclement weather in January of this year, from 50,000 to 70,000 more casual riders were carried on certain days than in the similar month last year.

The company holds the zone system of fares to be the most fair and equitable. If the demand for an extension of the single-fare limits to include former North Milwaukee was granted, this would eliminate the zone fares on that line, approximately $30,000 a year.

R. E. Moody, research engineer of the company, said that Detroit is one of the very few large cities having a lower cash fare than Milwaukee, its rate being 6 cents without a transfer, 7 cents with transfer. Milwaukee has a 7-cent cash fare with transfer, and eight tokens for 50 cents.

All suburbs, towns and townships surrounding Milwaukee and served by the company were represented at the hearing, which was adjourned to permit the legal representatives of the city and suburbs to study the figures presented. At the request of the commission, the company will present its recommendation for a method of putting into effect an increase of fares so designed and arranged that it will fall principally upon the occasional rider.

Bus Considered by Steam Railroads

Motor transport divisions to meet again in fall at call of general committee. Logical demand seen for bus and motor truck auxiliaries

MORE than 100 representatives from 80 railroads attended a four-day conference of the motor transport division of the American Railway Association at the Hotel Jefferson, St. Louis, Mo., February 26, 27, 28 and March 1. Until the final day the sessions were all executive, and the reporters for the daily and trade press were excluded with the exception of a special writer for one railway publication.

The gathering on March 1 was in the nature of a joint conference for all interested in automotive transportation. Its purpose was to discuss matters of mutual interest.

The program for this joint conference was as follows:

1. Depreciation of motor coach equipment.
2. Heavy fuels versus gasoline as fuel.
3. Rail cars versus motor coaches on feeder lines.
4. American Electric Railway Association classification of motor coach accounts.
5. Uniform cost-accounting for the railroad company; for the electric railway; and for the motor coach operator.
6. Method of classifying operations—for example, city, intercity and the like—so that cost comparisons will be useful in each class.
7. Rates of fare necessary for profitable operation.
8. How the motor truck and the motor coach help to meet competition.
9. The motor truck in modern business.
10. Highways to reach distant markets.

A. P. Russell, chairman of the motor transport division, presided at the executive sessions and he also read the report of the general committee of which he was the chairman.

The consensus of the railroad men attending the conference was that the American railroads are the logical agency to develop the motor transport field because they are charged with the responsibility of maintaining stability of the nation's transport. Speakers in the executive gatherings contended that this ideal cannot be attained unless the railroads are protected against the independent agencies which are alleged to milk the revenues of the steam railroads.

Some of the discussions in the executive sessions are understood to have been rather frank and it was apparent some of the railroads now realize they probably waited too long to enter the motor transportation field, permitting independent lines to build up close to their rails, so that it will be very difficult to combat this competition. Virtually all of the important railroads of the country were represented. Some have not yet entered the bus field and their representatives came to the gathering to get the inside facts from railroad men who have had experience with bus operations.

While a majority of those who spoke on the subject maintained that rail transportation still is and will continue to be the backbone of our national transportation scheme, they were ready to admit there is a logical demand for buses and motor truck lines and a legitimate field in which they can be operated successfully. That the railroads should supply the public's demand for automotive transportation agencies because of preferential right and considerations of public welfare was discussed.

It was also contended that federal regulation of buses would prove beneficial to the general public as it should weed out the undesirable and irresponsible operators and eliminate the present evasion of state control in many sections of the country.

It was brought out in the discussions that the competing bus lines have eaten heavily into revenues logically belonging to the railroads, in most instances taking the cream of the passenger business. It was contended that the buses can never supplant the railroads but, unless properly controlled, may injure the national transportation system by forcing some railroads into bankruptcy. The only way to solve this very serious problem is to direct bus development along proper lines with the consideration in mind of not impairing railroad prosperity. The Interstate Commerce Commission with its voluminous records and its vast

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knowledge of transportation needs would be an ideal agency to handle the entire bus situation, it was said. Chairman Russell is quoted:

One reason that railroads more logically and more serviceably can develop the bus field is that sometimes they can combine bus and rail transportation in such a way as to turn a loss in rail transportation into a profit in bus operation, while independent bus operators could not do so. Another very important reason is that reliability of service is the first consideration of the railroads.

A surprising fact brought out in the discussions of the subject was that the bus lines of the country now cover more aggregate mileage than the railroads. The total in 1928 was 270,000 miles covered by 86,000 buses or 13,000 more miles than the railroads now serve. However, it was said the railroad systems are more comprehensive, serving vast areas not penetrated by the bus lines. The bus lines are generally confined to the relatively congested metropolitan areas, not attempting a comprehensive national system except in a few isolated instances.

The general purpose of the conference was to bring together the railroads interested in the development of bus transportation, to study the problems that arise therefrom, and through the coordination of rail carriers to devise the most effective means possible in the development of combined rail and bus transportation systems.

The next meeting of the motor transport division will be held in November of this year at Toronto, if the general committee's recommendation is accepted. The by-laws of the organization were amended to provide for but two meetings annually instead of three. June and November were the months selected for these meetings, but there will be no session this June because of the sessions held in St. Louis.

A special nomination committee of seven was named to recommend candidates for the various offices. The election will be held in November. This nominating committee is composed of: M. F. Steinberger, manager of highway transportation Baltimore & Ohio Railroad; L. B. Burns, assistant to the general manager Seaboard Air Line Railway; E. Wanamaker, electrical engineer Chicago, Rock Island & Pacific Railway; G. L. Whipple, general superintendent transportation Union Pacific System; George McCormick, general superintendent motive power Southern Pacific Company; F. S. Hobbs, general manager New England Transportation Company; and E. A. Cunningham, efficiency engineer Canadian Pacific Railway.

The delegates were guests at a banquet given by the Missouri Pacific Lines at the Hotel Jefferson at 6:30 p.m. on Feb. 27. Samuel O. Dunn, Editor of *Railway Age*, Chicago, was the speaker of the evening. His subject was "Modern Transportation." On the morning of Feb. 27, E. F. Bisbee, vice-president East St. Louis Junction Railroad, was host at breakfast at the National Hotel, National Stock Yards, Ill.

Franchise Proposal Revived in Jacksonville

Definite announcement was made before the Council of Jacksonville, Fla., on Feb. 22 that a new franchise for the Jacksonville Traction Company would be submitted at an early meeting of the City Council. At the suggestion of Perry Atkins, president, the Council adopted a resolution requesting Mayor John T. Alsop, Jr., to veto the ordinance requiring the company to double-track Main Street, thereby opening the way for bus service.

Mr. Atkins made his promise that the new franchise would be submitted to the Council after J. P. Ingle, railway manager, made his proposal for the establishment of bus service to Norwood, Brentwood, Panama Park, Northshore Beach and Panama Gardens sections.

Mr. Ingle quoted figures gathered in a poll of the sections on the north side of the city on the question of preference for bus service. He said 70 per cent of the residents interviewed on Main Street favored buses, 72 per cent off Main Street in the section served by the Brentwood car line favored buses, and 95 per cent in Norwood, Panama Park and Northshore Beach desired bus service.

Mr. Atkins intimated the new franchise would leave the City Council as the body to determine the need for extentions and to say whenever and where such extensions would be needed. The company would be relieved of paving the strip occupied by tracks and extensions would be paid for from rentals to the company. He said he believed the Council would grant bus permits to the company under an agreement which would provide for adequate and continuous service.

A resolution by residents in the territory that would be affected by the extension of the railway and believed to represent public opinion in the territory was concluded as follows.

We, the citizens of North Springfield, Norwood, Panama Gardens, Panama Park, Brentwood, Pearl Court and North Shore Beach do hereby ask Mayor John T. Alsop, Jr., to veto City Council's ordinance ordering the Jacksonville Traction Company to double-track Main Street and do hereby petition City Council to reconsider its ordinance in respect to the wishes of the majority of the voters in these communities who want bus service instead of street car service, and we further ask that the City Council do authorize the Jacksonville Traction Company to remove its tracks on Main Street north of Twelfth Street, and also relieve the Jacksonville Traction Company from payment of Main Street paving charges north of Twelfth Street to enable the Jacksonville Traction Company to provide the bus service these communities want.

Paving Relief Bill Reported in Pennsylvania

The Senate committee on public roads and highways on March 5 vetoed by a scant majority to report the bill relieving electric railways in Pennsylvania from repaving the portions of streets and highways between their tracks which are torn up by municipalities. A contest among the members developed over the measure, it was understood. The vote was 14 to 11.

Free Rides to "Economy" Sale in Atlanta

Monday, March 4, was the date of the opening of the Spring Economy Sale at W. T. Grant Company's store, on Whitehall Street, in Atlanta, Ga., and the store gave away free, two car tickets to all persons who purchased as much as a dollar's worth of merchandise in any one department of the store. The following suggestion was made to passengers on the transportation lines of the Georgia Power Company:

When you pay your fare on your way to town in the morning just request the conductor or operator to give you a coupon, and when you have finished your shopping at Grant's the management of the store will give you two street car tickets, the cost of your transportation to the store and back home.

This is the second time Grant's has offered the free car ticket plan. Last October, under similar circumstances, several thousand Atlantians took advantage of the similar offer to add to the saving in bargains offered at the store.

Delay Asked in Wheeling Fare Case

A delay of 60 days in the rate hearing of the Wheeling Traction Company, which was scheduled for Feb. 28 at Charleston, was asked by representatives of the Wheeling Chamber of Commerce, the Merchants' Co-operative Association and the City Council following a joint meeting. The motion for the extension was made by a representative of the Merchants' Association.

Ambulance-Chasing Forbidden in New York

New rules to regulate the conduct of lawyers, especially in negligence cases, and designed to end "ambulance-chasing" or soliciting of retainers for any other branch of litigation were announced on Feb. 26 by the Appellate Division of the Supreme Court, First Department. The rules apply only to the attorneys in New York and Bronx Counties.

The new code, which also deals with the terms and with the settlement of litigation, is the response of Presiding Justice Dowling and Associate Justices Merrell, Finch, McAvoy, Martin, O'Malley and Proskauer to the recommendations made by Supreme Court Justice Wasservogel in his report last October on his investigation for the Appellate Division.

The new rules prescribe many of the requirements which Justice Wasservogel recommended as necessary to

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stop ambulance-chasing, the only important features of the Wasservogel report omitted from the rules being those regarded as requiring legislative action. Bills have already been introduced to effect these reforms.

The recommendations of Justice Wasservogel's report not included in the new rules because of the necessity of amending existing laws relate to declaring 33 1-3 per cent a maximum share of any recovery to be paid to an attorney for his services when a contingent retainer is made with a client, and also deal with an extension of the power of the courts to punish perjury and criminal contempt.

Justice Wasservogel recommended the addition to a judiciary law of a clause describing the power of the court to punish for a criminal contempt the following: "Willful disobedience to its lawful mandate: or the doing willfully and knowingly of an act without the mandate or authority of the court, where a statute requires such mandate or authority to be procured before such act may be done."

The corrective legislation has since been lost in committee.

"As-U-Go" Name of New Denver Publication

Mrs. C. E. Marks, 1660 Logan Street, Denver, won the $25 reward of the Denver Tramway Corporation for suggesting "As-U-Go" as the name for the new 4-page bulletin published by the company "that those who ride may read." More than 20,000 suggestions were received and considered, but Mrs. Marks was the only contributor who suggested this name.

In a statement the company said:

Now that it's all over, and the bulletin is named, what do you think of it? From now on, we hope to make this little paper increasingly interesting. In this connection, we beg to call your attention to page 2, where you will find a time-plan of morning week-day inbound car service for Route 11. Time-plans of this kind for various routes will be published from time to time. Is information of this kind interesting to street car riders? We hope it will prove a service convenience and will be the means of expediting street car service. So read As-U-Go. Read as you ride, or take As-U-Go with you when you leave the car.

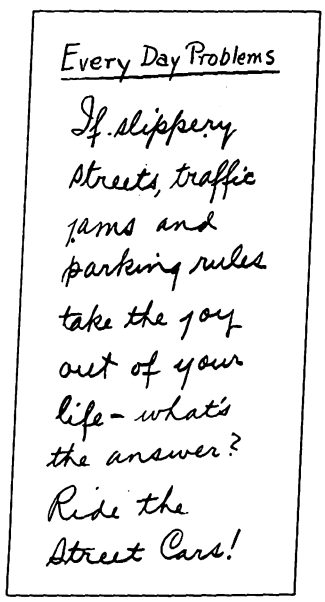
Safety Tunnels for Seattle

George B. Avery, superintendent of utilities at Seattle, Wash., in charge of the street railways, is backing a move to obtain from the City Council an appropriation for underground crossings for pedestrians at the intersections of Pike Street with First, Second and Third Avenues. The project would cost approximately $50,000 and is entirely separate from the proposed plan to construct seventeen new safety tunnels at Seattle schools, which would also cost $50,000.

Tacoma Mayor Resigns After Dispute

Mayor Melvin G. Tennent, of Tacoma, Wash., following a dispute with the corporation counsel's office, has resigned his position, and Ira S. Davisson, commissioner of light and water, has become temporary Mayor. Mayor Tennent is the principal owner of the Tennent Steel & Casting Company. He has been extremely active in an effort to adjust the transportation problems in Tacoma, co-operating with the Tacoma Railway & Power Company.

Appealing for Patronage in Salt Lake



One of a series run by the Utah Power & Light Company during January which won favorable comment. Two ads were run each week—on Tuesdays and Fridays in the three Salt Lake City papers, *The Tribune, Deseret News* and *The Telegram.*

Would Speed Up Kansas City Cars

Plans are being made by the Kansas City Public Service Company, Kansas City, Mo., to speed up service, in the belief that to cut off several minutes on the average trip from the residential sections to the downtown district will attract additional patronage. Although they are not ready to put their plan before the City Council, officers of the company propose to use three methods:

A skip-stop plan to reduce the number of stops to something like a stop for every two long blocks and for every three short blocks.

All principal street car streets to be arterial thoroughfares.

Street cars to have right-of-way and a clear path on their own tracks.

According to Powell C. Groner, the company will be ready to present its plan to the Council after two more weeks of study. Either a trial on three or four important lines, or an offer of a complete skip-stop and arterial plan for the entire city may be made. A tentative study shows how the number of stops can be reduced from 124 to 82 in one case on the round trip, and from 159 to 105 in another.

Work on Milwaukee Rapid Transit Line Being Pushed

Work began on Dec. 3 on the rapid transit line of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is being continued with vigor. By means of a subway terminal now contemplated and 2.8 miles of new line on private right-of-way, this project will provide high speed local service between Milwaukee and the rapidly growing urban district to the west.

To the south, work is well under way on the relocation of 6 miles of track of the Milwaukee-Racine-Kenosha Rapid Transit line to provide faster schedules and greater freedom from traffic interference. This job is scheduled for completion late this summer.

Grade separation is planned for 2½ miles of double track of the Milwaukee Northern division Rapid Transit line immediately north of the city. A program of necessary reconstruction of tracks will also be undertaken.

Committee on Movement of the Vehicle Meets in Chicago

With four subcommittees meeting on Feb. 23 and the main committee session occupying all of March 1, two crowded days of intensive consideration were devoted to ways and means of expediting the travel of all types of vehicles through city streets.

Both sessions were indebted to the Chicago Surface Lines for the privilege of including E. J. McIlraith and two of his traffic engineers in the discussions.

Subcommittee reports were presented by C. H. Evenson, E. D. Merrill, Joe R. Ong, and R. H. Pinkley on specific phases of the vehicular movement problem, as outlined in the ELECTRIC RAILWAY JOURNAL for Dec. 22, page 1091.

The main committee with Paul E. Wilson as sponsor and D. L. Fennell, chairman, will hold its final meeting in New York on April 26.

Opposition Develops on Highway Use

Democratic assembly district leaders are on record as opposed to the taking over by the county of the Erie County Traction Company's line from Buffalo, N. Y., to Hamburg and other nearby towns for the purpose of making a 40-ft. main traffic highway out of the Abbott Road and several other highways along the route of the railway. A bill to permit the county to acquire the railway's right-of-way has been prepared for introduction into the Legislature.

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Higher Fares in Columbus Postponed

The city of Columbus, Ohio, has succeeded in securing a postponement until April 1 of the plan of the Columbus Railway, Power & Light Company to increase cash fares from 6 cents to 10 cents, and from 25 cents to 35 cents for five tickets.

Councilman Fred Zimpfer, chairman Council utilities committee, has proposed that a utility engineer be appointed to assist the city in adjusting the fare controversy. He wants to start franchise negotiations with the company immediately after April 1.

The company is now operating without a franchise.

Election of Commissioners in Maryland Voted Down

Efforts to have the members of the Maryland Public Service Commission elected by the people rather than appointed by the Governor have failed. A bill providing for the change was introduced in the General Assembly, now in session at Annapolis, but has been defeated.

Drivers' Creed in Grand Rapids

The Commercial Drivers' Club, Grand Rapids, Mich., organized several years ago to promote safety, assist in reducing traffic congestion and assist the Grand Rapids Railroad in maintaining unobstructed right-of-way, has again established a precedent by adopting an official drivers' creed. In the cab of every member a printed creed card is hung so that the safety message is in sight at all times. The text of the creed:

As a member of the Grand Rapids Commercial Drivers' Club I pledge allegiance to the following safety creed:

To keep the vehicle I drive in proper mechanical condition at all times.

To inspect carefully and keep under careful supervision my load, insuring safety from falling articles.

To keep my machine under perfect control.

To keep off the Grand Rapids Railroad Company right-of-way as far as possible, avoiding interference with operation of its cars.

To obey all traffic regulations and drive in accordance with street signal light dictation; to use special care when driving in school zones.

To keep constant vigil for children wherever I am driving.

To be courteous to all officers of the law and to do my part in case of unavoidable accidents.

To all this I gladly subscribe, in an effort to make Grand Rapids a safer and better place to live.

Since the Grand Rapids club was organized, which organization was mentioned in the ELECTRIC RAILWAY JOURNAL, President Harry Bowles has sent copies of the by-laws to many cities organizing similar clubs designed to put into effect the accident reduction features of the Grand Rapids Code.

COMING MEETINGS OF *Electric Railway and Allied Associations*

March 12-14—**Oklahoma Utilities Association, annual meeting, Oklahoma City, Okla.**

March 14-15—**Illinois Electric Railway Association, Hotel Abraham Lincoln, Springfield, Ill.**

March 20—**Central Electric Traffic Association, Keenan Hotel, Fort Wayne, Ind.**

March 21—**New England Street Railway Club, Annual Meeting, Boston, Mass.**

April 5 — **Metropolitan Section, American Electric Railway Association, 33 W. 39th Street, New York, N. Y.**

May 1-3—**Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

May 13-15 — **National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

May 15—**Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.**

June 5-7—**Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

June 21-22 — **New York Electric Railway Association, Bluff Point, N. Y.**

June 27-28—**Central Electric Railway Association, Michigan City, Ind.**

July 24-26—**Electric Railway Association of Equipment Men, Southern Properties, Lexington, Ky.**

Aug. 15-16 — **Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.**

***Sept. 28-Oct. 4*—American Electric Railway Association. 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Employee Education Subject of Detailed Study

At its second meeting, held in Chicago on March 4, the committee on the employee, of the Transportation and Traffic Association, continued its consideration of outstanding problems of railway personnel from the transportation standpoint. Subcommittees, under Chairman H. H. Fenton, Chairman C. S. Slocombe, and Chairman W. Frank Persons, dealing respectively with employee information, accident-proneness and selection and follow-up, reported progress on the specific phases of the study assigned them.

Excursion Rates Popular on Kentucky Line

Week-end excursions to points in the tri-state territory by electric railways are increasing travel greatly, according to G. M. Millican, general manager Evansville & Ohio Valley Railway, Evansville, Ind., operating a railway line to Grandview, Ind., and bus lines to Mt. Vernon, Ind., and Henderson, Ky. By special tariff for the week-ends, passengers are afforded transportation at reduced rates. Tickets purchased at Evansville on Saturday or Sunday for any points along the railway and bus lines are good until Sunday night. The Rockport line between Evansville and Owensboro, Ky., in particular, is carrying heavy passenger lists at the week-ends.

According to excursion schedule of prices, the round-trip fare to Owensboro, Ky., is $1.50; Troy, Ind., $2; Tell City, $2.25; Cannelton, $2.25. These figures represent reductions of from 75 cents to $1 on each trip. Saturday-Sunday rates to Newburgh are 40 cents and to Mt. Vernon by the company's bus line, 85 cents.

The heavy haulage of coal by this company's lines this winter has greatly increased the freight end of the business.

Rolling Stock Committee Program for Cincinnati Meeting

Arrangements for the meeting of the standing and special committee of the rolling stock section, American Electric Railway Association, which is to be held at the Gibson Hotel, Cincinnati, Ohio, on March 11-12, are being completed, according to E. J. Jonas, superintendent of equipment Cincinnati Street Railway, local chairman of the committee. The program at present is:

MONDAY, MARCH 11, 1929

9:30 A.M. Meeting of standing committee of rolling stock division.
Meeting of each special committee.
12:00 Noon. Adjourn for lunch. All to lunch together in some convenient room.
1:00 P.M. Resume committee meetings. It is expected by this time one or more of the special committees will have finished its report and wish to discuss it before the standing committee.
6:00 P.M. Adjourn.
7:30 P.M. Informal dinner or banquet with a special speaker to be announced later.

TUESDAY, MARCH 12, 1929

9:30 A.M. Meeting of standing committee with special committees.
It is expected by this time that the committee work will have been completed so that special discussion of operating matters such as "pull-ins," etc., can be fully discussed.
12:00 Noon. Adjourn for lunch. All to lunch together in some convenient room.
1:00 P.M. Inspection of new shops, Cincinnati Street Railway, Cincinnati Car Company, and other places of interest.

A. F. Clark, Baltimore, chairman standing committee, has sent out 125 invitations and anticipates an attendance of 75 or more.

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Mayor Opposed to $50,000,000 Boston "L" Bill

Mayor Nichols, of Boston, appearing recently before the legislative committee on metropolitan affairs, expressed strong opposition to the $50,000,000 elevated rapid transit bill, suggesting that the measure be returned to the special commission which reported it to be redrafted. He said the bill as it stands is at variance with the special commissioner's report.

The Mayor opposed any plan for actual public ownership of the Boston Elevated Railway system, declaring for extension of public control. At the outset he admitted that he felt it impossible to draft a bill at this time which would receive the approval of the committee and the Legislature. In outlining his objections to the bill before the committee, he said he felt that parts one and two of the bill deprive the districts affected of any control.

Cars Speeded Up by Elimination of Parking in St. Louis

The St. Louis Public Service Company, St. Louis, Mo., reports a saving of eleven minutes a round trip has been effected on its Olive Street divisions through the elimination of downtown parking, the use of the skip-stop plan between Twelfth Boulevard and Channing Avenue, and a general speeding up of the entire system. The operations in January of this year and last year were the basis for the report. In January, 1929, the Olive Street cars traveled 42,661 more miles than in January, 1928.

Riders Receive "Transit News" in St. Louis

"Transit News" has been selected by the St. Louis Public Service Company, St. Louis, Mo., as the name of the miniature newspaper distributed on the street cars for patrons. A prize of $50 was paid to William Voderberg, of 4540 Claxton Avenue, for suggesting the title.

Hearings Soon on $22,000,000 Project for Baltimore

Electrification of the Pennsylvania Railroad lines in Baltimore has struck a serious obstacle. The railroad plans a $22,000,000 improvement project in the city, including tunnels and electrification, but the city is opposed to the railroad's plan to use overhead high-tension wires in Baltimore. The advisory committee appointed by the Mayor, which has been considering a series of ordinances providing for the improvements, has refused to agree to the overhead high-tension feature. The ordinances will be introduced in the City Council on March 11, and after they are referred to the proper committee public hearings will be held to consider the subject.

Recent Bus Developments

Pick-up and Delivery Service Started by Pacific Electric

T. J. Day, freight traffic manager Pacific Electric Railway, Los Angeles, Cal., recently announced the entry of the Pacific Electric Railway into the trucking field in southern California on March 11.

The new company will serve as a feeder to the parent company's rail lines, its trucks maintaining a store-door pick-up and delivery service throughout southern California. In general the truck subsidiary will be an express company and will not, at least for the present, operate trucks on the highways.

As explained by D. W. Pontius, vice-president and general manager of the Pacific Electric Railway, "the motor transport company will perform a complete service from the shipper's store-door to consignee's store-door under a through rate that will cover the entire service."

It will pick up shipments at the shipper's door and haul them to Pacific Electric's rail stations, where they will be transferred to rail cars. Under a contractural arrangement the Pacific Electric Railway will make the line haul to the station of destination, where the load again will be transferred to the Motor Transport Company's trucks for delivery to the consignee's place of business.

The transfer may be effected either by passing the entire truck body intact from the truck chassis to specially equipped rail cars, as in the case of bulk freight, or by the usual method of handling in case of miscellaneous package freight. Such co-ordination creates a greater and more efficient use for both utilities than are in existence or available.

The operation will be conducted by the Pacific Electric Motor Transport Company, a subsidiary, with Los Angeles as the principal place of business and capital stock of 5,000 shares with a par value of $100 a share. Present station agents will act as agents as well for the new company, although entirely separate tariffs and billing documents will govern the subsidiary's operations. Contracts will be made with present truck companies.

Tax Relief Measure in Ohio

A bill introduced in the General Assembly of Ohio by Joseph C. Dinsmore, of Hamilton County, proposes to exempt electric railways which operate buses from paying the excise tax of 1.2 mills on their gross receipts. Under the Ohio law these companies are also required to pay a flat tax each year.

At a committee hearing on the Dinsmore bill, S. L. Lipp, representing the Cincinnati Street Railway, said the existing laws were unfair to companies operating both electric cars and buses, inasmuch as others engaged only in the operation of buses pay only a single flat rate.

C. E. Lewis, Jr., of the New York Central Railroad, representing the steam lines of the state, urged that the committee also consider steam railroads. He said that, while no railroad operating in the state now was engaged in the bus business, he knew of at least two roads which contemplated augmenting their business with buses.

Buses for 13-Mile River Route

A report was made to the City Council of Cincinnati on March 6 by its traffic committee, recommending bus rather than street railway service to Fernbank and other downriver communities on a 13-mile route. Residents of the communities affected presented their views at a hearing held by the committee on Feb. 26, the decision ending a long-standing difference of opinions.

The committee's report contains no reference to fare, although it is known that Murray Seasongood, Mayor, personally favors a 10-cent rate in keeping with stipulations in an annexation agreement with the communities to be served. The fare, however, probably will be 20 cents cash or three tickets for 50 cents, with provision for "Sunday passes," as recommended by E. D. Gilman, utilities director, who pointed out that even with this charge the Cincinnati Street Railway, in operating the buses, would lose about $26,000 yearly.

Advocates of bus service at the hearing included Walter A. Draper, president of the Cincinnati Street Railway.

Railway Co-operates to Stop Cruising Taxis in Providence

Alonzo R. Williams, of the United Electric Railways, Providence, R. I., recently instructed inspectors of his company to co-operate with the police in checking up the activities of cruising taxicabs.

Inspectors have been "spotting" the license numbers of taxicabs whose drivers were soliciting fares. Many of the offenses occurred at street car stops where persons waiting for trolleys decided to avail themselves of taxi transportation. The taxis, he said, travelled repeatedly over an "S" shaped course.

A new city ordinance went into effect Jan. 1 to prohibit cruising cabs in Providence and the police have determined to enforce the measure rigidly. Already drivers have been caught violating the no-cruising rule, which would limit the use of cabs by the public to those called by phone, to those travelling back to their stand

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from trips, and to those standing at places which are to be designated.

General stands have recently been designated at which cabs may be parked in turn as fares are taken on. Special stands are designated in favor of companies and individual operators of cabs. At general stands all cars other than the hire vehicles are barred from parking. At special stands taxicabs not included in the company permits are prohibited from parking.

Bus Plea Made in Baltimore

Two applications to operate buses in Baltimore have been filed with the Maryland Public Service Commission. S. W. Mann, president Monumental Motor Tours, Inc., Baltimore, has asked the commission for authority to operate a line of modern 25-passenger buses from Belvedere and Park Heights Avenue to and from the center of the city. The fare, the petitioner states, will be 8 cents with two rides for 15 cents. Eight buses would be operated daily. The schedule would be every five minutes between 8 and 9 a. m. and 5 and 8 p. m. Between 7 a. m. and 11.45 p. m. service would be on the ten-minute basis.

The Conway Motor Company, Westminster, Md., has applied for a permit to establish a service between the Union Bus Terminal, in the downtown section, and Pikesville. The fare would be 10 cents to Park Circle, 15 cents to Arlington and 20 cents to Pikesville.

Harold E. West, chairman Maryland Public Service Commission, has replied to officials of the National Housewives, Inc., who wrote to the commission recently and asked if that body would permit a financially responsible company to operate buses in competition with the system of the United Railways & Electric Company. Mr. West said that installation of such a system would mean the elimination of the present system of railway transportation. The commission would grant permission to the company to operate the buses, he said, only if it could be conclusively proved:

That the substitution of a system of bus transportation for the present railway would be for the best interests of the public.

That the bus system would give a service as frequent and as comprehensive as the railway system and with a capacity as great as that of the railways, reaching all sections of the city and suburbs, and operating unprofitable as well as profitable lines.

That the rates of fare would be lower than the rates now charged by the railway.

That free transfers from one line to another would be given to the extent that such transfers are now given by the railway.

That the financial resources of the suggested bus company be sufficient to guarantee the permanence of the suggested operation.

That the suggested bus company contribute to the city and state an amount in taxes equal to that paid by the railway, including a sum of more than $1,000,000 annually for the maintenance of the city parks.

Right Sought in Delaware River Territory

Application has been made to the Public Service Commission of Pennsylvania by the Delaware River Coach Company for permission to operate buses between Torresdale and the New Jersey State line in Morrisville, and between the Pennsylvania Railroad station in Croydon and the junction of Pond Street and Wilson Avenue in Bristol. The application covers territory already served by the Trenton, Briston & Philadelphia Street Railway and the Pennsylvania Railroad. The local electric railway system reaches Trenton through an affiliated company, the New Jersey-Pennsylvania Railway, and by connection with the Philadelphia Rapid Transit Company's line at Torresdale passengers are taken into Philadelphia. Thus from Trenton to Philadelphia the electric railway parallels the Pennsylvania Railroad, which lately entered the bus business through acquiring an interest in several bus companies formerly owned by the Philadelphia Rapid Transit Company. It is understood that the new coach company has the backing of the officers of the present trolley line.

Complaints Aired on Revere Service

Mayor Cassassa, of Revere, Mass., has asked the committee on street railways to authorize the city to operate bus lines. In his assertion that transportation conditions in the city are "desperate," he is supported by a Senator and two Representatives from the city who add that the attitude of the Eastern Massachusetts is "unreasonable," and that complaints made in the past have been futile. On the other hand representatives of the street railway declare that any such legislation as proposed by the Mayor would cause the railway to meet unfair competition. Mayor Cassassa asserts that the Chelsea division of the street railway, which serves Revere, is the most profitable division. He says he is opposed to the principle of municipal ownership but in this case he sees it as the only means of relief.

The Mayor believes the city can operate buses to give Revere residents a 3 or 4-cent fare to Maverick Square, which with the 10-cent fare to Boston on the Elevated would provide rapid transit at reduced rates.

The street railway contends that it is obvious that the purpose of the bill is to ruin the Eastern Massachussetts in that district; that it would be a strange turn of events if the Legislature, which gave public control to the railway, would now proceed to cripple it by granting the request in this bill. P. G. Carleton, of the road, says he realizes the evil of the double fare, but he thinks the action on it may well await the disposal of the report of the special commission with respect to rapid transit. On the whole, transportation conditions in Revere are good. He has suggested to the Mayor that he take his complaints to the company trustees and they will be given attention. Another point made by Mr. Carleton was that the bill meant a reversal of the state's policy regarding municipal ownership, which provides that municipalities must first purchase private companies before entering into public ownership of a similar business.

The matter is still under advisement.

Adverse Report on Berkshire Bill

The Massachusetts Senate has accepted an adverse report from the street railway committee on the bill to authorize the Berkshire Street Railway to operate buses on the highways of Berkshire County. Had this bill been enacted the company would have been relieved from going to cities and towns for bus permits. This was opposed as vesting too much power in the State House and establishing a precedent as regards the situation in other parts of the state. Concurrence by the House in the action of the upper body was forecast.

Substitution Proposed in Sedalia

The City Light & Traction Company, Sedalia, Mo., has substituted buses for street cars and, if it is found that the buses meet all the needs, the present railway system will be abandoned.

Terms of Equitable Grant Made Bankers Wary

Chairman John J. Delaney of the Board of Transportation, New York, on March 6 attributed the reluctancy of the J. G. White interests to finance the Equitable Coach Company's proposed bus operation to the opposition of the city's railway interests, as exerted through their banking and investment connections and by pressure of litigation. Mr. Delaney declared that the Board of Transportation relied upon it in recommending the granting of the franchise to that company. He is reported to have said:

When it is known that the Chase Bank is the financial agent of the B.-M. T., that Blair & Company, Hayden Stone & Company, and other leading financial houses that deal in public utilities securities have been revealed in investigations as being large holders of the securities of the existing New York City railroad companies, it is not difficult to understand that a community of interests hostile to the introduction of any competitive element in the local transportation field was encountered by the Equitable. This community of interests did not want anyone but the present companies in complete possession of the local transit field.

On the other hand, a representative of one of the railways was quoted as saying that the pending litigation, the various forfeiture clauses, the short-term and the 5-cent fare feature of the franchise were all "red flags" to bankers, making financial houses reluctant to supply funds.

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Financial *and* Corporate

Reorganization of Second Avenue Railroad Approved

Chairman William G. Fullen, of the New York Transit Commission, has informally approved a plan tor operation of the Second Avenue Railroad by a corporation formed from members of the protective committee of certificate holders under a reorganization set-up. Acting on Mr. Fullen's suggestion, the Commission on March 7 approved the plan of reorganization, thus ending the receivership.

For twenty years the company's lines have been run by receivers, three of them dying while in service. Clarence J. Shearn, counsel for the certificate holders' committee, told the commission on March 1 that the operation of the lines during the past ten years by Charles E. Chalmers, the fourth receiver, was deserving of special commendation. The company today is "in excellent shape," he said, having been built up by Mr. Chalmers from a state amounting almost to complete demoralization. In his argument for taking the lines out of receivership, Mr. Shearn declared that the move would be a forward step in the progress of transportation in New York City.

The plan provides for formation of a corporation by certificate holders. It will take title by foreclosure and certificates will be exchanged for shares of stock in the new corporation on the basis of ten shares of no par value for every $1,000 certificate. A bookkeeping set-up of about $3,000,000 was agreed on as representing physical value of the property, with the understanding that it was not to be made the basis for any future rate-making case.

Offer Made for 500,000 Shares of United Gas Improvement

The United Corporation, formed early this year as a public utility holding company by the Morgan-Drexel-Bonbrigat group, on March 1 addressed an offer to the stockholders of the United Gas Improvement Company to exchange their shares for those of the United Corporation.

Not more than 500,000 of the shares will be accepted by the United Corporation, which is offering 1½ shares of its $3 cumulative preference stock and 2¼ shares of its common stock in exchange for each U. G. I. share. This represents a value of about $200 for each $50 per share of United Gas Improvement.

Almost simultaneously it was announced that George H. Howard had been elected president and a director of the United Corporation. Mr. Howard has been identified with the public utility industry for nineteen years, and in the last ten years has devoted his time almost exclusively to legal and business matters relating to various public utility companies, particularly matters regarding their operations, financial structure and consolidation.

$49,222 Net Income on Duluth-Superior

The total operating revenue and non-operating revenue of the Duluth-Superior Traction Company and its subsidiaries for the year 1928 were $1,907,125. This represents a decrease of 4.84 per cent compared with the previous year. Operating expenses, including taxes, were $1,688,731, or a decrease of $38,369. In the annual report submitted to the stockholders it is said that the amount of paving claims against the company by the city of Duluth had been reduced during the year by satisfactory settlements to an amount not exceeding $2,500.

Depreciation has been accrued and charged monthly into operating expenses at the rate of 2½ per cent upon the undepreciated original cost of the depreciable street railway property and at appropriate rates on the depreciable property of a subsidiary, the Duluth-Superior Coach Company. The total amount accrued to the credit of depreciation reserve during the year 1928 was $166,999. The net amount charged against depreciation reserve during the year for renewals and retirements was $81,769. Net additions to property during the year amounted to $114,032.

A. M. Robertson, the president, states that the experience of the company during the past two years demonstrates the necessity of a readjustment of rates of fare, operating conditions and character of the equipment to be used, in all of which the city authorities and public must assist, if a reasonable return on the fair value of the property is to be earned and a satisfactory service given.

A subsidiary, the Duluth Street Railway, made substantial progress during the year in converting its two-man cars for one-man operation. This program is to be continued during 1929.

Bus service operated as feeders to the street car lines was extended during 1928 but was not satisfactory as respects earnings. This was due largely to the additional bus-miles necessarily operated.

General mortgage bonds, par value $26,000, were retired under the sinking fund provision of the mortgage.

One piece of construction work, namely, rebuilding a double track in Duluth, cost $45,252 and another improvement, the removal of a mile of track in Superior, cost $17,190.

The accompanying statements show income accounts for 1928 compared with 1927 and some statistical data on bus and railway operation.

CONSOLIDATED INCOME STATEMENT OF THE DULUTH-SUPERIOR TRACTION COMPANY

	1928	1927
Operating revenues:		
Revenue from transportation..	$1,855,677	$1,948,393
Revenue from other operations	17,653	17,095
Total operating revenues....	$1,873,330	$1,965,489
Operating expenses:		
Way and structures.....	$190,491	$191,529
Equipment.....	209,561	194,023
Power.....	172,895	176,830
Conducting transportation....	738,024	772,140
Traffic.....	4,543	2,263
General and miscellaneous....	228,449	241,928
Transportation for investment-credit.....	—8,796	—8,275
Total operating expenses....	$1,535,169	$1,570,441
Net revenue from operations	$338,160	$395,047
Taxes assignable to operations.	$153,561	$156,659
Operating income.....	$184,599	$238,388
Non-operating income:		
Income from funded securities including interest on re-acquired bonds issued by The Duluth Street Railway.	$19,216	$22,613
Income from unfunded securities and accounts.....	1,218	2,043
Income from sinking fund and other reserves including interest on reacquired bonds issued by The Duluth Street Railway.....	13,354	14,035
Miscellaneous income.....	6	31
Total non-operating income	$33,794	$38,723
Gross income.....	$218,393	$277,112
Deductions from gross income:		
Interest on funded debt.....	$167,186	$168,175
Interest on unfunded debt.....	1,390	692
Miscellaneous debits.....	595	598
Total deductions from gross income.....	$169,171	$169,466
Net income transferred to profit and loss.....	$49,222	$107,645

NET ADDITIONS—ROAD AND EQUIPMENT OF THE DULUTH-SUPERIOR TRACTION COMPANY

Way and structures:		
Land.....	$4,724	
Track and paving.....	53,790	
Machinery and tools.....	15,215	
Distribution system.....	8,701	
Buildings and structures.....	868	$83,301
Equipment:		
Street cars and buses.....	$47,604	
Miscellaneous equipment.....	2,031	49,635
		$132,936
Less Credits:		
Property retired:		
Track and paving.....	15,857	
Distribution system.....	1,877	
Street cars and buses.....	655	
Cost of selling preferred stock..	514	18,904
Net additions to road and equipment during year.....		$114,032

STATISTICAL STATEMENT OF THE DULUTH-SUPERIOR TRACTION COMPANY

STREET RAILWAY AND BUS OPERATIONS

Total miles, all track reduced to single...	113.36
Total miles of street and right-of-way occupied by tracks.....	61.83
Total miles of bus routes.....	34.75
Revenue from transportation, per mile single track including miles of bus routes.....	$12,529.05
Revenue from transportation.....	$1,855,677

Short Abandonment in Fresno

The Fresno Traction Company, Fresno, Cal., has applied to the Railroad Commission for permission to abandon passenger service on that por-

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tion of its Sunnyside line on Ventura Avenue from Recreation Park easterly to the end of the company's line in Fresno County.

Net Income in Brooklyn Lower

Total operating revenues of the Brooklyn-Manhattan Transit system, Brooklyn, N. Y., for the seven months' period ended Jan. 31, 1929, were $28,112,915 compared with $27,586,215 for the seven months' period ended Jan. 31, 1928. Operating expenses increased from $17,930,308 to $18,306,475 for the 1929 period. After the consideration of income deductions, the net income was $3,545,949 for the seven months ended January this year and $3,647,033 for the seven months' period ended Jan. 31 of last year.

Petersburg Acquisition Under Discussion

Negotiations looking to the acquisition of the Petersburg, Hopewell & City Point Electric Railway, Petersburg, Va., are still in progress, although no definite action has resulted. Representatives of the Chicago interests involved went to Petersburg several weeks ago and inspected the property. A deal for the purchase of the line by Chicagoans has been considered since that time.

Stockholders of the company discussed the pending negotiations at the recent annual meeting, it was stated, but no definite action resulted. Reports made to the annual meeting showed that the past year had been a successful one for the company from a financial standpoint.

Receiver for Evansville & Ohio Valley Reports

A partial report in the receivership of the Evansville & Ohio Valley Railway, operating railway and bus lines, was filed by the receiver, William A. Carson, in the Vanderburgh County Probate Court at Evansville, Ind.

Cash receipts up to Dec. 31, 1928, totaled $73,266. Cash disbursements were $72,153, leaving a balance on hand of $1,113, with outstanding accounts totaling $9,568. The court approved the report and authorized the receiver to continue in charge of operating the company.

Another court entry authorized the railway to sell two small strips of land along the right-of-way in Spencer County, Ind., to the Indiana State Highway Commission to be used in improvement of State Highway No. 66. The receiver also was permitted to sell the company's interest in real estate, including towers, poles and other equipment along the Mt. Vernon line, which has been abandoned, to the Southern Indiana Gas & Electric Company. The company now operates buses along the Mt. Vernon highway between Evansville and Mt. Vernon, Ind.

Traffic, Fare and Wage Figures

The total number of revenue passengers, including bus passengers, reported by 223 companies to the American Electric Railway Association for the month of January, 1929, compared with January, 1928, is as follows:

January, 1929	788,065,646
January, 1928	800,254,229
Decrease, per cent	1.52

The decrease shown above is about the normal rate of decrease which has been prevailing in recent months and indicates that the decrease of nearly 4 per cent reported for the month of December was abnormal and due to the peculiar temporary conditions prevailing in that month, as was suggested in the comment in last month's service letter.

Average cash fare in cities of 25,000 population:

	Cents
Jan. 31, 1929	8.3227
Dec. 31, 1928	8.3032
Jan. 31, 1928	8.1274

The rise in the average fare during January was due to the following increases in fares granted during the month: In Minneapolis and St. Paul, Minn., the fare was increased from 8 cents cash with six tokens for 40 cents to 10 cents cash with six tokens for 45 cents. In Rochester, N. Y., the fare was increased from 9 cents cash with six tickets for 50 cents and twelve for $1 to 10 cents cash and the same ticket rates.

The average maximum hourly rates paid motormen and conductors in two-man service by companies operating 100 or more miles of single track:

	Average Hourly Rate Cents	Index Number 1913=100 Per Cent
Jan. 31, 1929	57.56	211.23
Dec. 31, 1928	57.55	211.19
Jan. 31, 1928	57.39	210.61

The increase in the average was caused by an increase of 2½ cents per hour granted to the motormen and conductors on the Illinois Terminal Railroad System at Springfield, Ill.

Election on Underliers in Philadelphia in Fall

Facing possibilities of legal delays that may consume many weeks or months, city officials and others interested in the plan to purchase the underlying companies of the Philadelphia Rapid Transit Company, Philadelphia, Pa., for $139,000,000 are reshaping their course toward a special election next fall on the proposition. Original plans called for submission of the question this spring to the voters. Now it is likely to go over to a special election after the general election next November. City Controller Hadley has persistently refused to join in the proceedings, originally because matters set forth in the city's petition were not and cannot, for extraneous reasons, be within his knowledge.

Puget Sound Interurban Right-of-Way Sought by Power Company

The Puget Sound Power & Light Company submitted the highest bid, $348,208, for the Seattle-Tacoma interurban property to Receiver Scott Z. Henderson, at the sale under foreclosure. The bid was for right-of-way and operating property. A. W. Leonard, president of the company, denied reports that the power company plans to restore railway operation. He said his company desired the right-of-way because its main transmission lines between Seattle and Tacoma are on it, and declared that, if his company is awarded the property, the tracks will probably be taken up.

Service over the interurban was discontinued by Judge E. E. Cushman, of the federal court, on recommendation of Attorney Henderson, who showed that it was not paying operating expenses and that it would be costly to rehabilitate the line. A physical valuation of $489,541 was placed on the outfit by Appraiser Henry L. Gray.

Rails Being Removed at Valdosta

The tracks of the Valdosta Street Railway, Valdosta, Ga., long in disuse, are being removed from the streets. Five years ago the cars ceased to operate and about two years ago the wires were taken down, but the rails remained. Recently a deal was closed whereby it was possible to get the tracks taken up and the street restored to its original condition for the price paid for the rail. The railway consisted of 5.25 miles of line.

Revenue in Quincy Falls Off

Although bus revenue in Quincy, Ill., showed a marked increase last year over 1927, the Illinois Power & Light Corporation reported total revenue from street cars and buses during the year of $208,201, as against $244,771 in 1927 and $263,722 in 1926. The 2 per cent franchise tax, payable to the municipality, amounted to $4,364, the smallest check the city had received from the transportation system in three years. Detailed revenue report included: Receipts from street cars and buses, cash fares, $25,262 and $3,780, respectively; from tokens used on street cars and buses, $70,172 and $86,650; chartered street cars, $81 and buses, $307.

Haverhill-Salem Service to Stop

The Massachusetts Northeastern Street Railway, Haverhill, Mass., is to discontinue service between Haverhill and Salem, N. H., on March 17. Cars will operate to Ayers Village. The Salem carhouse will be sold and tracks beyond the New Hampshire line removed.

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Book Reviews

Black on Rescission and Cancellation

Henry C. Black and Hon. Jay M. Lee. Published by Vernon Law Book Company, Kansas City. Three volumes (second edition). Price $30.

The first edition, published in 1916, became an outstanding legal text. The steady development of this branch of the law rendered a fuller treatise necessary. Part One deals with the discussion of rules and principles and contains a detailed examination of the various causes or grounds which justify the rescission or repudiation of a contract by one of the parties to it, or which warrant a court in ordering its annulment or cancellation. A valuable feature of the new edition is the greatly enlarged index.

Standards Yearbook—1929

Compiled by the National Bureau of Standards, George K. Burgess, director. Published by superintendent of documents, government printing office, Washington, D. C. Price $1.

Suggestions and data for all engaged in standardization will be found in the "Standards Yearbook for 1929." The many aspects of the subject call for a concise summary for busy men who most need to keep in touch with the latest advance in the standards field. The yearbook is designed to meet this need. It consists of eleven chapters, covering standardization of commercial weights and measures; standardizing the calendar; international standardizing agencies; national standardizing agencies; federal standardizing agencies; National Bureau of Standards; municipal, county and state agencies; general standardizing agencies; standardizing activities of technical societies and trade associations; bibliography on standardization for 1928, and an index.

It is the third issue of an annual which has proved indispensable to all interested in any phase of standardization in America and abroad. It summarizes and brings up to date current standardization activities and accomplishments in this country and elsewhere for the past year.

Steel Masts and Towers

"Mäste und Türme in Stahl." By P. Sturzenegger. 219 pages, 362 illustrations. Published by Wilhelm Ernst & Sohn, Berlin W 8, Wilhelmstrasse 90. Paper, 23 Reichsmarks; linen, 25 Rm.

Due to the need of steel structures for the support of wires in carrying electric current for lighting, power and railway purposes, there has arisen a demand for information relative to the design of poles and towers for this intention. This book gives details of the design and construction of many of the types used in European installations. An entire section of 30 pages is devoted to structures for railway purposes, including special towers for substations. Other sections include the principles and development of transmission structures, high-tension power transmission, anchoring and grounding of towers, protection against corrosion and erection.

Budget Control—What It Does and How to Do It

Issued by Ernst & Ernst, public accountants, New York. 40 pages.

How each part of the business budget should be prepared and the principles of its effective operation, together with a summary of benefits, are set forth in this revised edition of a work published by the authors four years ago. It has been widely used for informative and reference purposes by business executives, engineers and various students of business methods.

The book begins by defining the budget as a plan for co-ordinating all forces and directing them toward the attainment of a definite objective. According to the book, the budget estimates in advance the factors of time, volume and value necessary to produce a definite amount of sales and profit in a given period. It forecasts production, income, expenditures, financing, profit and financial position.

The procedure in preparing the master budget and its preliminary essentials represented by the budgets for sales, production and purchases, expense, plant additions and plant changes, and for cash proceeds, disbursements, balances and financing, is discussed concisely. The pages given to the classification of expense for budget purposes treat the subject in relation to manufacturing, wholesale and retail establishments.

Labor Management

By Gordon S. Watkins, Professor of Economics, University of California. A. W. Shaw Company, Chicago. 720 pages, price, $5 net.

In an analysis and interpretation of the principles of labor management whatever solutions are forthcoming will be born of three important conditions, namely: (1) An intelligent understanding and scientific interpretation of the forces of evolution which have produced modern industrialism; (2) a scientific investigation of employment conditions, which appear to be the basic causes of working-class revolt; and (3) the application of workable methods of improving employment relations. With this outline as a basis, the author proceeds to develop the subject matter, setting forth the basic assumptions of enlightened personnel administration. Next he points out that, if we would understand the intricate maladjustments in current industrial relations, we must have a clear perception of the economic antecedents strewn along the pathway of history.

In Part III, such topics as instincts, repression, acquisitiveness, gregariousness, sex and parental bent, fear and reason are discussed. In Part IV is an outline of the general principles of administrative science and a summary of the task and qualifications of the personnel manager. Part V takes up the selection and placement of workers, and job analysis and specifications. Part VI deals with education and training of employees.

Commerce Yearbook—1928

Published by the Department of Commerce, Bureau of Foreign and Domestic Commerce. Vol. 2, 750 pages. Price $1.25.

This volume gives in abbreviated form the same type of information on foreign countries as Vol. 1 presented on the United States. Vol. 1 is now available and Vol. 2 is expected to be off the press by Sept. 1. The two volumes constitute a complete and authentic picture of the trade and industry of the world during 1927.

Electric Drive Practice

By Gordon Fox. Published by McGraw-Hill Book Company, New York City, 1928. 421 pages; illustrated. Price $3.50.

"Electric Drive Practice" is a companion book to "Principles of Electric Motors and Control" by the same author. The present volume deals with classes of driven machinery which are in common use in many industries. Particular attention is given to the factors governing selection and application of motors and control equipment. Other general topics include mechanical and electrical features of motor installations. Separate chapters are taken up with consideration of motor drive for various special types of machinery such as centrifugal fans, blowers and compressors, air compressors, pumps, traveling cranes, conveying and elevating machinery and machine tools. Another separate chapter is given to industrial electric traction. To make the book more useful a bibliography is included at the end of nearly every chapter which gives the latest references.

The Engineering Index Service

This Engineering Index Service, instituted in January, 1928, is to be found in the public libraries of Newark, Cleveland, Bridgeport, Baltimore and the John Crerar Library, Chicago. Engineers in any field who live or work in New Jersey will find this mammoth index to the latest engineering literature, in the Public Library of Newark, N. J. The library is open daily from 9:00 to 9:30 and is convenient to all railroad stations. It answers inquiries by mail or by telephone.

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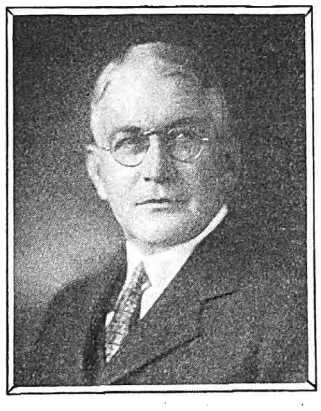
Personal Items

James P. Griffin Succeeds Jack Beall at Dallas

James P. Griffin was elected president of the Texas Electric Railway, Dallas, Tex., on March 5, succeeding the late Jack Beall. For the present Mr. Griffin will continue to be executive in charge of operations.

Continuously since 1905 with the Dallis outfit, Mr. Griffin has, since July 1, 1926, been serving as active vice-president in charge of operations. His first railway experience was at Waxahachie in the general freight and passenger office of a subsidiary of the Southern Pacific. Prior to his going to Dallas in July, 1905, he was secretary



James P. Griffin

to Jack Beall for one year during 1904 and 1905 while Mr. Beall was in Congress. With J. F. Strickland he was engaged in the project to build an interurban railway from Dallas to Sherman. This project was successful and that line was put in operation on July 1, 1908. Later he served as secretary and general passenger agent and auditor of these lines. On April 1, 1912, Mr. Griffin became also secretary of the Southern Traction Company, then building the interurban lines from Dallas to Waco and Dallas to Corsicana. These lines were put in operation in October, 1913. He also served as general passenger agent for these lines. On Jan. 1, 1917, the Texas Traction Company and the Southern Traction Company were consolidated under the name of the Texas Electric Railway and he was elected secretary and appointed general passenger agent of that company. Nearly six years ago he was elected vice-president of the Texas Electric Railway.

Mr. Griffin was born in Waxahachie, Tex., on Jan. 28, 1881. He attended the University of Texas after being graduated from the Waxahachie High School in 1900. He inaugurated the Bluebonnet Limiteds, operating from Waco, Corsicana and Denison and made this service a popular one. He is also credited with conceiving the plan of converting the interurban passanger lines into joint passenger and freight hauling lines, and, with the late Jack Beall, secured an amendment to the company's charter and permit from the Railroad Commission to enter this field in May, 1928. He is a vice-president of the Southwestern Public Service Association.

F. W. Bacon Heads Bus Company Taken Over by Railway

F. W. Bacon, New York City, vice-president Kentucky Securities Company, holding company of the Kentucky Traction & Terminal Company, which recently purchased a majority interest in the Consolidated Coach Corporation, has been elected president of the coach corporation. He succeeds Guy H. Hughlet, Lexington, who was elected vice-president and general manager. As indicated in the item in the ELECTRIC RAILWAY JOURNAL for Feb. 16, page 300, the Coach Company operates a large network of bus lines over the state and into several adjoining states.

W. J. Harvie With Omaha & Council Bluffs Company

William J. Harvie, employed by the United Traction Company, Albany, N. Y., for two years as safety director, will become efficiency engineer of the Omaha & Council Bluffs Street Railways, Omaha, Neb.

Many safety measures adopted by the company in Albany in the last two years, instrumental in reducing accident rates considerably, were suggested by him for use on the Albany system.

Mr. Harvie was formerly vice-president Auburn & Syracuse Railway, general manager of the Syracuse & Suburban Railway and chief engineer Syracuse Rapid Transit and the Oneida Railway and the Utica lines. He was also chief engineer in charge of the electrification of the West Shore between Utica and Syracuse.

FRANK H. WARREN, who recently announced his candidacy for the Republican nomination for city judge of South Bend, Ind., has resigned his position as claim agent for the Chicago, South Bend & Northern Indiana Railway. His resignation coincides with the railroad's policy of non-participation in politics, Mr. Warren said. In his letter of resignation, he expresses his appreciation of his relations with the electric line.

R. L. LONGSHORE has been appointed general manager of the Toledo & Western Railway, at Toledo. He succeeds H. O. Kelly, who has been appointed superintendent of the Springfield, Ill., division of the Wabash Railway.

W. H. Harton—President of Kentucky Association

W. H. Harton, general manager Cincinnati, Newport & Covington Railway, Covington, Ky., was elected president of the Kentucky Association of Public Utilities at the recent meeting of the organization held at Louisville. Mr. Harton is well-known for his work in directing the Green Line street cars, and is one of the few general managers concerned with the problem of giving interstate transportation to the public for a 5-cent fare.

He served his apprenticeship in the office of a civil engineer who represented various satellite communities around Cincinnati in an engineering capacity. In August, 1892, Mr. Harton entered the employ of the Cincinnati, Newport & Covington Railway as a levelman in the engineering corps. The local horse car lines were then being

W. H. Harton

consolidated and the motive power was being changed over from old dobbin to electricity. It was at a time when the then existing trackage was being reconstructed, preparatory to operating the heavier units, and new construction work was in progress on all parts of the system. This gave the young levelman work to do that took him to all parts of this northern Kentucky system.

He helped rehabilitate this system and, when the new trackage was completed, he became chief clerk to the superintendent. In 1898 he was appointed superintendent maintenanceg of way. On June 2, 1915, he stepped up to general superintendent and was promoted to general manager in December, 1919. As the man who keeps the Green Line moving, he is expected to make many improvements in the road if communities served heed the request of H. C. Blackwell, president, for a higher fare.

J. L. Fritsch Elected Vice-President of West Penn Railways

J. L. Fritsch of Pittsburgh was recently elected vice-president of West Penn Railways and Wheeling Traction Company in charge of engineering and promotional work. Mr. Fritsch has been

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chief engineer of the West Penn Railways since its organization.

Early in his career he was employed by the Cincinnati Water Works Commission on the design and construction of their new plant located at California, Ohio. On March 17, 1902, he went to Connellsville with the original Pittsburgh, McKeesport & Connellsville Railway, when the various small, isolated railway lines were being connected up to make a completed system. In October, 1903, Mr. Fritsch became chief engineer of that road, and has continued in that capacity with the West Penn Railways to date. In June, 1915, he went to Pittsburgh in charge of supervision of the track and roadway departments of the Wheeling Traction Company as well as of the lines in Pennsylvania.

Mr. Fritsch was born in Cincinnati, Ohio. He was graduated from that city's university in civil engineering in 1897. His most recent promotion was announced by H. L. Mitchell, president of the West Penn Railways.

Rolla Wells Honored in Bank Designation

Rolla Wells, who was receiver for the United Railways Company, St. Louis, prior to the purchase of the St. Louis street car system by the St. Louis Public Service Company, effective on Dec. 1, 1927, has been designated by the Federal Reserve Board at Washington as chairman of the board for the St. Louis Federal Reserve Bank, succeeding William McMartin, resigned. A former Mayor of St. Louis, Mr. Wells had been governor of the bank from its organization in November, 1914, to February, 1919, following which he was elected a Class B director, representing the group of agriculture, industry and commerce. He continued in that capacity until his appointment as chairman, which changes his status to that of a Class C director, a direct representative of the government. He was receiver for the Unitcd Railways from April, 1919, to Dec. 1, 1927.

FRANK H. MILLER, vice-president and general manager of the Louisville Railway, Louisville, Ky., was elected president of the Louisville Safety Council to succeed William L. Hoge at a recent meeting of the twelve directors.

JOHN ALDWORTH, who recently retired as general manager of the Nottingham Corporation Tramways, England, after a service of 30 years, has been retained by the City Council as consultant. He has also been elected an honorary member of the Municipal Tramways & Transport Association in recognition of his service to the association, of which he was president in 1907-1908.

WALTER O. RANDLETT, for many years secretary to the general manager of the electric department, Virginia Electric & Power Company, Richmond, Va., and recently promoted to the position of statistician, has now become a member of the comptroller's staff.

B. A. Hegeman, Jr., Dies Suddenly

Head of National Railway Appliance Company a leader in electric railway, bus and steam railroad transportation

BENJAMIN ARROWSMITH HEGEMAN, JR., well known in electric railway, bus and steam railroad transportation circles, died suddenly of heart attack at his home in New York on March 6. He was president of the National Railway Appliance Company of New York, president of the Hegeman-Castle Corporation of Chicago, president of the Anglo-American Varnish Company of Newark, N. J., and of the Genesco Corporation of Rochester, N. Y., and director of the Excelsior Savings Bank of New York. He was president of the Railway Supply Manufacturers Association in 1914 and a member of the American Electric Railway Association.

Photo by Blank and Stoller

B. A. Hegeman, Jr.

Few men in electric railway work, certainly very few men engaged in manufacturing and sales activities, gave of their time more freely to the work of the American Electric Railway Association than did Mr. Hegeman. His record of committee activities stretches down the years in a long unbroken line, containing many assignments quite arduous in the tasks they imposed. Still Mr. Hegeman was never known to falter when the desire was expressed in association councils that the weight of his experience might prove helpful. This year found him serving on the convention location, the manufacturers' contact and the exhibit committees, while last year he was a member of the exhibit committee and the year before that—1926-1927—he was a member of the American executive committee and the committee on finance. In 1925-1926 he served on three committees, executive, exhibit and finance. In 1924-1925 he served on two committees, the American executive and the finance. In 1923-1924 he was a member of the American executive committee and the convention location body. And so the record goes. It is a partial list, but there appears to be no need to expatiate for the benefit of men in the electric railway industry on what all this has meant to the railways. Both in manufacturing circles and in the railway industry Mr. Hegeman's record is so outstanding that no encomium on the work of the man would serve to enhance that record or mitigate the loss to the industry and the men actively engaged in it suffer by his death.

A son of Benjamin Arrowsmith Hegeman and Jane Roome, Mr. Hegeman was born in New York City on July 14, 1860. He was descended from Holland Dutch and English Colonial ancestry. He attended the public schools and was graduated from the Mount Washington Collegiate Institute in 1877. After eight years in the freight, passenger and treasurer's offices of the Delaware, Lackawanna & Western Railroad, he went to the Citizen's Mutual Life Insurance Company as cashier and assistant secretary. Eighteen months later he became general manager of the Lackawanna Live Stock Transportation Company, a position which he held for eleven years, until he became Eastern sales agent for the American Car and Foundry Company. In 1901 he was elected president and director of the United States Metal & Manufacturing Company.

On Oct. 23, 1883, Mr. Hegeman married Miss Kate Greenough Matthews, a daughter of Charles Matthews. He took an active interest in Republican politics, having been a Councilman and then Mayor of North Plainfield, N. J. For many years he was a member of the Republican Executive Committee.

His clubs included the Lotus, Automobile of America, Sleepy Hollow Country, Railroad, Baltusrol Golf, Apwamis, New York Athletic and the Lyres. Besides his son, daughter and wife he left five grandchildren.

THOMAS ANDREW TURNER, the first motorman to take a north side elevated train around the union "loop" in downtown Chicago, died on Jan. 18. He was also the first motorman to take an elevated train into the city of Evanston in 1905. Mr. Turner was born in 1853.

GEORGE LEE ESTABROOK, with the banking firm of E. W. Clark & Company for 41 years, died on Feb. 14 in Philadelphia, Pa. At the time of his death, as a firm representative, he was president of the Crystal Oil Refining Corporation, Shreveport, and secretary and treasurer of the Portland Electric Power Company, Portland, Ore. Mr. Estabrook was born at Athens, Pa. After being graduated from the Eastman Business College, Poughkeepsie, N. Y., he became a stenographer with E. W. Clark & Company and was quickly advanced.

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Construction Programs Planned

One million dollar improvements to be made by the Omaha & Council Bluffs Street Railway. Illinois Power Company plans extensive improvements. Chicago Orders Cars. Cincinnati starts track construction

MORE than $1,000,000 will be spent for improvements by the Omaha & Council Bluffs Street Railway, Omaha, Neb., during the coming year, according to announcement made by Chester D. Porter, vice-president in charge of operation. Half of the sum will be spent for the changing of routes and the improvement of track equipment and cars, and the other half will be used for the expansion and relocation of substations for the better conservation of power. W. J. Harvie, of Albany, N. Y., a consulting engineer experienced in street railway problems, has been called to Omaha by John M. Shannahan, president of the Omaha & Council Bluffs Street Railway, to aid in the suggested improvements. The special points to be studied by Mr. Harvie are the power requirements of the system, the car equipment and the shop facilities.

Improvements in Springfield

Ten new street cars and five new buses are included in the equipment which the Illinois Power Company, Springfield, Ill., will add to its railway system this summer. Final plans have also been completed for the construction of a $114,500 garage, work on which is now awaiting the selection of a suitable site. The new cars will be slightly smaller than the cars now employed on the Fifth Street line in the downtown district. When the new cars are received ten of the old cars will be destroyed.

The Illinois Power Company has a budget of $616,989 for construction work in its various departments in the city and, according to A. D. Mackie, general manager, it is expected that $200,000 more will be added before the final plans are completed. At present the railway's share in the budget is $178,117.

In Lynchburg an agreement has been reached between officials of the Lynchburg Traction & Light Company and City Manager W. B. Hart under which the street work to be done by the railway in street car track areas of the city is not to exceed $8,500 a year.

Plans for expansion of its facilities in the East and the Mid-West, involving the establishment of three new dispatching centers, were announced recently by the Piedmont & Northern Railway, Charlotte, N. C. Two freight offices at Charlotte and one in Cincinnati, Ohio, will be opened this month. The company now has offices at New York, Atlanta, and Dallas.

The Jamestown, Westfield & Northwestern Railroad, Jamestown, N. Y., operating an electric interurban service between Jamestown and Westfield, has completed a program of improving the interior seating arrangement of its cars. The new seats installed are the Pullman parlor-car type, single seats being installed on swivels on one side and stationary double seats on the other.

Cincinnati Starts Trackwork

The Cincinnati Street Railway, Cincinnati, Ohio, has started relaying track from Broadway to Smith Street, on Fourth Street, a total distance of 4,482 ft. The tracks will be laid in the center of Fourth Street and will be single tracks to replace the double trackage formerly existing in that street, which has become a one-way thoroughfare.

Work will be commenced from both terminals and a temporary track system will be used for street car operation, thus facilitating the work. One hundred and twenty-two-pound grooved rail will be laid and the city will resurface the street following the completion of the new track and a new water main. This Fourth Street track renewal is the second major downtown track improvement of the Cincinnati Street Railway under its extensive program for rehabilitation.

The Public Service Co-ordinated Transport, Newark, N. J., will install for trial purposes on some of its cars, air-operated automatic gong ringers. The devices will be first installed on the parlor cars now being put into service on the Central Avenue and Orange lines in the Essex division.

Seattle Improvements

An immediate appropriation for new construction work, necessary for the rerunning of West Seattle Street cars on the Spokane Street elevated down to First Avenue south, is requested of the Seattle City Council. Approximately $100,000 will be needed for this construction. According to the superintendent of utilities, the rerunning plans contemplate elimination of the Elevated Street Railway on Whatcom Avenue between Spokane and Washington Streets. The cost of repairing this strip of railway structure and making it safe for continued use is said to be almost prohibitive.

According to Commissioner Ira S. Davisson, the seven used street cars for the municipal belt line, recently ordered by the city, will probably be rejected. It is claimed that a city inspection has revealed that it will cost at least $1,000 per car to recondition the cars if accepted. The cars were to replace those now rented from the Tacoma Railway & Power Company.

Syracuse Railway Co-ordinated Bus Lines, Syracuse, N. Y., which is controlled by the New York State Railways, has ordered five model AB four-cylinder Mack bus chassis and four 233-in. Mack model BK six-cylinder bus chassis. The Los Angeles Railway, Los Angeles, Cal., has placed orders for four urban type Twin Coaches. The Chicago & West Towns Railways, Chicago, Ill., has received five Mack model AB 225-in. bus chassis and one Mack model AB 29-passenger city type bus.

Chicago Orders Cars

Chicago Surface Lines, Chicago, Ill., has placed an order for 33 cars with the Cummings Car & Coach Company and another order for 33 cars with the J. G. Brill Company. The remaining 34 of the lot of 100 will be built in the company's own shops.. As mentioned in the Feb. 9 issue of the JOURNAL, these cars are of the large front-entrance, center-exit type. They are for two-man operation and are equipped with sufficient motor power to give quick acceleration and high running speed. Each car seats 60 passengers. Loading and unloading are facilitated by double and single folding entrance doors and double and single sliding exit doors.

Materials Ordered

The Capitol Traction Company, Washington, D. C., has recently placed orders for 275 gross tons of 7-in. 103-lb. A.E.R.E.A. grooved girder rail. This company has also ordered 530 International Steel twin ties, 300 Thermit rail welding portions, 35 gross tons of cast-iron track yokes and manhole castings for underground conduit track construction, 22 tons of malleable iron special track castings for underground conduit track, one carload of track bolts, special hook head bolts, washers, etc.

The Dallas Railway & Terminal Company, Dallas, Tex., has placed orders for one carload of creosoted pine poles and 150 21-in. rolled-steel wheels. The Portland Electric Power Company, Portland, Ore., has ordered three buses costing $35,713.

Ten tons of 500,000-circular mill cable and 6,000 No. 00 bronze trolley ears have recently been ordered by the Toronto Transportation Commission, Toronto, Ont. This railway has also ordered 300 33-in. motor wheels, 200 30-in. motor wheels, 200 26-in. motor wheels, 100 22-in. motor wheels and two sightseeing launches of 29-passenger seating capacity. The Washington Railway & Electric Company, Washington, D. C., has placed orders for 200 cedar poles, 500 ft. of 9-in. road

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rail, 500 ft. of 6-in. road rail, 700 cast-iron track yokes, and 3 surface branch offs. This company also has placed orders for one Greenfield threading machine, one Westinghouse air compressor and 36 sets of Westinghouse vacuum brakes for type Z coaches.

United Railways Electric Company, Baltimore, Md., plans a motor bus service and repair building to cost approximately $275,000. The Wisconsin Power & Light Company, Madison, Wis., will soon take bids for an addition to the power plant to cost $50,000.

Exhibitograph No. 5

MANUFACTURERS!

Have you made your plans to

Exhibit

at the

48th A.E.R.A. Convention?

Applications for exhibit space will be mailed

APRIL 12

Buses for Public Service to Have New Features

In placing an order for 267 new buses with the Yellow Coach & Manufacturing Company, the motor coach division of General Motors Truck Corporation, it is announced by Public Service Co-ordinated Transport, Newark, N. J., that the buses will have the best system of heating and ventilation that has yet been placed in service by the company. In addition, the most modern braking equipment and engines of considerable more power than have so far been used will be installed.

The heating and ventilation will be accomplished by means of an improved hot-air system by which air is blown by electrically-operated fans over coils of hot water from the radiator. This uniformly heats the bus throughout and makes for better ventilation.

All the chassis and a few of the bodies will be built at the Pontiac, Mich., shops of General Motors but the majority of the bodies will be built at the Public Service shops in Newark. When these buses have been placed in service, Public Service will have a fleet of 2,000 buses actually in operation. The entire electrical equipment will be furnished by the General Electric Company.

The new buses will be of both the gas-electric and gas-mechanical types, the gas-electrics being used in city service and the gas-mechanics on suburban and long distance lines.

The engines will be the sleeve-valve, silent Knight type, with six cylinders. They will have higher compression and more power than those now in service.

The buses will be equipped with balloon tires, something new on the so-called city service type of bus, and will have leather seats, both of these features designed to give the greatest possible comfort to the passengers.

On the gas-eleectric drive buses there will be three sets of brakes as follows:

Westinghouse service brakes with brake shoes on rear wheels.

Independent emergency brakes on electric motor shafts operated by a hand lever.

Another set of independent electric brakes operated by the controller.

The first delivery on the order is expected sometime in May. In the meantime the bodies are already being built at the Newark shops and, as fast as the chassis arrive, they will be attached to the bodies.

Specifications on Northwestern Pacific Cars

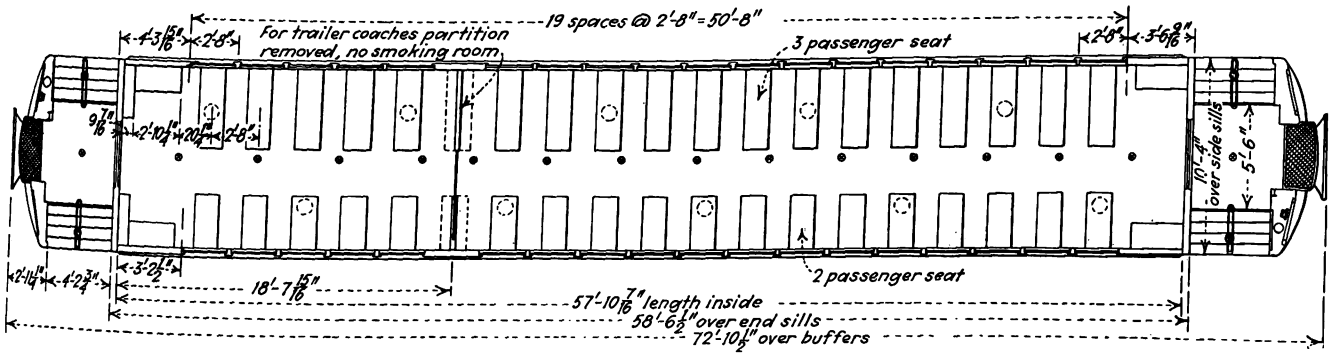
Five motor cars and five trail cars have recently been ordered by the Northwestern Pacific Railroad, San Francisco, Cal., from the St. Louis Car Company, as mentioned in the Dec. 8 issue of ELECTRIC RAILWAY JOURNAL. The motor passenger cars are of the two-man, interurban type of double-end, double-truck construction. Each car is 72 ft., 10½ in. long, 10 ft. 6 in. wide and seats 98 passengers. The bodies are of all-steel construction with aluminum arch type roofs. They are heat insulated with balsam wool, the interior having aluminum trimming. The seats are leather upholstered, being of three-passenger size on one side of the car and two-passenger on the other. Each motor car is equipped with an 18-ft., 8-in. smoking compartment and is also provided with a folding operating cab in each end. The smoking compartment seats 29 passengers.

The motor trucks have a 7-ft., 3-in. wheelbase and are equipped with inside-hung motors, 33-in. rolled steel wheels and plain type journal bearings. No trolleys are provided as power is collected through third-rail devices.

The trail cars are exact duplicates of the motor cars except that they have no smoking compartments and have a seating capacity of 103 passengers, two seats replacing the partition. These trailers are also equipped with controllers and have a truck wheelbase of 6 ft. Additional details are given in the accompanying specifications.

J. G. White Rebuys British Firms

J. G. White & Company, Inc., has announced the repurchase by them of J. G. White & Company, Ltd., of London, and in the forthcoming annual report will disclose the sale of the J. G. White Management Corporation to J. H. Pardee and J. I. Mange, president and vice-president, respectively, of the J. G. White Management Corporation. The latter company, it is now disclosed, was sold early in 1923, although no



Floor plan of the cars being built for the Northwestern Pacific Railroad by the St. Louis Car Company

Length over all	72 ft. 10½ in.
Length over body posts	58 ft. 6½ in.
Truck wheelbase	7 ft. 3 in.
Width over all	10 ft. 6 in.
Height, rail to top of roof	13 ft. ½ in.
Window post spacing	2 ft. 8 in.
Body	All steel
Roof	Aluminum arch
Air brakes	Westinghouse
Axles	Forged steel tempered and quenched
Conduit	Metal
Control	Westinghouse multiple unit
Couplers	Westinghouse automatic car air and electric
Curtain fixtures	Adams & Westlake
Curtain material	Pantasote J-86-M
Door mechanism	National Pneumatic operating interlocking and signal for sliding gates
Doors	Sliding, partition end type
Floor covering	Flexolith
Glass	Plate in doors and ends-DSAA in side sash
Hand brakes	Miner
Heat insulating material	Balsam wool
Heaters	Railway Utility single unit truss plank
Headlining	Agasote
Interior trim	Aluminum
Journal bearings	Plain
Journal boxes	Malleable iron
Motors	Westinghouse No. 557-E-7, inside hung
Registers	Ohmer
Sash fixtures	O. M. Edwards
Seats	Hale & Kilburn
Seat spacing	2 ft. 8 in.
Seating material	Leather
Steps	Stationary
Step treads	Kass
Trucks	St. Louis-Commonwealth
Ventilators	Globe
Wheels, type	Rolled steel 33 in. diameter
Wheelguards or fenders	Plain

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formal announcement has heretofore been made. These changes leave J. G. White & Company, Inc., with two subsidiaries, namely, the J. G. White Engineering Corporation and J. G. White & Company, Ltd., of London.

The British company, organized more than twenty years ago by J. G. White, was sold to their interests at the outbreak of the World War. Increasing foreign business of J. G. White & Company, Inc., and the J. G. White Engineering Corporation is the reason given for the recent repurchase, arrangements for which were made by J. Dugald White, vice-president of the New York company. The British subsidiary, which until this time has been engaged chiefly in engineering activities, will have facilities for acting in the investment banking field as well.

Railway Construction in Italy

The only means of communication with the Republic of San Marino, in the heart of Italy, is by carriage or motor from Rimini, the nearest Italian city having railway connection, a distance of 15 miles, according to Consul Joseph Emerson Haven, Florence. Direct railway connection with the capital of the republic has long been desired by the San Marinese, and on March 26, 1927, a convention between the Kingdom of Italy and the Republic of San Marino was signed, with regard to the erection of an electric railway line, the construction of which was assigned to an Italian company. Work was commenced on Dec. 2, 1928, and it was announced at that time that the line would be completed and in operation in two years. Ten tunnels will be necessary, and near the town of Serraville a bridge will be required across the Ausa River. It is thought that there may be opportunity for American business, although rolling stock, electrical material, etc., will be of Italian production in so far as possible.

Weekly Business Conditions

The volume of trade during the week ended March 2, as reflected by check payments, was smaller than in the preceding week but greater than a year ago, according to the weekly statement of the Department of Commerce. Industrial activity, as indicated by operations in steel plants, was also greater than during either comparative period. The production of bituminous coal during the latest reported week, while somewhat lower than during the preceding week, was substantially larger than in the similar week of 1928. The output of lumber showed a gain over the preceding week but a decline from a year ago. Petroleum production was running considerably in excess of last year. Freight-car loadings covering the latest week showed a gain over the corresponding period of 1928.

Prices for copper, cotton, iron and steel were generally higher than in either prior comparative period. Loans and discounts of federal reserve member banks showed only slight change from the preceding week but were higher than a year ago. Interest rates on call loans averaged higher than in either the preceding week or the similar week of last year. Bond prices averaged lower than in either period. Prices for stocks showed gains over both periods.

METAL, COAL AND MATERIAL PRICES F.O.B. REFINERY

	March 5, 1929
Metals—New York	
Copper electrolytic, cents per lb.	19.275
Copper wire, cents per lb.	21.375
Lead, cents per lb.	7.25
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	48.875
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.425
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.425
Central, Ill., screenings, Chicago, net tons	1.075
Kansas screenings, Kansas City, net tons	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.35
Weatherproof wire base, N. Y., cents per lb.	22.375
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	11
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.5
Turpentine (bbl. lots), N. Y., cents per gal.	61.5

Improvements to Be Made in London

Extensive improvements are to be made during this year by the Underground Electric Railway, London, England, according to a recent announcement by that company. Escalators are to be installed at Highgate and Camden Town stations, and the Charing Cross station improvements will be completed. A number of stations will be rebuilt and improved, and the new Underground Building at St. James Park station will be completed. An automatic ticket system will also be introduced at this station.

Three hundred and seventy-two additional cars were put into service on the Hampstead and City, Bakerloo and Piccadilly tubes. Ninety-one new motor cars will be placed in service on the District Railway. Many additional improvements will be made including the installation of a 15,000-kw. set, new boilers and new switchgear at the Lots Road Carhouse.

More than 1,000 omnibuses will be equipped with pneumatic tires. The Elmers End garage will be completed and two new garages will be constructed in north and west London. New motor coaches will be introduced for private hire service. Two new cars of the modern type will be added and the uncovered topped cars will be converted into covered cars. Additional cars in the South Metropolitan Electric Tramways will be remodelled.

TRADE NOTES

NACHMAN SPRING-FILLED CORPORATION, Chicago, Ill., recently purchased the plants and business of the National Spring & Wire Company and the Marshall Company, Grand Rapids, Mich. The Grand Rapids plants will operate as the automotive division of the Nachman Spring-Filled Corporation under the name of the National-Marshall Spring Corporation by Mr. James L. McInerney, former president. In addition to assuming the presidency and direction of the National-Marshall Spring Corporation, Mr. McInerney will be retained as an executive of the Nachman Spring-Filled Corporation. The Nachman factory at Los Angeles, Cal., will continue to serve the Pacific coast enterprises as it has in the past.

H. A. BAKER, of Schenectady, N. Y., has been appointed service manager of the International General Electric Company, with headquarters in New York City. Mr. Baker succeeds C. F. Neave, who has been named manager of the newly organized refrigeration department of the company.

GEORGE H. SCRAGG is once more actively associated with the Mack International Motor Truck Corporation, New York, N. Y. Mr. Scragg has only recently returned from an extended trip which took him to the West Indies and Europe.

CUTLER-HAMMER Manufacturing Company, Milwaukee, Wis., announces that it has acquired the business of the Trumbull Vanderpoel Electric Manufacturing Company, Bantam, Conn., which will be operated as a subsidiary of the Cutler-Hammer company under its present name. This purchase will add a complete line of meter service and safety switches to the present Cutler-Hammer line of motor control, wiring devices and allied electrical items.

Weekly Business Indicators

(Weeks ended Saturday. Average 1923 — 25 = 100)

	1929				1928			
	Mar. 2	Feb. 23	Feb. 16	Feb. 9	Mar. 3	Feb. 25	Feb. 18	Feb. 11
Steel operations	.....	117.1	114.5	113.2	109.0	111.0	112.0	111.0
Bituminous coal production	.....	120.7	122.5	124.1	103.0	104.4	96.2	100.0
Lumber production	.....	96.4	84.1	81.8	101.4	108.6	106.4	104.5
Petroleum production (daily aver.)	.....	.....	128.4	129.3	113.2	112.8	113.4	113.3
Bldg. contracts 37 states (daily av.)	124.5	93.1	85.1	79.8	111.0	122.2	114.9	117.3
Price iron and steel, composite	87.9	87.6	87.6	87.6	86.5	86.0	86.0	86.0
Copper, electolytic, price	.....	129.0	129.0	129.0	100.0	100.0	100.0	100.7
Bank loans and discounts	.....	129.5	129.9	130.1	121.2	120.4	121.1	121.3
Interest rates, call money	187.9	169.7	169.7	163.6	109.1	103.0	109.1	112.1
Business failures	131.9	101.0	117.0	135.1	126.8	118.7	127.8	134.2
Interest rates, time money	177.1	177.1	177.1	171.4	105.7	105.7	105.7	102.9
Federal reserve ratio	90.2	91.4	90.1	89.4	95.6	96.4	95.5	95.6

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
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CHARLES GORDON, *Editor*

LOUIS F. STOLL,
Publishing Director

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A New Kind of "Drive" Is Needed

DURING the last few years there has developed within the electric railway industry a recognition of the fact that the business of urban transportation is to a large extent a merchandising enterprise, that the sale of rides can be fairly compared with the sale of any other commodity, and that one of the principal problems confronting the industry has to do with salesmanship. Yet it must be admitted that one of the greatest essentials for sales success, namely, the training of the sales force, has not received the attention it deserves. However capable the average trainman may be in other respects, it cannot be disputed that, by and large he is none too efficient as a salesman. That is not because he is congenitally inept or incapable of learning, for he has learned to do other things with a commendable degree of efficiency. Indeed, it is in no small measure due to the men on the platform that the industry has been able to hold its ground during these last few difficult years of increasing costs.

Some time ago the call went out for power saving campaign as a means of cutting down expenses. The motorman willingly and ably responded to the appeal by improving his technique of feeding his controller and by taking advantage of every opportunity to coast. Starting as a special "drive," the saving of energy soon passed into regular routine and became a definite part of the duties of a good operator. Similarly, when the drive against accidents was initiated in a further effort to reduce expenses it was to the man on the platform that the appeal was made, and again the response was prompt and effective. The safety movement, starting as a drive, with safety weeks and safety months, has progressed to a point where it is no longer a sporadic effort but a day-to-day job, in which both the conductor and his motorman take a commendable pride. By means of energy saving and accident prevention, both brought about through the intelligent co-operation of the men on the platform, the operating expenses of electric railways have been progressively reduced by many thousands of dollars.

Now the time appears to be at hand to initiate another industry-wide movement, having as its objective the training of the platform man in the sale of rides. From saving energy and avoiding accidents the operator must be called upon to acquire the technique of salesmanship. With little more than the age-old qualities of courtesy and tact and a neat personal appearance upon which to build, he must acquire and put into practice that intangible something, that indefinable quality which will so commend itself to the average patron as to induce him to continue and increase his patronage. Individuals there are in every group of trainmen who already possess this quality to a marked degree. On every property are to be found men with whom the patrons like to ride. With these men as a nucleus around which to build and with the knowledge of sales psychology which is available from other sources, it should be possible to develop the average train force into a group whose presence would be a constructive force in any community. The stake is well worth playing for and a step in this direction would appear to be the next logical development in an industry that must go ahead if it is to survive.

Forward Looking Rapid Transit Project in Cleveland

GREAT things transit-wise appear to be ahead for the city of Cleveland. In one of the most comprehensive plans of its kind ever advanced, the Van Sweringen interests, in a proposal to take over the Cleveland Railway and certain suburban systems, have indicated their true appreciation of the physical side of the problem of supplying suburban service to the modern community. The plans are still in embryo, but even as partially divulged they indicate that the problem of local transit in and about Cleveland is to be approached on the basis of the co-ordination of that service with that of the entrance of the trunk lines into the city. This is most important.

As in so many other cities the situation at Cleveland has plainly become one in which rapid transit for the longer hauls is necessary. At Cleveland, however, it has been recognized that this rapid transit service should be provided by one agency and not by several competing agencies since that means waste in duplication of facilities.

This recognition alone is significant, but it is still more significant that a militant attitude should be adopted toward it and that recognition should be accorded the existing city transit system in the proposal. Contributions of the Van Sweringens to the growth and development of Cleveland have already shown that they, working with the Cleveland Railway, are incomparably better equipped to study and respond to the new and the real needs of the city in this direction than any new company possibly could be. In fact, this is so obvious as to be self-evident.

The vehicle under which the Van Sweringens propose to work is the Metropolitan Utilities, Inc. That company would control practically all of the public transportation facilities in the metropolitan area of Cleveland, and to the new company would be intrusted the further building of such facilities. Stockholders of the Cleveland Railway are being asked to deposit their stock. While it is too early to predict the outcome, acceptance of the proposal by them appears to be assured. President Alexander of that company and other members of the rapid transit committee favor the proposal. As they see it,

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operation of competitive facilities would inevitably result in waste and excessive costs, while co-ordinated control and operation of transit facilities in the metropolitan area will result in decreased cost of furnishing service.

In this move Cleveland would appear to take the lead in rapid transit planning under the far-sighted direction of President Alexander and his associates in the Cleveland Railway, and the equally far-sighted planning of the Van Sweringen interests. There may be some occasion for questioning certain economic phases of the plan, particularly the apparent intention to build with private capital rapid transit facilities which involve heavy fixed charges that become a permanent burden on the community's transportation facilities. But in its physical aspects, and in its recognition that public transportation in a community or metropolitan district is a natural monopoly, the Cleveland proposal is a forward-looking enterprise.

Business Does Its Own Purging

COLONEL STEWART of the Standard Oil of Indiana has gone down to defeat in a contest unusual in the annals of American business. Doubtless it was difficult for the employee-stockholders to realize that the debonair chairman of the board who walked pleasantly among them was the same man associated with the story of secrecy and evasion unfolded at Washington, one of the four responsible participants in the affairs of the phantom Continental Trading Company, the books of which were destroyed and the identity of which faded as mysteriously as its form had taken shape.

It is only right that conclusions should be drawn carefully and that the accused should have the benefit of any doubt. There has been much doubt, and on a technical point the jury acquitted the Colonel. But the fact remains that the Supreme Court said of the Continental Trading Company that it "was created for some illegitimate purpose." If the premise be accepted that a profitable end justifies any means, there would be no more to be said. But that premise is not tenable. Dividends are desirable. But they do not rank ahead of ethics. In seeking to make a contest on the issue Colonel Stewart was ill-advised by his friends. As the *Wall Street Journal* so forcefully said, "modern conceptions of corporation management, while demanding business ability still require that something higher than profits shall be shown."

In the defeat of the Colonel for re-election a salutary lesson lasting in its effect appears to have been administered quite as effective as any the courts could have dealt out, since it evidences again the growing disposition of business to administer its own rebuke to proponents of practices among its members that do not square with the revised business morality of the present day.

Adding to the Convenience of the Patron

GOOD merchandising, whether it be of a luxury, a commodity or a service, requires that attention be paid to the convenience of the customer. It must be made easy for him to buy, or he is not likely to undertake the effort unless he is particularly desirous of obtaining what the merchant has to offer. When the sale is that of a service the facilities for making the customer acquainted with the service are an essential part of the product itself. The enormous increase in the use of electricity in the home, for instance, is due in no small part to the many campaigns made directly to the user to show the convenience obtainable with some new device, or to indicate additional uses to which a device already installed may be put.

With transportation systems the problem is the same in principle as it is in other lines of business, but there is considerable difference in the methods that must be employed. For the average patron the rail or bus line is not directly at the door of his home, nor is it always adjacent to his place of business. When the patron gets off his daily beaten path it is necessary for him to learn the most convenient routes and the car schedules.

It is for the benefit of such patrons that the methods used on the London Underground have been developed. These have been discussed in this paper from time to time. In last week's issue appeared a series of illustrations of the latest developments of the Underground to direct its patrons. Destination and route signs are used effectively to prevent confusion and uncertainty on the part of the passenger, so that he may save time and worry. The methods used are the result of careful study, and are of great value in making the use of the transportation facilities pleasant and profitable. Some of them are similar to arrangements in use in this country, while others are entirely novel. A study will indicate that practically every one of them can be adopted here, although some are especially adapted to rapid transit lines. With the present-day demands of the patrons for more convenient transportation service, no company can afford to do otherwise than to adopt similar means of giving the patrons all the information possible as to routes and destinations of its vehicles.

A Property That Helps to Make Circumstance

YEAR after year certain street railways publish annual reports which are most heartening. One of these companies is the Chicago Surface Lines. True, Chicago is a big city—a city of magnificant distances. It is growing fast, but the explanation of the extraordinary record made by that company is not to be found there. The ordinary explanations do not account for the growth in gross receipts from $31,966,049 in 1915 to $62,391,622 in 1928, in total rides from 1,115,312,129 in 1915 to 1,621,215,876 in 1928 under an average fare per ride that has advanced from 2.81 cents in 1915 to 3.80 cents in 1928.

Circumstances of the growth of Chicago and other economic factors do, of course, play some part in the final record. But under similar circumstances other systems elsewhere show an entirely different trend. Furthermore, the rate of fare charged by the Chicago Surface Lines is 7 cents, which is considerably less than the average for the industry. For the explanation of the unusual results achieved by this property in increasing riding and earnings one must look beyond mere circumstances to the attitude of the management itself. Even there one finds little that is spectacular or novel. In the last analysis, this property is producing results by the simple process of putting into practice the principles which have been widely discussed within the industry for several years.

First of all, the Chicago Surface Lines management has confidence in the possibilities of the local transportation business. It believes that patronage can be attracted by improvement of service, and it has more than proved

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this to be a fact. For several years the property has been speeding up its cars to the uttermost and striving toward the objective of "a car in sight" as a policy for increasing off-peak riding. The extent to which this policy has been applied is reflected in a service increase for the fiscal year ended Jan. 31 of 728,354 passenger car and bus-miles. Every year since 1922 there has been a corresponding increase in traffic. For the year just closed the increase in total rides was 35,774,749 and in revenue passengers 10,355,973. All the more remarkable is this record since, as the ELECTRIC RAILWAY JOURNAL has pointed out before, the system is without adequate credit and is operating under temporary franchise extensions due largely to a badly muddled political situation and no real assurance of its future operating rights.

Keeping up to date is a fetish with this management. A new world's record for the operation of every car on five successive days was established by the Chicago Surface Lines for the period Dec. 17 to Dec. 21, inclusive, when 3,639 cars were in service. Such records are merely some of the talismans that tell the tale. Too many street railways, far too many, wait upon circumstance. The Chicago management helps to make circumstance, where circumstance is within the possibility of its molding.

Electrification Receiving New Impetus

QUIETLY but steadily the work of electrifying the steam railroads is going ahead. The article appearing in the JOURNAL this week treating of the expansion of the facilities for power supply to handle the trains of the Pennsylvania Railroad in the Philadelphia-Wilmington district gives an indication of the magnitude of the work involved. While the installation is made necessary by the extension of the electrified zone to Wilmington, already in service, the present demand is much less than will be the demand when the electrification northward to New York is completed and all the trains in the vicinity of Philadelphia are moved with electric power.

Electrification has been facilitated greatly by the use of power purchased from the local utility company, as it is in Philadelphia, and as it is planned to do with other electrification projects of the Pennsylvania. The power loads in railway service are large and fluctuate over a wide range, so that if independent power plants are built they must be of great maximum capacity compared with the average. When purchased power is used it is possible, on the contrary, to adjust schedules so that train movements, particularly of freight and certain long-distance passenger trains, are made at such times that the additional power does not add in full value to the industrial and lighting peak. Thus the railroad can obtain power at a cost usually less than if it were generated in the company's own plants, and the investment of the railroad itself is reduced materially, since power facilities are one of the major items in the cost of electrification.

The installation discussed in the present article is only a small part of the entire project being put through by the Pennsylvania. While this project when completed will be the largest in America, other roads in the United States already have electrification work under way or have announced plans that represent major additions in the progress of electrification. These have been referred to in this paper from time to time. In the aggregate the contracts already made will increase the mileage of electrified track in the United States within the immediate future by about 2,000 miles, or 50 per cent of the existing mileage shown in the review published in the issue of Jan. 12. It also is well known that other railroads have been studying the subject intensively. The success of the present electrifications and the great advantages, particularly in the handling of heavy traffic, of electric operation, are bound to bring about an extension far beyond what has yet taken place or been announced.

Lack of Regulation Is Taxicab Weakness

IF ONE were to judge from surface indications alone it would appear as though the taxicab had elected to follow the path of the discredited jitney. Of course, this is not the case as the taxicab has a legitimate place in the transportation picture along with the street car and the rapid transit train, but certain recent developments in which taxicabs have been involved are anything but reassuring to those who have any interest in the future of this very much troubled industry.

From many sections of the country, from large cities as well as small, come accounts of taxicab wars, of the attempted establishment of single-fare or zone-fare taxicab systems and of the difficulties arising out of various and sundry attempts of taxicab owners and operators to make money by selling goods below cost. Seldom do we hear of a competitive taxicab system bidding for business upon the basis of better service, of safer service or of more courteous drivers. Always it is lower fares or longer hauls for the same fare. And all attempts of this nature lead inevitably to the same result, the failure of the operators, poorer service instead of better, and loss of credit and disillusionment all around.

From its very inception there has been something fundamentally unsound about the taxicab industry as it is generally conducted. The question of a proper rate of fare aside, too much dependence has been placed upon practices which have long since been outlawed or tabooed by the legitimate carrier. Almost alone in the transportation industry the taxicab driver depends for a living upon long hours of service, supplemented by tips. Put the independent taxi driver on an eight or a nine-hour day and deprive him of the hand-outs which he receives from his passengers and he would not stay on the job a month. In the course of time the matter of hours of labor will probably adjust itself, but the tipping evil is apparently here to stay and will continue to be the bait held out to induce the uninitiated outsider to try his luck in the business of public transportation. A small matter, perhaps, but sufficient to throw the entire industry out of balance when it comes up for regulation and economic consideration.

The lack of regulation has, of course, long been apparent, and is probably the basis of most of the afflictions by which the industry is plagued. In certain instances the cut-rate taxicab has been given the tacit support of city authorities on the theory that cheap transportation and plenty of it without regard to the cost can be synonymous with good transportation. Fortunately this idea has been pretty generally discredited and is now rapidly going into the discard. With the growing recognition of the fact that the principal function of the public highway is to serve as an avenue for the movement of traffic has come a realization of the necessity for the proper regulation of all vehicles using these avenues. The taxicab cannot continue to dodge the issue indefinitely, and with proper regulation will come an end of many of the evils with which the industry is beset.

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Erie Canal Now Rochester's Subway

Overhead of the rapid transit line designed for high-speed service. Grooved intermediate wire and single No. 0000 grooved contact wire suspended from 1.02-in. messenger

In the oval is a view of the old Erie Canal in Rochester, where it passed over the Genesee River. This same section, now occupied by the subway and decked to give a new street to the city's downtown section, is shown in the other view

THREE years previous to the opening of the Erie Canal, on Oct. 29, 1822, a consignment of flour left Rochester by canal boat bound for Little Falls, N. Y. This was the first shipment of merchandise offered by the city to the new, and as yet uncompleted, Erie Canal, and marked an important event in the transportation history of Rochester. Just 106 years later a second important date in the transportation history of the city was recorded with another initial shipment over the same canal bed. However, instead of being carried by boat, the shipment was carried by rail and over a 9-mile rapid transit line.

During the first six years after the opening of the Erie Canal, Rochester grew from a village of 2,700 to a town of 11,000. The completion of the subway seems likely to stimulate another growth in the city. It has already increased bordering real estate values as adjacent lands have been purchased and new industries have moved into the section served. It appears that the payment of $12,000,000 by this municipality for the undertaking has already proved a sound investment.

Because the new Barge Canal does not make use of the old bed of the Erie Canal, negotiations were started in 1911 for the abandonment of the lands of the latter within the city. In August, 1921, the Common Council authorized the acquisition of these lands. Plans already had been made by E. A. Fisher, then city engineer, for a railway in the bed, the railway to be used particularly for interurban cars and freight. There were many industries located adjacent to the canal and Mr. Fisher's plan offered an excellent method for freight interchange.

When in January, 1922, the State of New York ceded the canal lands to the city for a consideration of $1,500,000, plans had been made for the laying of tracks from Monroe Avenue in the town of Brighton to Western Widewaters near Driving Park, a distance of 9 miles. The plans called for two tracks to extend the full length of the proposed route and, in addition, one freight track for 7 miles and two other freight tracks for 1½ miles. Connections were proposed with the Rochester & Eastern, the Rochester & Syracuse, the Rochester, Lockport & Buffalo, the New York Central, the Lehigh Valley, the Erie, the Buffalo, Rochester & Pittsburgh, and the Pennsylvania Railroads. These plans all have been accomplished with the exception of the Pennsylvania and the Erie, whose connection cannot be made until an old canal race is abandoned. In addition to these, connections

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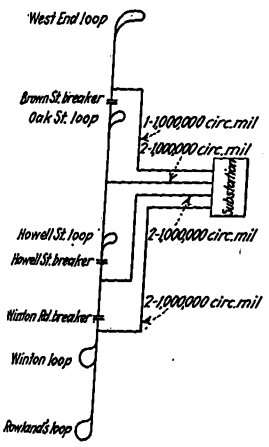
with the New York State Railways' surface lines have been made at Monroe Avenue, Oak Street, Lyell Avenue and Emerson Street.

Prior to the completion of the subway, a citizens' advisory committee suggested that the New York State Railways operate the subway. Accordingly, the Common Council in November, 1927, arranged for the New York State Railways to operate the subway under their "service-at-cost" contract.

At the present time rapid transit cars operate on a ten-minute headway during rush hours and a twenty-minute headway on base schedule. During the first month of operation, December, 1927, 85,248 passengers were carried, and in March, 1928, 116,633 were carried. The number of passengers has increased steadily from that time until the present. In addition to the regular city lines all interurban lines are using these tracks. Shelter stations are located approximately every half-mile along the system. At the City Hall station there is a comfortable waiting room with interurban ticket office, newsstand and rest room.



Feeder diagram of the system, showing how the line was divided into four sections, each fed separately from the substation

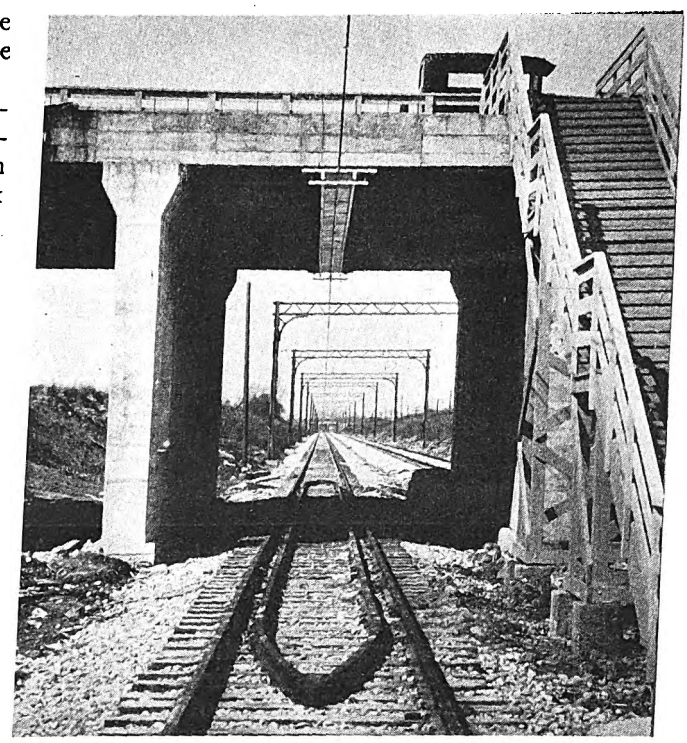
The legal formalities which opened the subway for use by the New York Central, the Lehigh Valley and the Buffalo, Rochester & Pittsburgh Railroads were transacted on Aug. 31, 1928. At the present time the freight interchanged by these railroads is being handled by one electric locomotive.

With the exception of a few locations all structures supporting the overhead are of the bridge type, spaced 300 ft. apart on tangent. Practically all bridges span four tracks, a few, however, spanning five. Some of the bridges are as long as 90 ft. Tubular steel poles are used for special pull-overs and loops while many wood poles are used on commercial spurs. Pole bracket construction is used almost entirely on these spurs.

The trusses as well as the columns that make up the bridge structures were erected by a self-propelled locomotive crane with a 60-ft. boom. For column setting the crane was located on the track nearest to the cement foundations. For swinging the trusses into position from the flat cars, the crane was located on one of the center tracks. Wherever possible the steel was placed on top of the retaining walls. This decreased the amount of steel needed and simplified the structures. This also gave a decided advantage on curve structures where large end thrusts were encountered. Incidentally, on one of the curves near the aqueduct an end thrust of 20,000 lb. has been attained during winter weather.

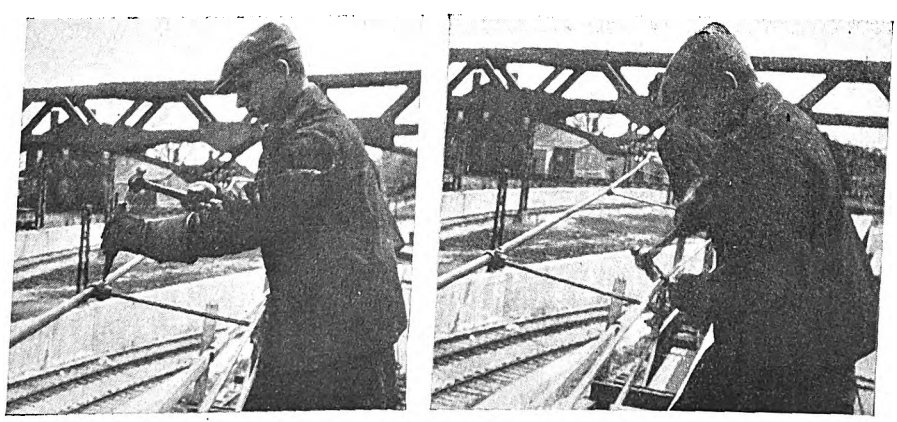
Overhead Designed for High Speed

The overhead system, designed for rapid transit service, consists of a 1.02-in. diameter copperweld-copper messenger wire from which is suspended a No. 0000 grooved intermediate wire. A single No. 0000 grooved contact wire is suspended, in turn, from the intermediate wire. The contact and intermediate wires are of the same material: phono-electric on one section and cadmium-bronze on another. Connections between the main messenger and intermediate wire are by means of bronze rigid hangers, spaced approximately 20 ft. apart. The contact wire is suspended 6 in. below the intermediate wire with flexible hangers of the loop type. To prevent arcing of loop hangers during the period when a car is drawing current from the contact wire, frequent copper bonds have been inserted between the contact and intermediate wires.



Catenary construction was used on all open-track main line of the Rochester rapid transit line

The main messenger has a breaking strength of 49,000 lb. and an area of 587,000 circ.mil. The combined intermediate and contact wires have an area of 254,000 circ.mil, making a total of 841,000 circ.mil for the overhead system and a total of 3,364,000 circ.mil for the four-track system downtown. This section is fed



At left—The messenger end of the curve hanger is clamped securely to the messenger wire. At right—The intermediate wire is held in the curve hanger by peaning-over a lip on the top of the clamp

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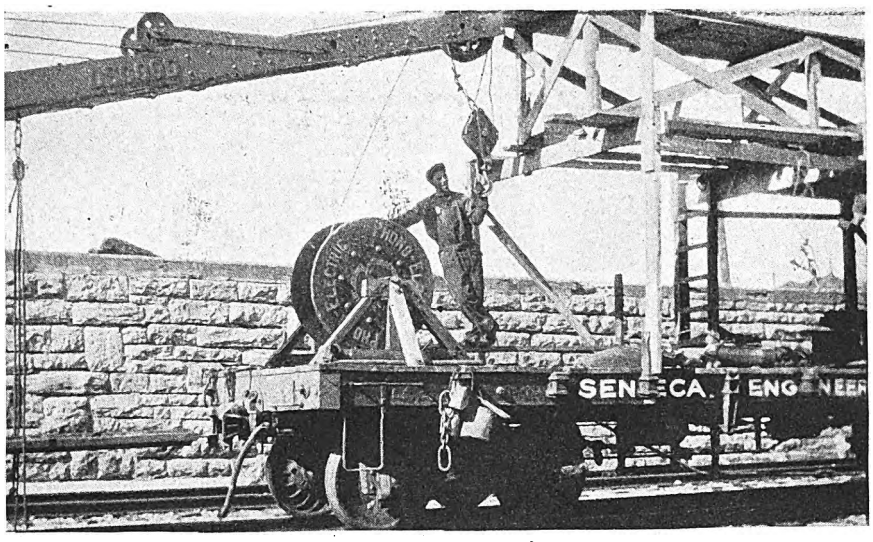
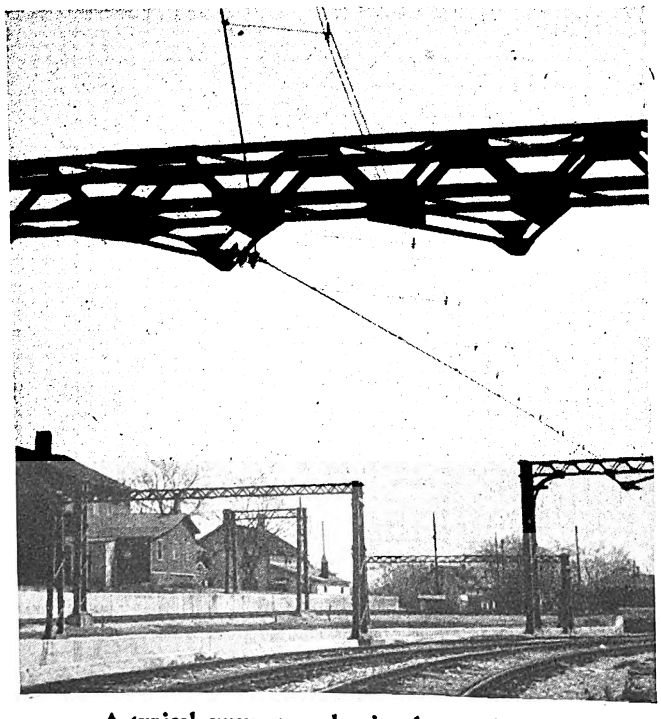


A locomotive crane made cable stringing comparatively easy

with two 1,000,000-circ.mil copper feeders. All messenger wires, with the exception of those for the commercial sidings and loops which are directly suspended, and those in the covered section of subway, are insulated and suspended with two suspension insulators. They are of the ball-and-socket type with a 7½-in. shell diameter and 5-in. section length. A closed-seat, forged-steel, suspension clamp is used on all tangent and curve work. A combination mechanical grip and cast-spelter button clamp is used for dead-ends and splicers. A split chuck surrounds the cable and is backed up by a spelter button, cast on the end of the cable. The split chuck is tapered on the outside and fits into a sleeve which is cone-shaped internally. Pulling the cable forces the spelter button to push the split chuck deep into the cone-shaped sleeve, thus causing the split chuck to grip the cable. The main messenger dead-end insulation consists of two parallel strings of 4¾x6¾-in. porcelain strain insulators, two units per string. Each string has an ultimate breaking strength of 30,000 lb., thus providing a dead-end assembly capable of withstanding any strain imposed on the main messenger. The porcelain insulators are assembled with copper U-bolts, the copper bolt having about the same characteristics as the strand at the mechanical loads encountered.

Dead-ends for the intermediate and contact wires are made to the same steel yoke. Insulation of similar design, but smaller in size and strength, is employed. The No. 0000 grooved wire is held with a clamp containing a chuck similar to the Cleveland splicer.



A typical curve span showing hanger location

Construction for Curves

On curves a 10½-in. high-strength insulator was used for supporting the messenger wire. Many of the curves of greater degree required two strings of these insulators with a total breaking strength of 30,000 lb. All curves with the exception of approaches to stations, which had only a slight curvature, were constructed with incline catenary. A solid or rigid bronze clamp allowing 6 in. of separation between the intermediate and contact wires was designed for the curve hanger. The lower or contact wire was clamped while the intermediate wire was held by peaning-over a lip on the top of the clamp. The hanger rod was inserted through the center of the clamp and held with nuts on both sides. The messenger end of the hanger was clamped to the messenger wire. Thus good feeder taps from the messenger wire to the contact wire were made.

On the higher degree curves, particularly the 12 to 18-deg. sections, the curve hanger rods are almost horizontal. With the usual construction, employing an intermediate wire 1½ to 2 in. above the contact wire, pantograph operation would be impossible. In the Rochester construction there is a clearance of 3 in. from the hanger rod to the pantograph shoe at the contact wire. This clearance together with the slight upward angularity of the hanger rod provides sufficient clearance for future pantograph operation.

The overhead wires were cross-bonded at approximately 1,000-ft. intervals. Lightning arresters also were cut in at these points.

Overhead in the Subway Proper

All overhead in the subway proper was suspended from a wood trough. Standard composition mine hangers and a mechanical feeder clamp suspended at 20-ft. intervals supported the intermediate wire, the main messenger wire being dead-ended at the entrance of the subway and carried through as feeder only. The contact wire was connected to the intermediate wire with duplex clips at 10-ft. intervals. Steadies and pullovers were made by replacing the short bolt in the duplex clip with an eyebolt and eyenut, a guy wire being attached to the eyes. Incidentally, all guys within the railway, as well as those outside, were double-insulated with porcelain strain insulators.

At the present time the use of wheels and shoes requires trolley frogs at all turnouts and crossovers. Clearance, however, is provided for pantograph operation on the main line, but not on the loops and a few of the sidings.

Non-ferrous materials were used in the overhead system where feasible. The parts included cables, catenary hangers, intermediate hangers, pullover fittings, splicers,

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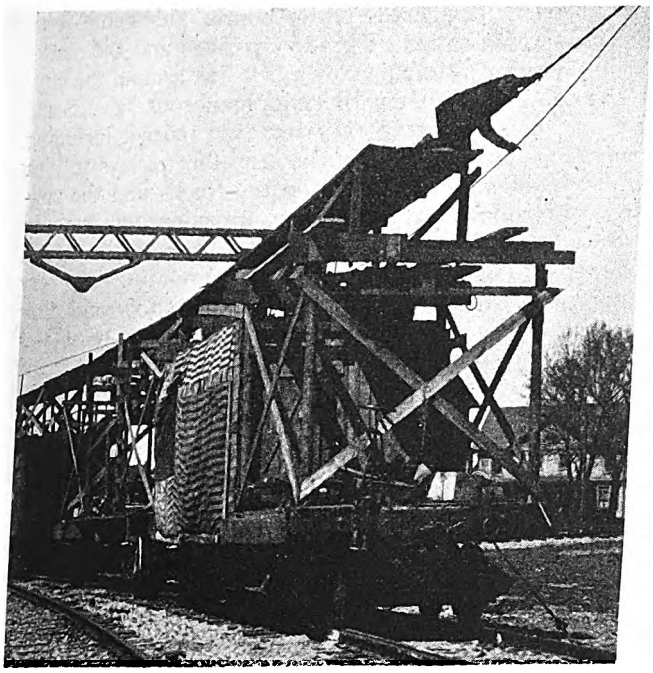


Staging on box and flat cars aided the linemen in connecting catenary hangers

dead-ends, and other hardware. Such items as suspension clamps, insulator caps and pins were of steel and malleable iron. The non-ferrous parts were constructed from selected grades of bronze.

Track and Bonding

The roadway was built with 90-lb. A.S.C.E. rail, laid on tie plates and 7-in. x 9-ft. ties, with washed gravel and cracked stone ballast. The roadbed was located in a cut throughout its length which required an extensive drainage system. It was estimated that future surfacing and ballasting will raise the roadbed outside of the subway proper about 6 in. This was anticipated during the overhead design and, consequently, all suspension insulators on tangent were suspended with a steel strap which would permit of 6 in. of shortening, thus maintaining the original contact-wire height.

The track was bonded with gas-weld, steel terminal bonds of No. 0000 capacity. This work was all handled by contract. Frogs, crossings and other special work were bonded with long bonds. Future bonding can be handled with arc-weld bonds, the power being drawn from the 600-volt d.c. overhead system.

Educating the Public Concerning Traffic

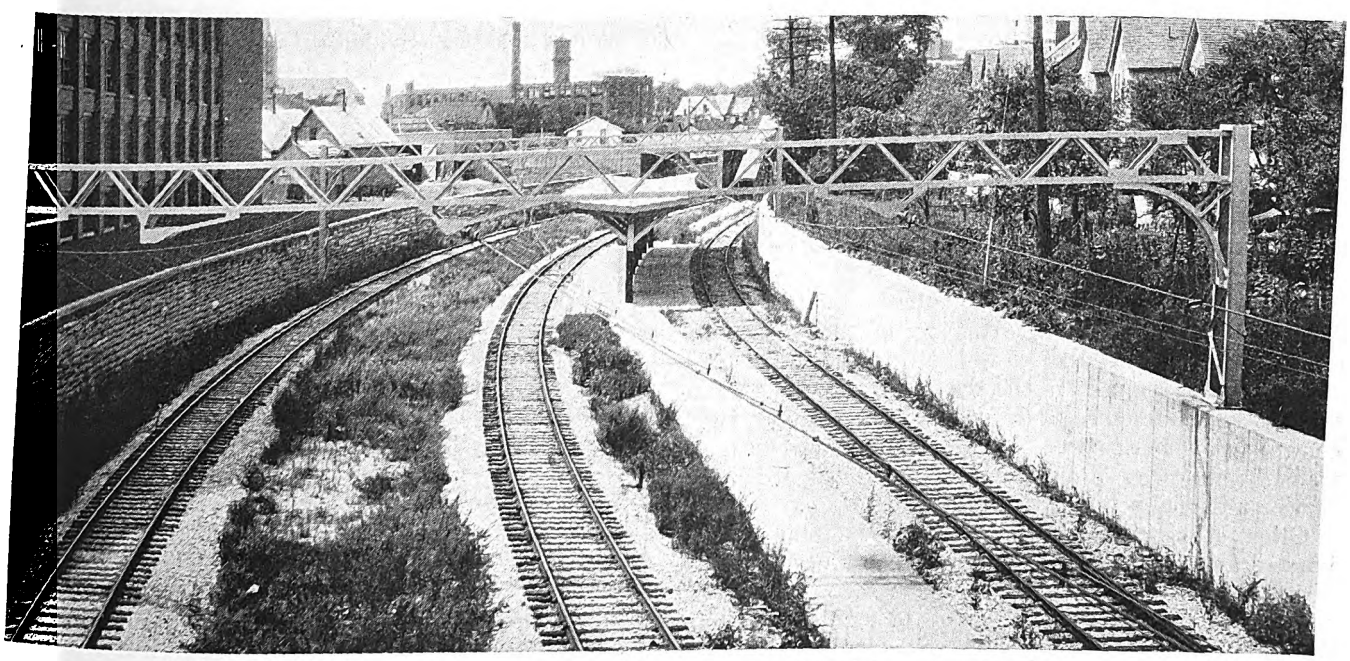
P.R.T. uses many lines of approach in arousing interest in efforts to reduce street congestion

MOTION pictures, radio talks, newspaper stories and advertisements, signs and folders in cars, cabs and buses and a prize contest for letters suggesting cures for traffic ills all served to arouse public interest in the traffic problem during the "80 per cent" campaign recently carried on by the Philadelphia Rapid Transit Company. Besides centering attention on the congested condition of Philadelphia's streets, the campaign, by emphasizing the urgent necessity for traffic relief, served also to enlist the co-operation and sympathy of the people of Philadelphia in a traffic survey now being undertaken by Mitten Management.

This annual campaign takes its name from the fact that 80 per cent of Philadelphia's street users make use of public transportation mediums. "Give the 80 Per Cent a Square Deal" has been the slogan of these campaigns, which have endeavored to point out that the 20 per cent who do not use the street cars and buses utilize a great deal more than 20 per cent of the available street space, especially when parking is permitted in the downtown district.

The use of the motion picture, the radio and the letter contest constituted the principal points of departure from last year's campaign.

"The Peace Time Big Parade" was the name given the motion picture which portrays the similarity between the movement of troops in wartime and the daily trans-



The presence of retaining walls materially decreased the cost of steel for supporting the spans

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portation of the "Peace Time Army" in a modern city. Official government war pictures were used and were interspersed by pictures taken in the streets of Philadelphia and at different locations of the transit organization. One of the best shots was taken in the early morning and shows a seemingly endless procession of cars streaming forth from the barn to make their first trip of the day.

"The Peace Time Big Parade" was shown in more than 30 theaters in Philadelphia and surrounding territory to an estimated audience of 115,000. In addition, it has been shown in connection with nine talks on traffic ills before various organizations. A 16-mm. film was made from the standard film, so that the picture might be shown with a small projector if desired.

Mitten Management's half hour program over station WIP each Friday evening was devoted wholly or partly to the 80 per cent campaign on eight occasions. It was used not only for traffic talks but also to announce the traffic survey and the prize letter contest. The winners of this contest were also announced over the radio, the program being extended to an hour for this purpose, and the first five winners gave short talks at this time.

This contest offered prizes aggregating $500 for letters of 1,000 words or less giving practical suggestions for the alleviation of traffic congestion. Proposals of huge engineering projects such as double-deck streets, overhead sidewalks or underground trolley service in the downtown district, measures involving great expense and requiring many years for completion, were discouraged, the car-riders being asked instead to devise measures which would secure more immediate relief.

Public interest in traffic betterment was well demonstrated by the results of this offer. For although the prizes were not large (first prize $125, second prize $100, third price $75, fourth prize $50, fifth prize 25 and 25 prizes of $5), nevertheless 1,936 letters were received between Nov. 19, when the contest was announced, and Dec. 15, the closing date. These letters were all read and acknowledged and the suggestions tabulated. All of those which showed promise were copied and sent to a committee of traffic engineers who graded them and awarded the prizes.

The top prize winners turned out to be men quite conversant with traffic problems. First prize was won by T. Elmer Transeau, an instructor in highway engineering at Drexel Institute, Philadelphia. William V. Brandt, the second prize winner, is with the Electric Storage Battery Company. The third man, H. C. Crowell, is assistant to the chief engineer of the Pennsylvania Railroad, while the fourth, T. H. Henkels, is an engineer with the Commercial Traffic Association.

It is interesting to note that the point most generally discussed was the parking problem, 521 contestants having introduced this into their letters. Of these, 133 proposed total abolition of parking in the downtown district. Another much discussed subject was the restriction of delivery trucks in the downtown district. Contestants to the number of 236 agreed that a more rigid control of deliveries would speed up the movement of traffic, while many of these saw in consolidated delivery service a partial solution of the problem.

Other suggestions made included abolition of the horse-drawn vehicle in the central business district, pedestrian traffic control, legislation to keep slow-moving vehicles off the car tracks, boulevard stops, skip stops, the segregation of trolley and vehicular traffic in the downtown streets, city-built garages in the central business district, staggered office hours, side-chute coal trucks, the elimination of grade crossings and the marking in a prominent manner of a belt line around the city.

The contest was not without its humorous side. Some of the suggestions were very fantastic indeed, including such things as placing derricks atop the trolleys to pick up automobiles that go dead on the tracks and the running of trolleys in the wrong direction on one-way streets, so that autos would perforce keep off the tracks.

Most of the letters, however, were fundamentally sound, and while no startling new and at the same time practicable ideas were proposed, still the contest was considered highly successful in view of the good will and public interest which was developed. For, if nearly two thousand people took the trouble to write letters, it must necessarily be assumed that a great many times that number gave some thought to the subject.

The letter contest, as well as the whole 80 per cent idea, was given wide publicity through newspapers and through folders and signs on the cars and buses. The "80 per cent" idea has by this time become so familiar to Philadelphians that it is no longer necessary to define the phrase. Consequently the ads carried such messages as "Help to keep traffic moving for the 80 per cent" and "Broken down vehicles caused 151 delays to the 80 per cent in October," without attempting to explain the meaning of "the 80 per cent."

Another bit of favorable publicity during the campaign came with the announcement of the new corps of co-ordinated supervisors for the downtown district, men who have charge of trolley cars, buses and taxicabs.

The whole campaign has served to bring the public face to face with the problem which confronts Philadelphia. Progress reports of the Mitten Management traffic survey are assured of an eager audience, and there is reason to expect that the whole survey will be given thorough consideration by the people of Philadelphia.

Yankee Thrift Emphasized in Advertisement

"DOWN in the State of Maine" old-fashioned Yankee thrift is still a prevalent characteristic of the population, and the Biddeford and Saco Railroad has not failed to recognize this in its publicity, as can be seen from the accompanying example of its advertising.

A Shiny Penny Seems More Valuable to A Child Than A Worn Half-Dollar (Try it and see)

To some adults of middle age the bright attractiveness of a new, "inexpensive" (?) auto seems of more immediate value than a well filled bank book.

But as old age draws on, and the burdens of life weary one more quickly, the passing extravagant pleasures of former years are overshadowed by the needs of the day. ..... Then he who knew the real value of money is prepared for ease and comfort.

Among the average rank and file of us, that man is the street-car rider.

Biddeford and Saco Railroad Co.

"A FRIEND TO THE THRIFTY"

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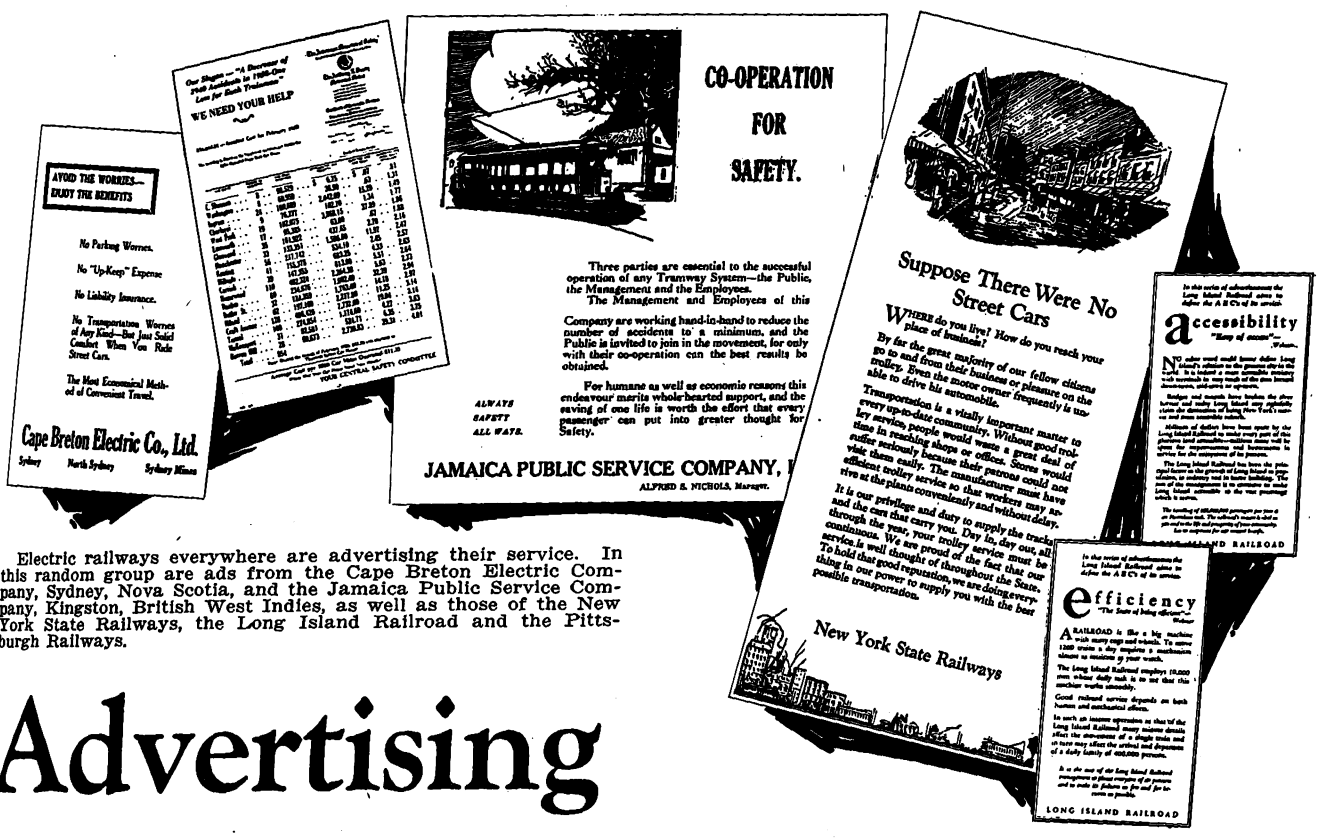

Electric railways everywhere are advertising their service. In this random group are ads from the Cape Breton Electric Company, Sydney, Nova Scotia, and the Jamaica Public Service Company, Kingston, British West Indies, as well as those of the New York State Railways, the Long Island Railroad and the Pittsburgh Railways.

Advertising

An Active Force in Selling Transportation

Red heads, clowns, historical spots, points of interest, company facts and letters of the alphabet attract the public's attention to posters and other mediums bearing messages from the electric railways

THAT the electric railway industry is selling street car and bus transportation by means of advertising, on a scale never before attempted, is forcibly demonstrated by the flood of copy that continues to pour into the JOURNAL's office. Display "ads," posters, window strips and pamphlets covering every phase of the service and employing all psychological mediums to curry public approval are received in every mail from the nation's four corners, from Canada and from the British possessions in the West Indies.

Starting on the west coast, the Portland Electric Power Company, Portland, Ore., recently has completed an extensive newspaper campaign, linked with posters displayed in all of its rolling stock, which accomplished the dual purpose of celebrating the property's twentieth anniversary and selling service.

The campaign opened with a full page spread, entitled "That the People of Portland May Be Served." This appeared in the city's four principal dailies. It was followed by a series of 10x14¾-in. and 8x12½-in. display ads attractively illustrated, these appearing alternately in the papers, so that Portlanders read the messages four times every seven days. With each page of copy was carried the notation that it was No. 1, 2 or 3, etc, "of a series dealing with the daily mass transportation of a great city."

Copy for the initial broadside contained eleven paragraphs, stressing the cardinal principles of service, with special emphasis laid upon employee efficiency. Above the main caption and extending across the ad was a list of the 31 trolley lines. Midway on the page and to the left were seven italicized paragraphs revealing such pertinent items as the fact that the company carried 250,000 passengers daily, operated 568 street cars and 33 buses, maintained more than 200 miles of trackage, and operated 41,000 car-miles a day.

Of special significance is "ad" No. 3 in the series, which deals with the safety record of the company—one of the first to foster the safety movement. The copy is striking in arrangement and text. In the upper right-hand corner, framed by a scroll, is given the earth's total population by continents. Beneath the tabulation one reads:

> The total world's population is 1,885,531,210, according to the most recent figures. The total number of passengers carried by the P.E.P. city and interurban lines from January 1, 1907, to the present time is 1,858,718,622, or nearly the world's population . . . without the loss of a single passenger life!

This theme is reiterated in large type, the text ending with: "The safest place in Portland is on a trolley." It is again very effectively employed in a later piece of copy captioned "Mother knows they're safe." In addi-

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This striking ad, relating in terms of the world's population the company's safety record, was one of a series prepared by the Portland Electric Power Company

tion to its use in the press, the first safety ad was made into a poster done in several colors, red predominating.

The same punch and attention-attracting phrases characterize the other ads in this series. They cover the much-discussed questions of private vs. public conveyance, traffic congestion attendant upon the use of private cars in business, parking worries, the responsibility of public utilities in storm and stress, and the economy effected by the use of bus service. They bristle with such phrases and captions as these: "There are no 'parking tags' in street cars!" "40 cents for 5 miles or 8 cents a mile," "Are you sure you use your car in business," "Trolley riders never have to say, 'Good morning, Judge!'" "Pay us 8 cents and we take care of your parking," "The street car man will tell you," "Bent fenders and scratched bodies never worry the trolley rider!" and "A cigarette isn't the only thing that makes you walk a mile." In every case the arrangement of text and illustration has been given thoughtful study, ample white space being left to set off the message.

From the Pacific Electric Railway, Los Angeles, Cal., comes an outstanding sample of publicity in the form of a night picture taken from Inspiration Point, Mount Lowe. This is a panorama of 41 miles of territory showing the lights of Los Angeles and 26 adjacent cities. In striking contrast to the light-studded night are five scenes on Mount Lowe which the text of the poster states is southern California's world-renowned resort, located on Pacific Electric lines.

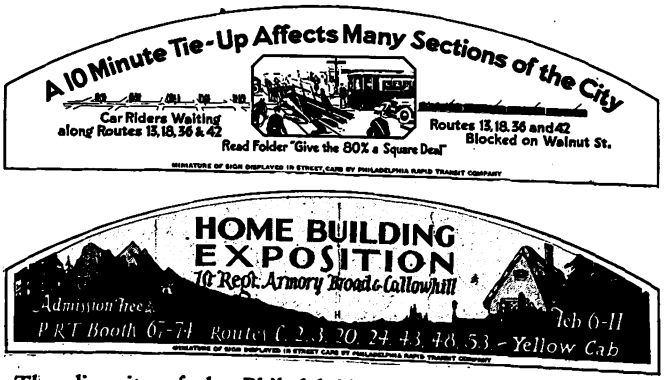
Jumping from the coast to Kansas City, Mo., one encounters another lively newspaper campaign, conducted by the Kansas City Public Service Company, which had a dramatic climax with the publication of an advertisement paid for by employees of the company, as a streamer line at the bottom of the ad states, with money "subscribed in cash by them so that the public and company may know their true sentiments." This piece of copy gave a detailed account of the Brotherhood's agreement with the company, a list of benefits which it enjoys, embracing health, accident and life insurance, free medical and legal advice, hospital and nursing service, and also a creed expressing the employee's duty to the public.

The company's campaign consisted of eighteen display advertisements featuring the "mutuality of interest between the community and its transportation system." Copy was prepared by the commercial department, and the art and layout work by the advertising department and art staff of the Kansas City *Star*. The ads were run in the *Star* and Kansas City *Journal* four times a week.

Display type and illustrations dominated the copy for this campaign, which included selling the property's rehabilitation projects. A skillful combination of type, halftones and sketches was used in this series. One striking ad in this group tells the story of "$705,354 for improvement" by means of thumbnail sketches of and statistics on the number of tons of rails, ties, sacks of cement, cubic yards of sand and crushed stone required to construct new track in localities detailed opposite the material data. A freight train illustration repeats this story in a most effective manner, as does a contrasting view of an old and a new viaduct.

Features of safety and modernization of rolling stock comprised the copy for two of the most striking ads of this series. Costs of private and street car transportation were presented by means of a per cent tabulation on the automobile upkeep per mile as compared with monthly average of 26 round trips via the trolley. The saving effected is shown by a series of entries in a savings account book. As a pedestal for these graphic illustrations there is a forceful testimonial letter on the subject of parking worries vs. comforts of the street car. This letter, from a citizen, was addressed to the president of the company. In striking contrast was a humorous piece of copy revealing, by two sketches, that since the first automobile made its appearance trolley cars have always been considered the safest place in the street.

Invading Canada, one finds that the charming historic points of old Montreal have been presented pictorially to car patrons of the Montreal Tramways in a series of 28 newspaper spreads, under the general caption of "Your



The diversity of the Philadelphia Rapid Transit Company's advertising subjects is illustrated by these two car cards

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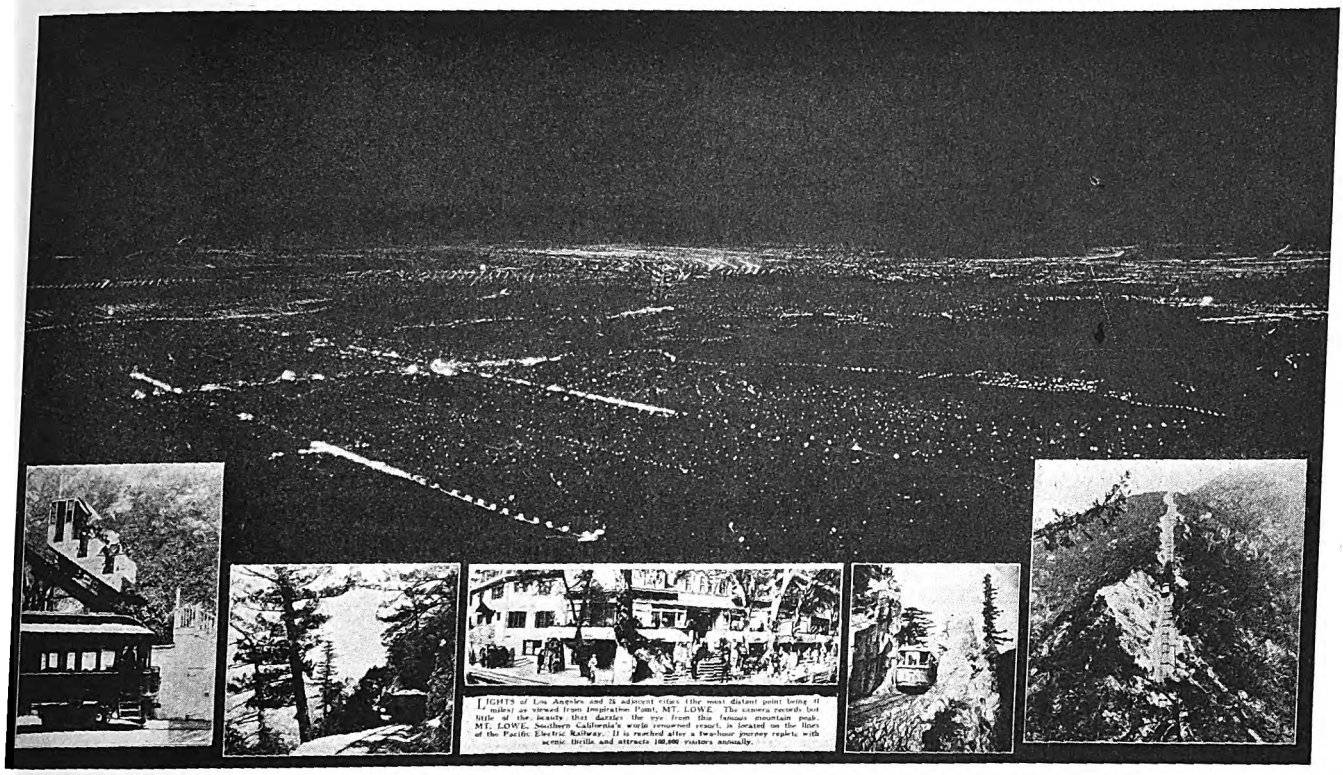

This poster from the Pacific Electric Railway, showing a night picture of Pasadena, Los Angeles and other neighboring cities, taken from Mount Lowe, and five views of the resort itself, is an outstanding example of publicity

Montreal." So valuable were these ads, considered from both historical and artistic standpoints (the illustration in many cases approaching the technique of old wood cuts), that they have been reproduced in a handsome booklet, a copy of which was sent the JOURNAL by Lieut.-Col. J. E. Hutcheson, vice-president and general manager of the Montreal properties. In a letter accompanying the booklet Colonel Hutcheson states, incidentally, that in the first three months of the year the Montreal Tramways carried 4,500,000 more revenue passengers than during the same period of the previous year. Although he does not attribute this increase to the publicity program, the booklet makes one wonder if in some measure it was not responsible for this interesting record.

An analysis of the copy in this series is difficult and is best accomplished with the eye, both from the standpoint of illustrations and the valuable text which accompanies them. Some of the points covered are Notre Dame, Parish Church, Château de Ramezay, Jacques Cartier Square, showing the old market and Nelson Monument, the Cartier Monument, St. Joseph's Oratory, Fort de la Montagne, Notre Dame de Bonsecour, Montreal Harbor,

Display type and illustrations dominated the copy of the Kansas City Public Service Company in its campaign consisting of 18 display advertisements in newspapers. The series featured "the mutuality of interest between the community and its transportation system"

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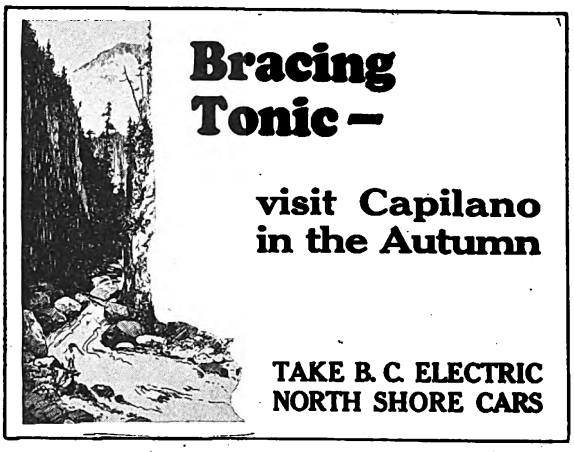
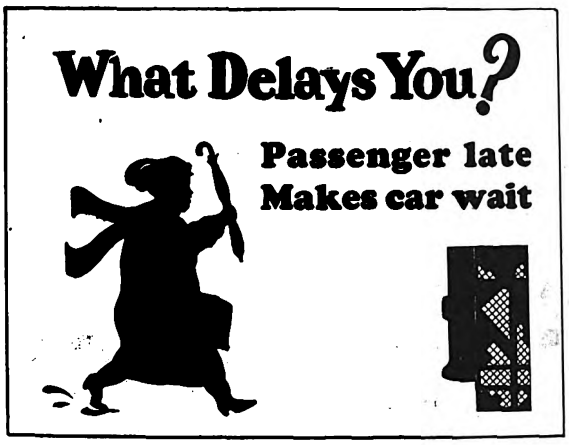
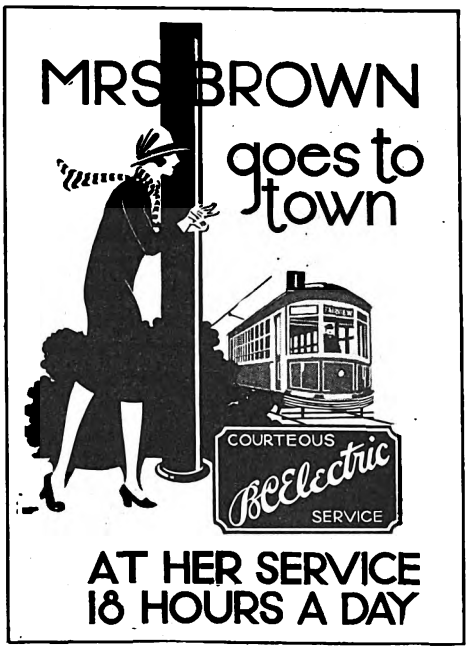
St. Helen's Island, Notre Dame de Lourdes, the Art Association, Historic Place Royale, the Hotel Dieu, Montreal's first hospital, the new courthouse, the Royal Victoria Hospital and the Université de Montreal. The period of a year was used to cover these and other points of interest, and, according to Colonel Hutcheson's foreword, the object of the campaign "was to awaken the interest of Montreal's citizens and also to furnish authentic and accurate information that would be appreciated by visitors to the city."

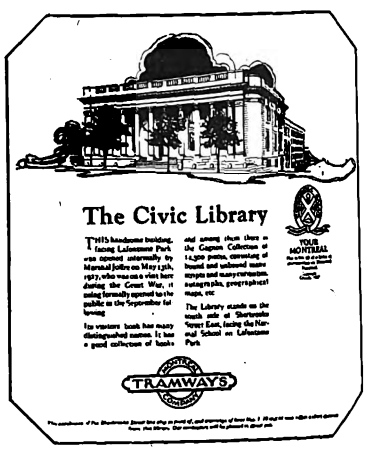
To the east of Montreal, the Cape Breton Electric Company, Ltd., Sydney, Nova Scotia, has been active in publicity matters, using the newspaper medium. While these advertisements are small, they cover all the up-to-the-minute selling points of modern transportation.

Another company beyond our northern border which is telling the public of the value of car and bus transportation is the British Columbia Electric Railway at Vancouver, B. C. Its publicity activities have been confined to 19x27-in. poster sheets, and 9½x12½-in. poster cards









Two Canadian companies that have advertised extensively are the British Columbia Electric Railway, Vancouver, B. C., and the Montreal Tramways. The two illustrations at the top, the two at the bottom and the one in the center are of posters prepared by the B. C. Electric. The other two are typical advertisements from a series of 28 featuring points of historic and general interest in and about Montreal

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and sheets. The large posters are done in several attractive colors, while the small sheets are a combination of solid color for a background with the message and illustrations in a contrasting color. Such a slogan as this adorns the posters: "What Delays You—Too Many Stops to a Mile?" This is illustrated with sketches of an open drawbridge, automobiles cutting in and running in front of cars, and late passengers running for cars. Besides stressing the causes for service interruption, the small posters have been effectively used to lure the public to the countryside around Vancouver, by means of coach, interurban and observation cars.

Lately, the New York State Railways, Rochester, N. Y., used the newspapers as a forum to discuss with the public, among other subjects, its reasons for asking for an increase in fares. Under the caption "We want you to know all the facts," six paragraphs in display type were used to present the argument. These were arranged in a space 6x12½ in. so as to leave ample white space and to attract instant attention. One paragraph announced that the company had prepared a series of statements "which will explain frankly and in detail the facts on which our appeal is based." The closing paragraph invited patrons to study the question in order that their intelligent cooperation could make for better service. Other ads detailed the necessity for adequate transportation service, under such captions as: "Where do you work?" "A Useful Citizen," "Suppose There Were No Street Cars" and "Just After the Whistle Blows."

Transportation problems in and around Buffalo were made known to the public in a series of posters prepared by the International Railway. "Thank you!" was the heading for one of these posters, which expressed appreciation to car riders on one line for their forbearance during the process of construction work. Another poster, issued in co-operation with the Buffalo Council of Churches, reads: "The test of a city's greatness is the kind of men it brings forth." On the back of this attention is called to the constructive civic advertising which was being run in the *Saturday Evening Post*.

Employing 25 letters of the alphabet to discuss its service from A to Z, the Long Island Railroad recently put on an extensive campaign in 107 Long Island newspapers, the advertisement appearing once a week in each paper. C. C. Pennington, assistant general passenger agent and advertising manager, was responsible for the unique copy. Commenting upon the effectiveness of this service, George Flotow, publicity agent, writes: "I think this type of advertising has had the important effect of giving the traveling public and general public on Long Island a better understanding of our problem. Several local papers have published favorable editorials on this series."

In make-up the ads left little to be desired. By the use of a large boldface but lower case initial with smaller letters, also bold face, for the remaining letters of the key word of each ad, the main theme commanded the reader's instant attention. In keeping with the Websterian flavor of the series, under nearly all of the headings a definition from Webster was given. For instance, the first ad had as its theme "accessibility." Directly under this word was: "Easy of access—Webster." Key words in the campaign included "Betterments," "Confidence," "Efficiency," "Fairness," "History," "Knowledge," "Optimism," "Wages" and "Vision." In each case the ads occupied a space two columns by 7 in.

In line with its confrères in the States, Jamaica Public Service Company, Ltd., Kingston, B.W.I., has used the newspapers in appealing to investors in utilities stock, as

These posters, conspicuous for their color combinations and "snappy" subjects, are from the Pittsburgh Railways, which advertises extensively

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well as for the purpose of selling car service and electric appliances. It also is using 16x24-in. stiff cardboard posters in its trams, dealing with safety and other subjects. Such slogans as "Ride the Trams, There Is an Organization Behind Our Service," "Careless People Take Short Cuts in Life," and "These Cars Carry 25,000 Passengers Daily," comprised the text. The lettering was in large capitals alternated in red and black ink. Christmas copy was especially effective from the standpoint of text and illustrations.

Turning to western Pennsylvania one discovers the Pittsburgh Railways pursuing its usual extensive cooperative publicity campaign in conjunction with civic organizations. Claiming first interest are the 18¾x26¾-in. posters, conspicuous for their color combinations and snappy items. For example, upon a lemon-yellow background is a charming red-headed flapper holding up a weekly pass. The caption reads: "Girls, 'tis leap year. Pick a winner." The lettering is in black and green, shaded with red, and the facsimile of the pass is made rather striking by using black letters on a white background. Less flamboyant, yet none the less attractive, was a poster used in connection with the recent International Art Exhibition at the Carnegie Museum. Here a graceful action picture of a Spanish dancer was employed to tell the story. The color scheme of rich browns and reds of the dancer's costume was contrasted effectively with an indigo blue background. Another striking poster of this class invited inspection of "Utility Hall," a model home of the Equitable Gas Company and Duquesne Light Company. The illustration and text were in white on a field of blue. Enticing color pictures of the same size have as their theme the beauties of spring and autumn in the country. In conjunction with the Western Pennsylvania Safety Council and Pittsburgh Chamber of Commerce a large poster in colors was issued in the interest of clean-up week.

Employee no-accident records also have been skillfully made use of in poster work. A large poster featuring the photographs of three motormen and giving the names and carhouses of twenty others, bore the caption: "These motormen had no accidents during the past year." Beneath the operators' names were statistics showing the decreases in accidents and accident costs over corresponding one-month periods. Following this was a detailed record of carhouses, enumerating the number of accidents, car-miles operated, settlements and verdicts, cost per 1,000 car-miles and accidents per 10,000 miles operated, the latter being the basis of comparison. The statement was signed "Your Central Safety Committee."

Civic pride combined with civic achievements have largely influenced the text matter which the Pittsburgh company has placed on its 7x15½-in. end rack cards. In one year 135 different examples of text were used. Each card was kept in approximately 1,400 cars and trailers, in daily service, for a period of seven to fifteen days and was viewed by almost 400,000,000 patrons during the year. A handy booklet giving the text of 311 end rack messages has been distributed to the industry.

As examples of promoting community and civic interest the following messages are typical: "Pittsburgh Has the Largest Tube and Pipe Mill and the Largest Structural Steel Plant in the World" and "Greater Pittsburgh's Power Plants Produce More Electric Power

Large brightly-colored posters are used by the Cincinnati Street Railway to sell its service. These three, with varied subjects, are typical

than the American Niagara Falls." Of diversified interest are such slogans as "To Keep Out of the Crowds, Shop From 10 Until 4," "Ah, Madame, Shopping via Weekly Pass is So Pleasant" and "Pedestrians Should Be Seen and Not Hurt." Another good example is this clever jingle:

I always take a street car
Whene'er I go to market;
'Cause when I take a trolley
I never have to park it.

In addition to these mediums, effective publicity is secured through *The Transit Guest,* a weekly publication. The company also issues *Trolley Travelog,* a comprehensive guide to the points of interest in and around the city.

The Philadelphia Rapid Transit Company continues its publicity and advertising campaign with a diversity of subjects and illustrations. The cards displayed not only sell car rides but feature current civic events. For example, for the Penn-Notre Dame basket ball game last season this text was used: "The 'Four Horsemen' Against Traffic Congestion—Trolley, Bus, 'L' and Yellow Cab to Penn-Notre Dame Game." Many of these cards are cleverly illustrated. In design and spirit they reflect the city's historical atmosphere as well as its modern-day bustle and progressiveness.

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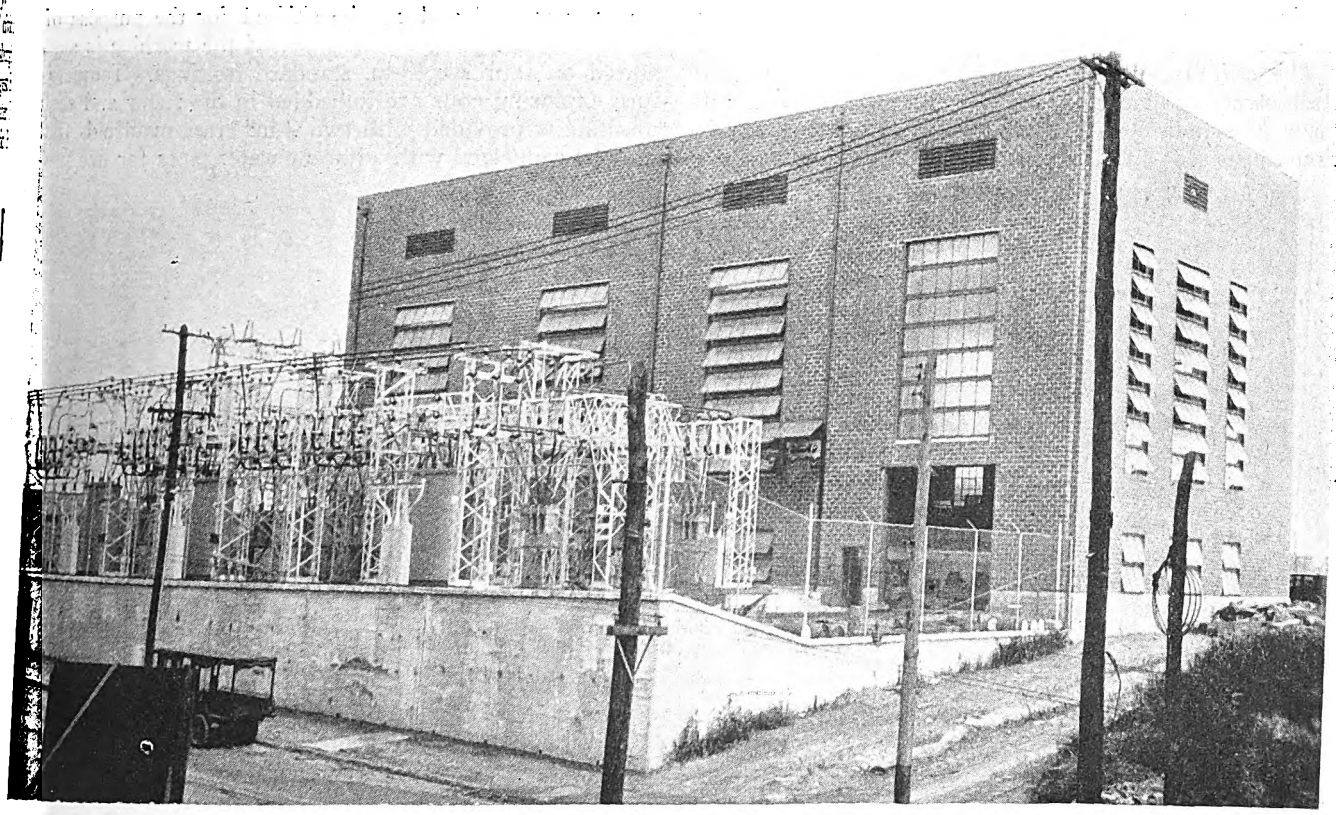
Electrification Program at Philadelphia Gains Momentum

Extension of suburban railway electrification, including the Philadelphia to Wilmington division, requires additional power supply. New frequency changing station of 200,000 kw. ultimate capacity installed to carry additional load of electrified sections



The 60-cycle outdoor substation and the station building which will ultimately accommodate six frequency changing sets

EXPANSION and improvement of transportation facilities in Philadelphia and the surrounding territory have been necessitated by the continuous industrial growth of the district. The entire territory is served by three large steam railroad companies, two of which offer extensive service in suburban traffic. The need for improved schedules, faster service, increased comfort for the passengers and those living in the vicinity of the railroad, and lower operating costs, made electrification of the railroad inevitable. The Pennsylvania Railroad took the initial step and electrified its tracks of heaviest service, the Paoli and Chestnut Hill divisions. The other two railroads are making preparations for electrification in this district within the next few years.

The Paoli and Chestnut Hill divisions of the Pennsylvania Railroad are fed from the Schuylkill steam plant, a part of a large interconnected power system. Electric power generated at 25 cycles, 13,200 volts is delivered through submarine cables to the Arsenal Bridge substation erected by the railroad across the Schuylkill River. At this point it is metered and passed through transformers which step up the voltage to 44,000 for single-phase transmission along the electrified tracks.

The present extension of the electrification, including the Maryland division between Philadelphia and Wilmington, demanded additional power and a point nearest the center of the new load was selected at Lamokin, in Chester, Pa., as the site for the new substation adjacent to the Pennsylvania Railroad tracks. Power at 60 cycles, three phase is received from the network of the Philadelphia Electric Company through underground cables. It is converted to 25 cycles, three phase through frequency changing sets and delivered from the terminals of the 25-cycle generators through underground cables to a three-phase outdoor ring bus. Single-phase transformers stepping the voltage from 13,200 to 132,000 distribute power to feeding stepdown substations by means of single-phase high-tension transmission circuits running along the railroad right-of-way. Each stepdown substation will transform to 11,000 volts for trolley-rail circuit.

Lamokin station is of the outdoor type with the exception of the frequency changing sets and operating room, which are housed in the station building. There is a railroad standard gage track and a broad gage transformer track on the outside of it passing through the yard and the station building on the lower floor to permit

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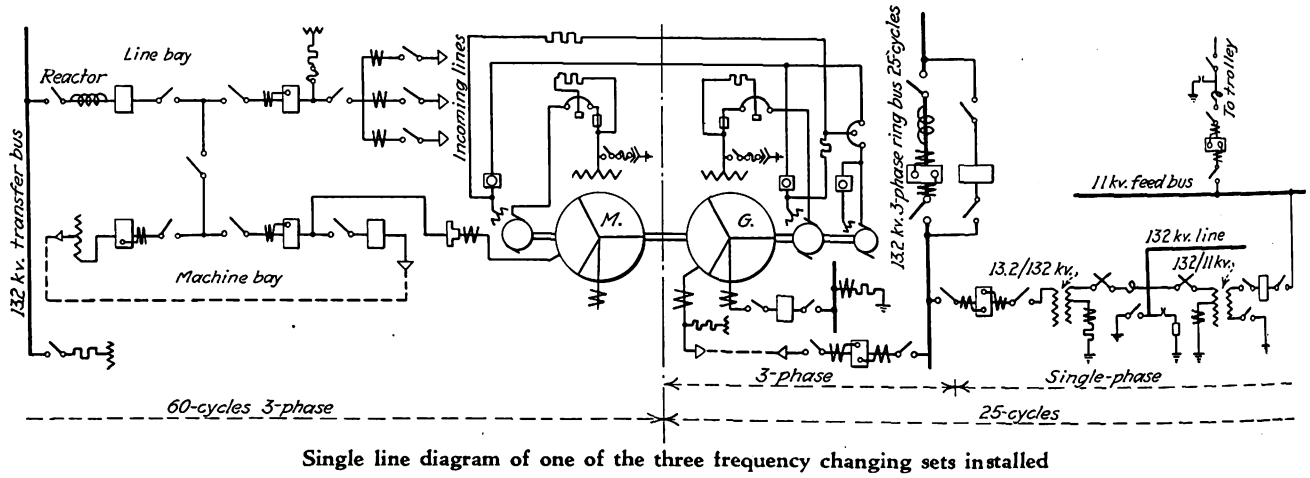
equipment to be hoisted to the upper floor by means of a 100-ton Niles crane, provided with a 10-ton auxiliary hoist. The property of the power company accommodates the 60-cycle outdoor substation and station building. The 25-cycle outdoor substation equipment is located on the adjacent plot belonging to the railroad. The ultimate development is to consist of six frequency changing sets, of which three were installed in the initial construction.

Special care has been taken to provide reliable source of feed for this substation. Power is delivered to each machine from the Chester steam plant through 350,000 circ.mil underground cables, each phase being carried by three single conductor cables. This arrangement was considered more advantageous than the use of one large conductor per phase because of greater flexibility and ease in handling the smaller cables.

The entire outdoor equipment is supported by a rugged steel structure consisting of two longitudinal sections made of standard structural steel. The outdoor substation consists of fifteen bays, of which one line and one machine bay act as a unit operating each frequency changing set. There are six double bays of that type to be installed. Of the remaining three bays two are to be used for switching equipment of two station light and power transformer banks, and one for bus sectionalizing equipment. The main conductors are 2½-in. I.P.S. copper tubing provided with grounding points in places where inspection and maintenance are necessary. The grounding of the outdoor substation consists of 2x¼-in. copper bus with taps taken to the columns, tanks, bases and frames of the outdoor equipment, each tap consisting of a 3x¼-in. copper bar. Galvanized iron pipes are driven on all corners of the substation and tied to the grounding network. These pipes terminate in boxes and the connection with the ground bus is made in a manner to facilitate testing. The two station light and power transformer banks are located south of the building, each consisting of two 150-kva. OISC transformers. The 60-cycle outdoor substation and station building are shown in an accompanying illustration.



Single line diagram of one of the three frequency changing sets installed

Quick Response Excitation for Frequency Changers

The station will ultimately accommodate six frequency changing aggregates, each consisting of a 60-cycle, three-phase, 13,200-volt, 300-r.p.m. synchronous motor, rated 18,000 kva., 90 per cent power factor, coupled with a 25-cycle, 13,200-volt generator, rated 30,700 kva., 70 per cent power factor lagging, single phase, and 15,000-kw. when used as a three-phase machine. Three of these units are used in the initial installation. The ultimate capacity of the station will take care of the entire power demand of the Wilmington-Philadelphia section when full electric service is installed.

Each foundation of a frequency changing set is supported on piling driven under all bearings, the piling being 15-in. iron pipe filled with reinforced concrete. The piling is connected to the general grounding system by means of standard rail bonds. Vibration may be expected due to the pulsating torque caused by the loading of only one phase of the generator. An expansion joint 1 in. wide is provided on the main floor level all around each unit to prevent vibration being transmitted beyond the machine's foundations. The armature frame of each motor is welded and can be shifted for the purpose of synchronizing. The 20-in. shaft of the machine is supported on four 20x40-in. standard bearings. Temperature exploring coils are imbedded in the stator and each machine is provided with two 2-in. brass manifolds that may be connected with adjacent water pipes for fire protection. Each machine has a sheet steel inclosure with ventilating openings in the upper part of the yoke. The exciter of the motor is mounted on the extension of the motor shaft and is rated 60-kw., 250-volt direct current. The generator has also a 135-kw. direct connected exciter with a 15-kw. (pilot) auxiliary exciter mounted on the extension of the main shaft.

The field air circuit breaker and rheostats are located on the main floor of the machine hall adjacent to the corresponding exciter. The auxiliary exciter feeds the field windings of the main exciters and has a 200-amp. 250-volt air circuit breaker in series. The main exciters, therefore, are separately excited machines while the auxiliary exciter is a shunt machine. The use of the auxiliary exciter eliminates the necessity of large main field rheostats and permits a quick response of excitation during short circuit disturbances and heavy load fluctuations.

The neutral leads of the generator, after passing through current transformers used for differential protection, are tied together and continued through a single-phase, 1,200-amp., 15,000-volt oil circuit breaker in series with 1,000-amp., 15,000-volt disconnecting switches. All neutral oil circuit breakers are tied to a neutral bus brought outside. This bus passing through a current transformer becomes grounded through a 4-ohm resistor rated at 2,000 amp. for one minute. This current transformer and three unit resistors are located along the south wall of the building in back of the station light and power transformer banks. The basement under the machine hall accommodates the instrument transformer

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compartments and auxiliary equipment, including a frame shifting motor and motor-driven oil pump for each machine, an oil purifier heated by an immersion electric heater with three heat control, a rotary oil pump and a 7x6-in. air compressor. Electrolytic lightning arresters with fuses and balancing resistors connected across the field of each machine are located in the basement on each machine foundation. A Cory interlock system is used on all outdoor switching equipment to prevent the opening of disconnecting switches under loads by unauthorized persons, or damage from the same cause through malicious tampering.

Switching Under Load on the Low Tension Side

The outdoor equipment of the railroad consists of a three-phase, 13,200-volt, 25-cycle ring bus, ultimately to be sectionalized in three parts or six sections. Each section is to be fed from a separate frequency changing set. The two middle sections feed one single-phase transformer while two-single phase transformers will be connected to each end section. The adjacent sections are tied by means of oil circuit breakers with reactors and disconnecting switches in series. There also will be a shunt tie having the same kind of equipment but no reactors. Each section is to have its potential transformers with fused resistors.

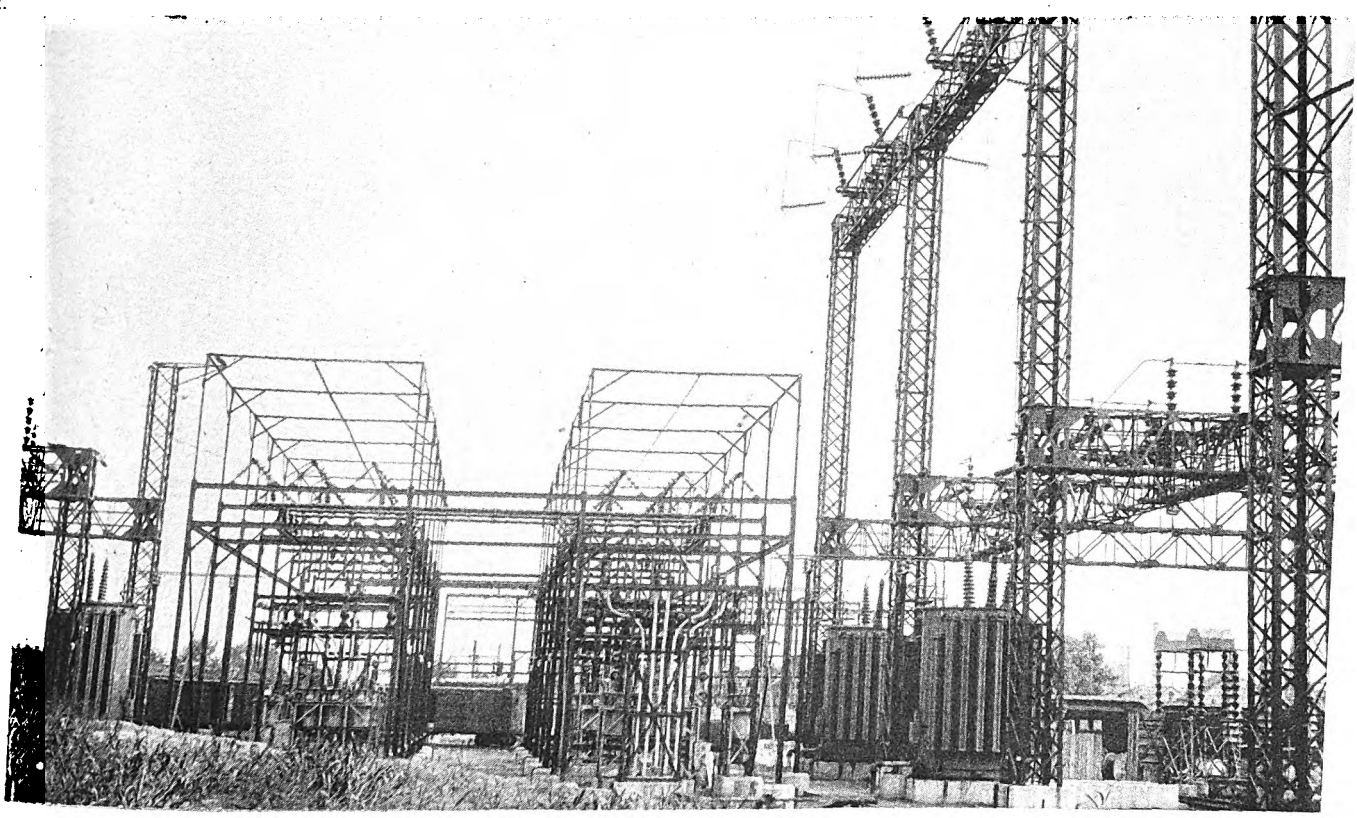
The low-tension side of the single-phase transformer connects to the 13,200-volt bus through an oil switch with disconnecting switches in series. The high-tension winding of this transformer steps up the potential to 132,000 volts, having the middle point of the winding grounded through a resistor located outdoors under the high-tension switching structure.

The high-tension structure carries the 132,000-volt line air current breakers, choke coils and lightning arresters. A tap is taken from the high line to a single-phase transformer stepping down to 11 kw. for feeding the contact wires of the local section of tracks. Only that part of the outdoor equipment which is directly tied into the 13,200-volt, three-phase bus is controlled from the two 25-cycle switchboards located in the operating room. All the secondary control wires from the bushing type current transformers and from the potential transformers in the outdoor substation are brought directly to the pipe room under the 25-cycle board, or indirectly when passing previously under the 60-cycle control boards. Such indirect routing of cables was caused by the duplication of ammeters connected in series on both instrument boards.

The initial installation is to consist of three-bus sections sectionalized with no shunt ties, each section being fed from an individual generator.

All secondary control cables are brought in iron conduits to the pipe room located directly under the operating room. A steel frame is built in the pipe room under each switchboard to carry connection boxes for the pipes, auxiliary panels for fuses, cutouts, secondary relays and other equipment of the secondary control circuits. All pipes carrying d.c. control leads are brought under the relay board, and those carrying a.c. secondary leads terminate in boxes under the instrument board. The intermediate and cross connections between the boards are made in pipes running under the pipe room floor or overhead.

The 60-cycle control boards are of a circular type centrally located in the operating room. This arrangement requires a fanlike steel structure to permit the passing of control pipes from the pipe room to the switchboards. To avoid an excessively heavy structure the operating room floor was not made entirely self-supporting, part of the load being taken by three columns in the



The outdoor equipment of the railroad includes a 13,200-volt, 25-cycle ring bus which will ultimately be sectionalized in three parts

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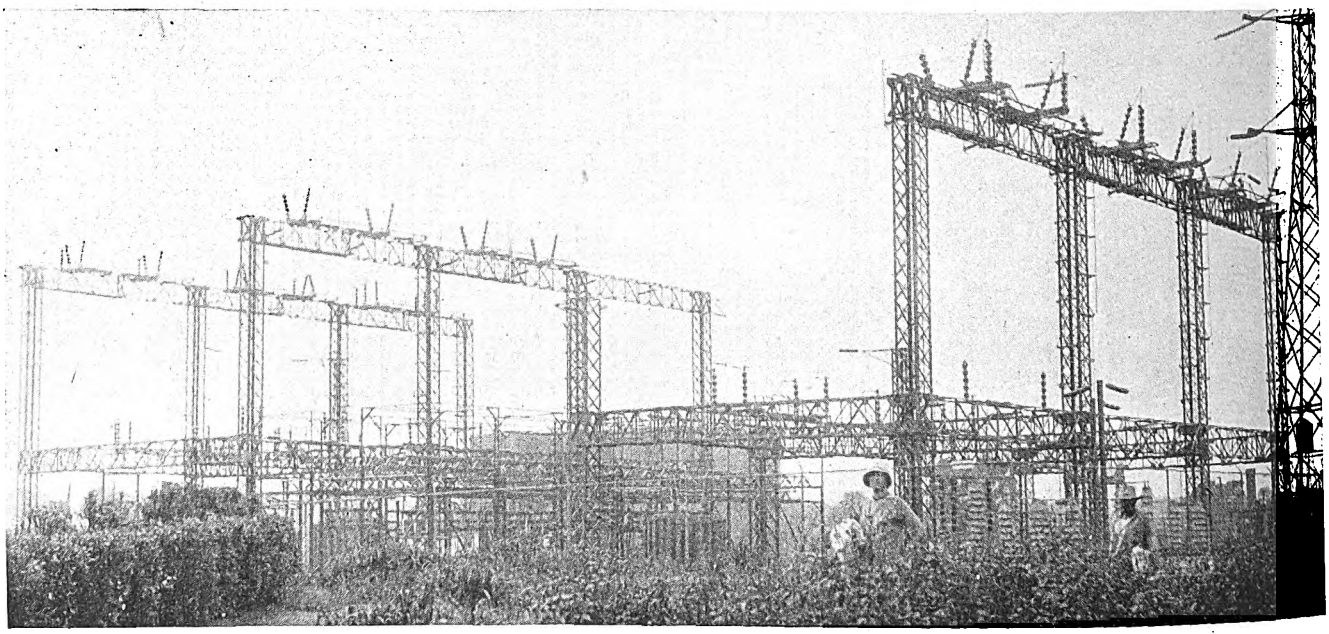
pipe room. The benchboard is centrally located in the operating room, and concentrically in relation to it is the instrument board, with the relay board back of it. The station light and power board and the d.c. board are to the right side facing the circular boards, and to the left is the 25-cycle instrument board with the relay board back of it. The remaining part of the floor space in back of the station light and power board is occupied by the railroad signal equipment, consisting of two motor generator sets with switching equipment for generating 440-volt, 100-cycle, single-phase current. Each set consists of a 75-hp., 60-cycle, three-phase motor using 2,300 volts from the station light and power two-phase, 220-volt circuit, transformed to 2,300 volt, three phase by means of a bank of two 37½-kva. single-phase transformers per machine. These transformers are located outdoors in the railroad switchyard.

A Lundin and flash test panel is located in the basement to facilitate testing of cables. Two motor generator sets are installed on the operating floor level for generating direct current and feeding the two storage batteries. Two



The high-tension structure carries the 132,000-volt line air circuit breakers, choke coils and lightning arresters

battery rooms are provided in the basement, only one being equipped for the initial installation. The 25-cycle control and relay boards accommodate all meters and protective apparatus necessary for outdoor bus and transformer equipment, and a duplicate control is provided for the generator oil circuit breakers. These breakers can therefore be tripped from both boards while the closing can be made only from the circular board. All high-tension 132,000-volt switching equipment is controlled from a switchhouse located on the railroad premises.

Ground Resistors Have Relay Protection

This station, acting as a link between the highly fluctuating railway loads and the immense source of power of the Philadelphia Electric System, must have an adequate and reliable relay system. Electric instruments, therefore, must be interposed between the main circuit or apparatus and the current breakers in such a way that any abnormality in the circuit will act on the relays. These in turn, after proper discrimination as to the magnitude and character of the fault, cause the circuit breaker to trip, thus relieving or protecting the circuit or apparatus.

In deciding upon the type of protection two important factors must be kept in view: The protection against interruption and the apparatus protection. The service protection requires an automatic sectionalizing of equipment in the station, so as to isolate the disabled section without disturbing the normal régime of all the remaining equipment.

The 60-cycle equipment is protected by type CO overcurrent relays actuated from bushing-type current transformers located on the incoming power side of the running oil circuit breaker. The secondary control current passes through auxiliary HG relays used for tripping the running oil circuit breaker, the field air breaker, and for operating the alarm and auxiliary circuits. Each motor also has a differential protection consisting of PQ type relays actuated by current transformers located in the line compartments of the machine hall. The d.c. control circuit of these relays actuates a special hand reset, multiple contact, auxiliary relay, tripping the running oil switch and the field breaker, and operating the annunciating system. The necessary hand resetting of this auxiliary relay prevents the operator from an immediate reclosing of the starting and running oil circuit breakers, thereby inducing him to investigate the cause of trouble previous to reclosing the breakers.

The tripping of the differential or overload relays of the motor does not cause cutting the generator loose from the ring bus. Under those conditions the machine will continue running from the 25-cycle side, providing the adjacent 25-cycle bus sectionalizing switch is closed. The unit will be started anew if tripped by the overload relays, or shut down by the operator when tripped by the differential relays.

In the initial installation the station will be operated on the unit basis, each machine being fed separately from the generating station. In the ultimate installation each incoming line will have power directional relays actuated by bushing-type current transformers in the line oil circuit breakers. Provision also is made for overcurrent protection of the magnetizing switch, three-phase type

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COA relay being used for compactness instead of three single-phase relays.

The protection of the generator is entirely independent from the protection of the motor. It also has overload and differential relays working in a manner similar to that of the motor except that the exciter field breaker is not tripped simultaneously with the machine oil circuit breaker.

The protection of the single-phase 13,200 to 132,000 volts step-up transformers is accomplished by means of differential type MC relays operating the transformer oil circuit breaker, and actuated by bushing-type current transformers in the breaker and the power transformer. The outgoing high-tension lines are protected by type CO overcurrent relays actuated from bushing-type current transformers on the high-voltage leads. The line also has a ground protection by means of an overcurrent relay, type CO, actuated by a current transformer in the grounded middle point lead. This middle point of the high-tension winding is grounded through a 330-ohm outdoor type resistor, protected by an overcurrent type CO relay connected in series with the ground relay. Bus differential relays, type MC, are used for protection of the bus, and are actuated by bushing-type current transformers on the incoming side of the generator oil switch and the outgoing side of the bus and transformer oil circuit breakers.

The 132,000-volt air circuit breakers are controlled from the control house on the railroad premises. The control circuits of these breakers and the oil switches are interlocked by means of auxiliary d.c. relays to insure the opening of the air breakers upon the action of the differential resistor protecting relays. The ground resistor relay has a logarithmic characteristic and becomes energized whenever the ground current of the line is not sufficiently high to actuate the ground relay yet sustained and high enough to cause damage to the resistor.

The design and installation of converting and distributing equipment for the Pennsylvania Railroad was in charge of Gibbs & Hill, consulting engineers of New York City.

Parking Prohibited After Snow Storms

UNDER agreement with the city of Montreal, the Montreal Tramways pays 50 per cent of the cost of snow removal from "tramway streets." This expense to the company is in addition to the ordinary broom and short wing work done by snow sweeper equipment. Before automobile parking interfered, the tramways' equipment winged the snow out to a "windrow" alongside the track, after which city equipment piled the snow near the curb, from whence it was removed. During the past few years, however, automobiles parked at curbs during and after storms, have interfered greatly with the use of long wings on the tramways' equipment, as well as street cleaning operations, thus increasing the cost of snow removal. In many instances, after storms, moving vehicles made such use of the space cleaned by sweeper equipment as to cause serious delay to street car traffic.

Dash sign carried on Montreal cars to warn motorists against parking during and after snow storms

In December last the situation was discussed at a conference between officials of the roadway department of the city and officials of the company. The result of this conference was that the chief of police was authorized (under existing city by-laws) to prohibit parking on "tramway streets" and bus routes, during and after a snow storm, when requested by the roadways department to do so.

In order to aid the city in notification of such a prohibition, the tramways agreed to carry "No Parking" signs in the street cars, and display them on the front or rear of the car, on notice from the city.

Magnitude of German Street Railways

STATISTICS of German street railways are given in the latest handbook of German street railways, light railways (interurban lines) and private railways, published by *Verkehrstechnik* for the Verbandes Deutscher Verkehrrswaltungen, formerly the Association of German Street Railways, Light Railways and Private Railways. A total of 182 street railways, 309 light railways (of which 34 are electrically operated) and 128 private railways are listed, which together have a working length of 20,864 km. (12,957 miles). The capital invested is 2.8 billion marks ($666,000,000). In the latest year for which reports were received 154,681 persons were employed, 4.66 billions of passengers were carried and 86.4 million tons of goods were dispatched. Some of the most interesting figures are given in the accompanying tables.

TABLE I—GERMAN STREET RAILWAYS MORE THAN 100 KM. (62 MILES) OPERATING LENGTH

	Km.	Miles
Berlin Street Railway System	615.0	381.3
Hamburg Street Railway	217.3	134.7
Rhenish Railway of Dusseldorf	172.0	106.6
Street Railway of Hanover	166.9	103.5
Aix-la-Chapelle Light Railway (25 km. additional in the Eupen district sequestrated)	152.1	94.3
Dortmund Street Railways	150.2	93.1
Municipal Railway of Dresden	139.8	86.6
Greater Leipzig Street Railway	128.8	79.8
Bochum-Gelsenkirch Street Railways	125.6	77.9
Street and Vorort Railway of Cologne	115.7	71.7
Municipal Street Railways of Munich	110.1	68.3

TABLE II—GERMAN STREET AND INTERURBAN RAILWAYS, CLASSIFIED BY LENGTH

Length Km.	Length Miles	Number of Railways Street Railways	Number of Railways Interurbans	Number of Railways Total
Under 3	Under 2	13	1	14
3– 10	2– 6	43	12	55
10– 20	6–12	51	10	61
20– 30	12–19	12	6	18
30– 40	19–25	12	2	14
40– 50	25–31	15	0	15
50– 60	31–37	7	1	8
60– 70	37–43	3	2	5
70– 80	43–50	4	0	4
80– 90	50–56	1	0	1
90–100	56–62	3	0	3
Over 100	Over 62	13	0	13
Length not stated		3	0	3
		180	34	214

TABLE III—NUMBER OF PASSENGERS CARRIED BY LEADING GERMAN STREET RAILWAY SYSTEMS

Berlin surface lines	834,701,449	Hanover	76,192,180
Hamburg	335,272,342	Bremen	70,152,167
Berlin elevated	222,530,000	Dortmund	69,351,698
Cologne	222,103,908	Chemnitz	50,924,848
Dresden	201,146,742	Magdeburg	49,665,946
Munich	166,806,096	Bochum	44,949,126
Leipzig	159,224,496	Karlsruhe	40,526,449
Frankfort-on-Main	143,622,050	Mannheim	39,409,543
Dusseldorf	139,684,449	Konigsburg	38,938,926
Breslau	125,987,832	Halle	38,595,178
Stuttgart	121,154,314	Stettin	32,805,116
Essen	84,690,830	Duisburg	30,817,066
		Dantzic	30,768,111
		Aix-la-Chapelle	29,770,847
		Kiel	25,499,731

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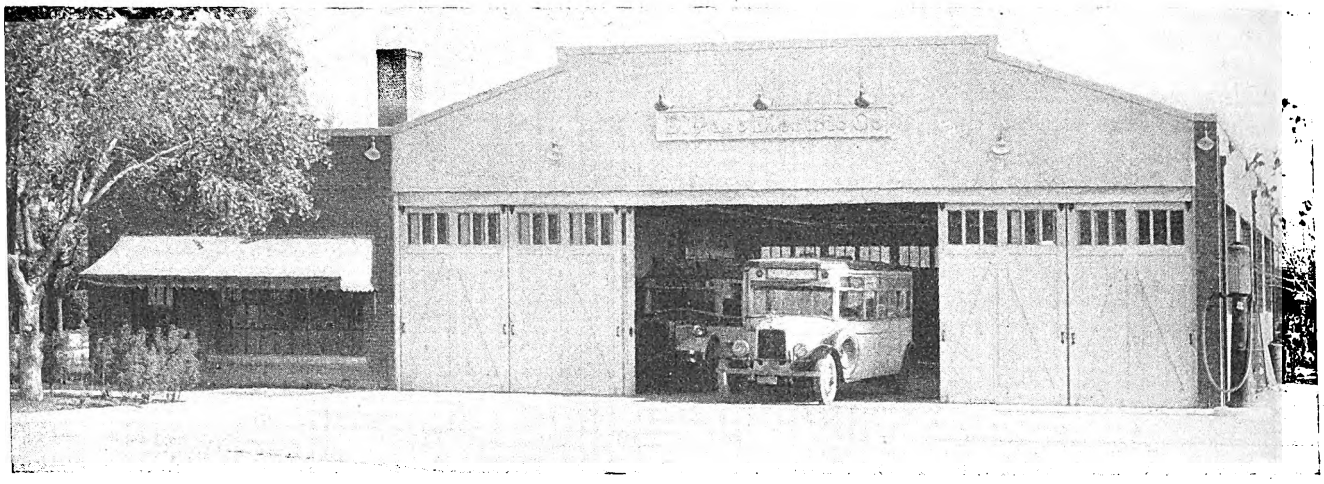


The architectural treatment of this new garage of the El Paso Electric Company makes the building distinctive

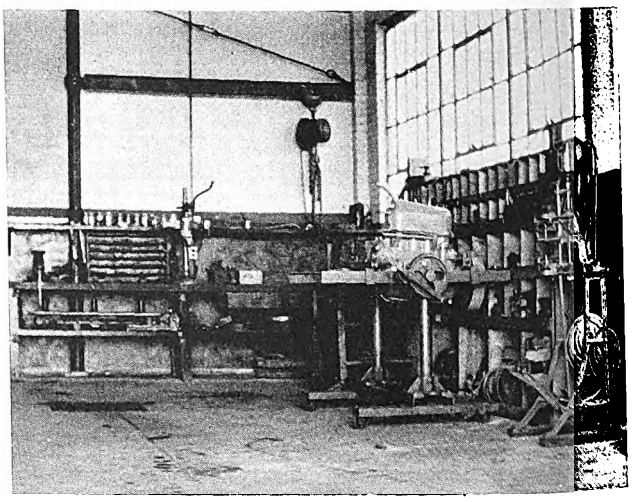
Attractive Garage Houses El Paso Buses

Well lighted and ventilated building used for storing, inspecting, servicing and washing the buses. Repair shop completely equipped

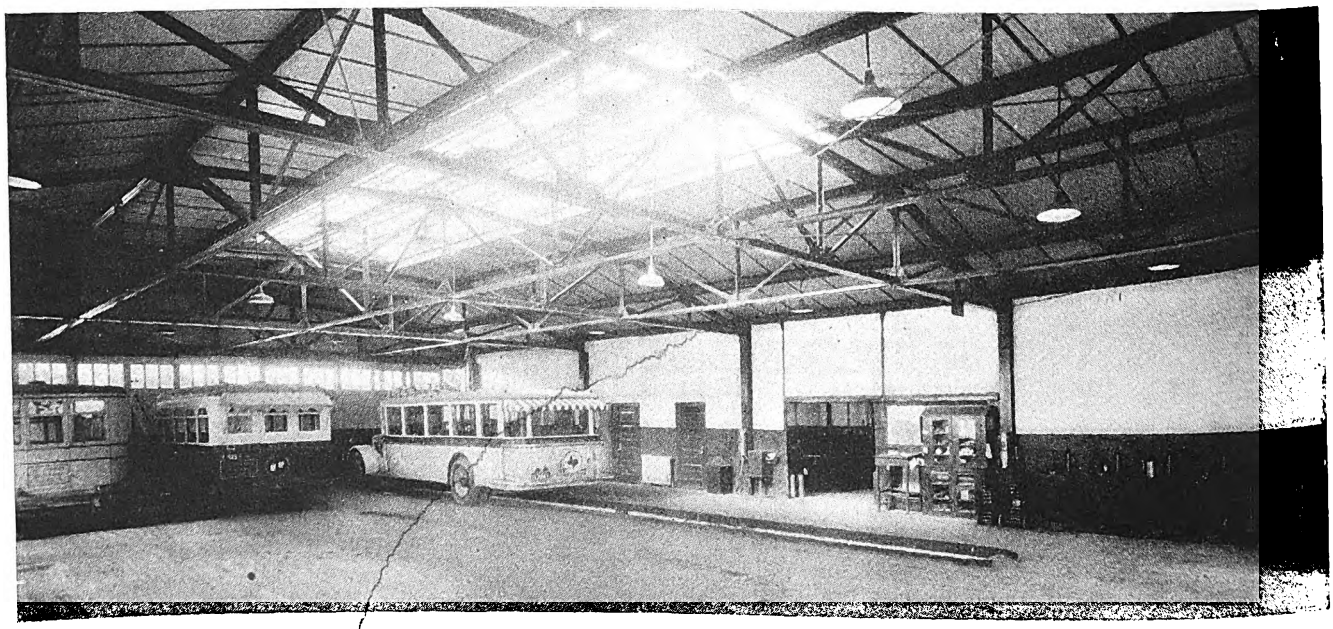
BUSES of the El Paso Electric Company, El Paso, Tex., are now quartered in an attractive new garage, equipped for servicing and repairing the buses, as well as storing them. The building is of steel and brick construction, with inner walls of steel lath and plaster, concrete floors and gypsum roof. Steel sash running the entire length of the outer walls permit an abundance of natural light to enter and also provide ample ventilation.

The main part of the garage, used for bus storage, inspection, servicing and washing, is 50x80 ft. This room is entirely open at both ends but can be closed tightly by means of sliding doors. There is a large skylight in the center of the roof. The inspection pit is long enough to accommodate two buses at a time, and is illuminated by electric lights set in depressions in the walls. There are a number of sewer drains in the floor to take care of bus washing.

The shop is located in a room 20x40 ft., and is adequately equipped for all repairs. It has two 2-ton chain block hoists, which travel on overhead beams, for lifting the bus bodies, and a jib crane with a ½-ton chain block hoist for handling the motors. There is a motor stand for holding the motors while they are being repaired or



The repair shop is equipped with two 2-ton chain block hoists, a jib crane and all necessary machines and tools



Main part of the garage where the buses are stored and serviced

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overhauled, and located in one corner of the shop is an air compressor with a storage tank 2 ft. in diameter and 7½ ft. long. The air-supply system is connected to the storage tank in the carhouse by a pipe running under the street. Other equipment in the shop includes a main bearing and connecting rod bearing boring machine, a valve refacing machine, a drill press, a bench grinder and a brake lining machine.

Four 110-gal. oil tanks with pumps are used for storing the motor oils. The buses are fueled at two gasoline pumps, one at the front and one at the rear of the garage. Each pump is connected to a 1,000-gal. storage tank.

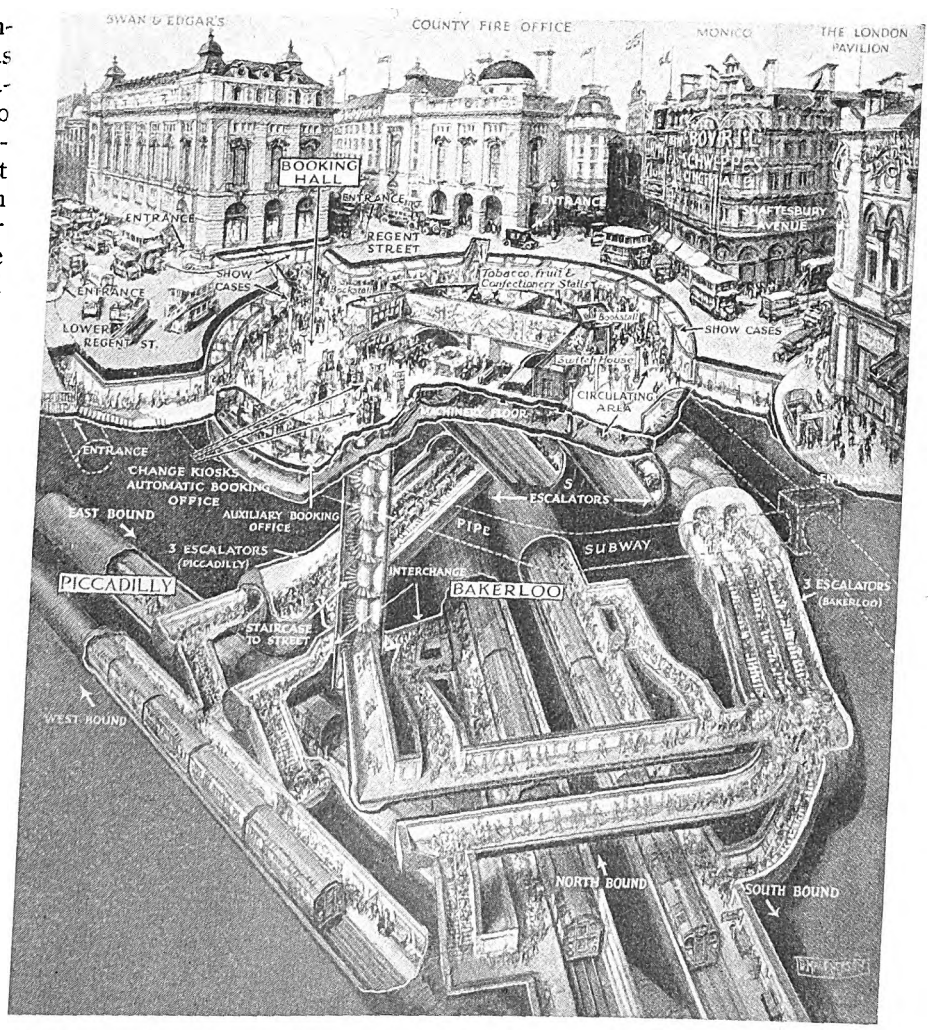
Two rooms in the northwest corner of the garage serve as offices for the master mechanic and his clerk. A locker room and lavatory, equipped with showers, also is located in the building. Hot water is furnished by an automatic electric heater. The building itself is heated throughout by steam radiators. Both the heating plant and the electric water heater are in the basement.

London Underground Completes Extensive Station at Piccadilly Circus

It serves two tubes and has a capacity of 50,000,000 passengers a year. All excavation and construction material had to be conducted through one 18-ft. shaft

LONDON'S new and extensive underground passenger station has just been completed at Piccadilly Circus at the junction of two tubes, the Piccadilly tube and the Bakerloo tube. The original station at this junction dates from 1906, when the two tubes which cross each other at this point were opened. At the time it was built, this station seemed adequate to meet the requirements for many years to come, as it had to deal at that time with an annual traffic of only 1,500,000 passengers. Since then Piccadilly Circus has become a busy commercial center, being close to the retail shopping and theater districts of London. In consequence, the traffic at this station has grown until 25,000,000 passengers now pass through its portals annually.

When it became evident ten years ago that the old station was becoming inadequate, the new one was planned, and the last four years have been devoted to its construction. The public opening took place on Dec. 10, 1928, with appropriate ceremonies and was attended by a large gathering of distinguished guests. The cost of the new station was more than £500,000 ($2,500,000).



The latest tube station to be opened in London is at Piccadilly Circus, a congested traffic center. Four years were required in its construction and its cost was about $2,500,000

It connects the Piccadilly tube, 102 ft. below the ground, with the Bakerloo tube, 86 ft. below the ground, and it provides entrance and exit to the platforms of both tubes by passageways and escalators. Owing to the necessity of keeping obstructions on the streets at a minimum during the work of construction and thus permit a constant movement of traffic, the engineering problems were complicated. An important factor in making them so was the need also not to disturb the services supplied by the gas, electric light, telephone, water and hydraulic power mains running in all directions immediately below the roadway. To complicate the problem further, a large sewer passed directly through the projected location of the main ticket office.

After the engineering drawings had been prepared, the custom was followed, as has been done with previous new underground stations, of preparing full sized models

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of the various levels so as to experiment with them and thus obtain the most satisfactory arrangement. In the case of this station, the models were built up with scaffold poles, cardboard and other pliable material, and the layout was arranged and rearranged and submitted to various tests until finally the most suitable scheme with respect to the position of escalators, landings, passageways and other features was produced. These tests were carried on at a place where covered accommodation was available for setting up a full sized plan of the main ticket office.

When work was actually begun on construction, excavation was conducted through a small "island" near the center of the area on which a monument stood. This was removed for safekeeping, and a shaft, 18 ft. in diameter and 92 ft. in depth, was sunk at this point. Through this shaft, the construction of all of the work with the exception of the main entrance and ticket office was carried out. This shaft was also used for the passage of materials, equipment, etc., to and from the work and for bringing spoil up to the surface. Fortunately the subsoil was suited to make construction fairly easy. It consisted largely of clay, with an overlay of gravel near the surface. Water was not, therefore, encountered to any extent, so that it was not necessary to build coffer dams or to work in compressed air.

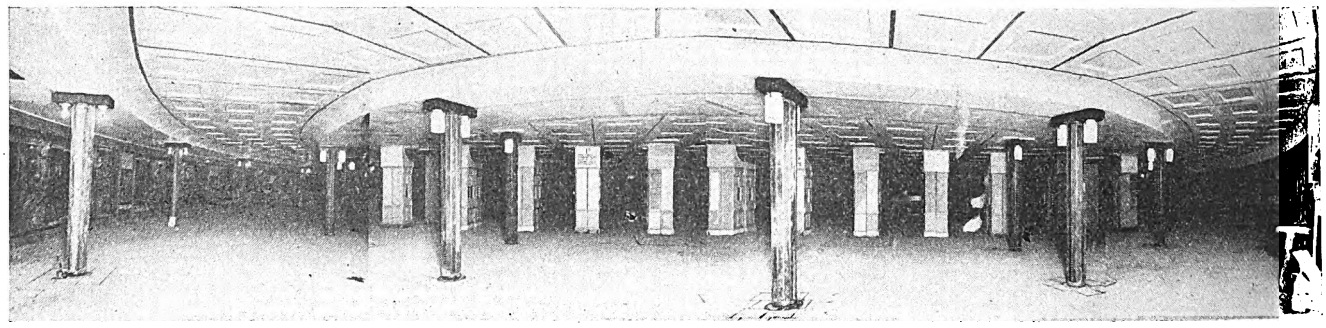
After the shaft was sunk, the next procedure was to drive headings or tunnels at various depths. Before actual work could be begun on the station and its passageways, however, a special subway had to be built to carry the water, electric light and other mains which underran this area. This pipe subway is 12 ft. in diameter, or 3¾ in. larger than the railway tubes. It is of similar design, being of circular section and lined with cast-iron segments. Herein it differs from pipe subways constructed elsewhere in London, as they have been of square or arched section and brick built. This pipe subway extends around the Circus at a depth of from 18 to 30 ft. below the surface, and forms a sort of outer circle to the station. It is 550 ft. in length, but instead of being level throughout its course, it has frequent undulations, so that it may pass above or below obstructions that lie in the path. Inclined tunnels having a total length of 300 ft. lead from this subway to the streets around it.

When the pipe subway was finished, the various conduits, cables, etc., were placed in it. They are now quite readily accessible, and henceforth any work concerned with them can be conducted without the former necessity of opening the roadway and hindering traffic.

The most difficult part of the work was the construction of the main ticket office, as none of the streets overhead could be blocked or opened up while the work was proceeding. This task was achieved by a series of methodical burrowings, until the ground below the surface became a labyrinth of steel roofed and steel supported tunnels. Then, through the removal of the intermediate walls of earth, an elliptical chamber, 155x144 ft. in area and 9 ft. in height, was opened up only a few feet below the surface. The permanent steel work was then put in place.

Each of the four columns erected in the central portion of this floor is capable of supporting a weight of 309 tons, while the 60 columns erected in a double row around the perimeter of the hall are capable of supporting individual loads ranging from 78 to 150 tons.

The six subways that radiate from this main entrance and ticket office were excavated by a similar method. Headings were driven from the main room along the sites of the subway sidewalls, and in these the foundations were built and the subways gradually completed. These subways connect the main ticket office and the various exits and entrances at the different corners. Incidentally, these passageways are arranged so that pedestrians can use them in crossing from one corner to another without buying a railroad ticket. Hence, the station is a public convenience also.



This large circulating area is only 2 ft. underneath one of the busiest traffic centers in London

Owing to the depth of the platforms below the surface of the street, it was necessary to divide the escalators into upper and lower flights. In all there are eleven escalators, the greatest number in any London underground station, and the five in the upper flights are the largest number yet installed side by side. All have a speed of 100 ft. per minute.

An average of about 150 men were constantly engaged during the four years that were occupied in the construction of the station and its appurtenant work.

The greater part of the main ticket office is finished in travertin marble and presents a handsome appearance. The flooring is of large white tiles, each 1 ft. square. The decorations include some paintings in oil along the inner side of the headwall of the escalators. The central compartment contains a map of the world, showing the British Empire in a distinctive color. Backing this map are smaller panels with pictures representing the activities of the Underground in the sphere of urban and suburban transport.

The tiling of the public subways is of biscuit color, relieved by black borders. The lighting is by lamps of opal shade.

Following the recent practice of the company, a large part of the ticket sales will be by automatic machines. The latest types are arranged to print the tickets as well as deliver them. Twenty-six of these machines are arranged around the ticket office. As the zone system is used, they issue tickets ranging from 1 penny to 6 pence in denomination. There is also an automatic change-making machine.

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Pacific Coast Executives Hold Regional Conference

First of series of meetings to be held in various sections of the country under the auspices of the Advisory Council inspires frank discussion of current problems and outlook for industry

DURING two busy days, on Feb. 27 and 28, 1929, executives of electric railway properties in the Far West met in San Francisco for an informal and frank discussion of problems of policy and operation and for a comparison of views with respect to the outlook for the industry. The meeting, which was held under the auspices of the Advisory Council of the American Electric Railway Association, was well attended by principal executives representing electric railway companies along the entire Pacific Coast from Portland to San Diego and eastward to the Rocky Mountains. J. N. Shannahan, chairman of the Advisory Council, presided.

In opening the meeting Mr. Shannahan announced that this was the first of a series of regional conferences of principal local transportation executives to be held in various sections of the country for an intimate discussion of regional problems of mutual interest. He expressed a firm conviction of the basic need for organized community transportation service in modern cities, and pointed out that such service must be put on a sound and profitable basis before new capital can be expected to flow in to permit transportation service to keep pace with growing community requirements.

Transportation Vital to Community Progress

"The public has a vital interest in the local transportation problem of the country," said Mr. Shannahan. "The very existence of modern cities as we know them today depends upon the maintenance and expansion of efficient public transportation service. To accomplish this, these properties must earn more than merely enough to pay fixed charges and operating expenses. The public must be brought to recognize this situation and to understand its own interest in the continuation and development of efficient community transportation." Mr. Shannahan expressed the belief that the public can be brought to recognize the facts of the transportation situation and to deal fairly with them, by outlining briefly his experience in Omaha during the effort to obtain an equitable franchise there, following a long drawn-out controversy and a previous popular defeat of almost the same franchise that was recently passed by a vote of almost 4 to 1.

In discussing the purposes of the conference and the outlook for the industry, L. S. Storrs, managing director American Electric Railway Association, directed attention to the striking similarity of the problems faced by various companies throughout the country. Each property, however, explained Mr. Storrs, is inclined to consider its own problems to be individual and special. To this point of view he attributed the apparent inertia on the part of individual managements in applying the methods which have proved successful on other railways. Mr. Storrs indicated that it was to help in overcoming this inertia that the plan of holding a series of regional conferences among the principal executives of operating companies in the several sections of the country was suggested.

Paul Shoup, president Southern Pacific Railroad and member of the Advisory Council, expressed the belief that the transportation industry of the country has made progress toward better public understanding of its problems. He felt that the American public may be expected to deal fairly with a question upon which it is properly informed and that it can be interested in the facts of the transportation situation if they are properly presented.

Problem of Congestion Presents Opportunity

"The public, however, is not interested in other people's troubles," warned Mr. Shoup. With respect to the growing traffic congestion arising from the widespread use of automobiles, Mr. Shoup felt that the increasing difficulties encountered by modern communities as the result of congestion may be expected to react to the benefit of public transportation companies provided that equipment and service improvements are developed to take advantage of the opportunities presented. He held that the adequate development of efficient public transportation offers American cities a solution of the problem of congestion that has assumed extremely severe proportions in practically every large community.

As the discussion progressed, speakers dealt with various details of management and operation, but there was a persistent effort to keep in the forefront broad questions of principle and policy dealing particularly with fundamental economics and the relation between transportation and community development. "The local transportation industry," declared Samuel Kahn, president Market Street Railway, San Francisco, "presents three broad questions that are fundamental in any business enterprise. First of these is that of the right to do business; second, is the question of the right to earn a fair return on the investment, which shall be adequate to attract capital for improvements and expansion. Finally, and equally important, is the question of ability to earn an adequate return even after the right to do so is not an issue."

Mr. Kahn agreed with previous speakers that the current problems of many properties are common and similar

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in general terms. He held, however, that each property presents many special problems and pointed to the menace of municipal ownership propaganda as a basic question of particular importance in the Pacific Coast region.

Importance of Personal Leadership Stressed

Chairman Shannahan stressed the importance of personal leadership as a factor in the success of all American business today. "The growing size and complexity of business organizations have increased rather than decreased the importance of that single individual who furnishes the vision to plot a course through the shoals of unsound economic methods, and the inspiration to build esprit de corps in a vast organization frequently spread throughout the country or the world," declared Mr. Shannahan. "In each great business enterprise characterizing this modern industrial era, there is always one dominant personality that provides inspiration and leadership. Bankers recognize the importance of the man at the top in business success. In this respect the electric railway industry is no exception, and there is great need for leadership in the solution of its problems.

"Conferences of principal executives for the discussion of policies are of importance to the entire industry and to the future of each individual property," continued Mr. Shannahan. "The local transportation industry must look for its rejuvenation and advancement to the general recognition and application of sound economic principles. Many of the industry's past and present difficulties are attributable to its readiness to grasp at unsound expedients and its failure to recognize dangerous policies that were followed during the promotional and competitive stage of its development. In large measure, the continuing difficulties that have existed since the war are attributable to the industry's failure to dig below the surface of daily operating routine and to establish clearly the principles upon which the rehabilitated structure of community transportation must be reared. Great harm is done whenever an individual property adopts an unsound expedient in the attempt to work out its own salvation. For that reason, conferences among principle executives are vitally important in order that unsound policies may be avoided and the entire industry may be united in its advocacy of the principles upon which the complex economic problems of community transportation may be worked out."

At the request of Chairman Shannahan, Charles Gordon, editor Electric Railway Journal, discussed the general outlook for the industry and some of the factors involved in putting the local transportation business on a really satisfactory financial basis. "After all," said Mr. Gordon, "there is only one great basic question with respect to the local transportation industry, and that is whether or not any combination of rates and service can be devised which will satisfy the public on the one hand and, on the other, produce a satisfactory return for investors."

General Improvement in Basic Conditions

The speaker pointed out that there has been more progress in rebuilding the foundations of the industry than is apparent from a close-up view of daily operating results. In three principal respects, he held, there has been marked underlying improvement, extending to many properties throughout the country. First, in respect to franchises, former grants with arbitrarily fixed terms and conditions have given way in many cities to documents sufficiently flexible in their provisions to permit changing conditions and requirements to be met as they arise. Most notable among the characteristics of modern franchises are those of the indeterminate type as to duration, and service at cost as to rates. Only a casual survey is needed, according to the speaker, to give an impressive perspective of the extent to which modernized franchises have replaced the former type of rigid, fixed-term grants that were largely responsible for the serious difficulties into which the industry was plunged during the war and post-war period.

Next, but by no means secondary in importance, according to Mr. Gordon, is the vast improvement that has been made in the relations between local transportation companies and the public they serve. In city after city, as the past decade is reviewed, a condition of suspicion and unfriendliness on the part of the public, and dogged, stubborn combativeness on the part of railway managements has been replaced by cordial relations and a mutual effort toward co-operation. In many instances the change in public relations was a quick and complete reversal of conditions, brought about in a surprisingly short period of time through a change in method and attitude on the part of railway managements themselves.

Furthermore, the speaker pointed out, the change in the condition of franchises was accompanied by a breakdown in the former arbitrary 5-cent fare which had become a political fetish upon which politicans rode into office with a total disregard of the fundamental transportation requirements of their communities. With only a few notable exceptions the 5-cent fare has been definitely eliminated throughout the country and it is of particular significance that a satisfactory solution of local transportation problems seems most remote in those cities that have continued to be misled by fixed 5-cent fare advocates.

Ability to Earn Adequate Return Primary Question

All of this, declared Mr. Gordon, is evidence of the marked improvement in the basic conditions that underlie the local transportation industry. He held that only one great question exists to which the answer appears to be in doubt. That, in brief, is the question of the ability of the industry to earn a satisfactory return at any reasonable level of rates in the face of growing competition from private automobiles. It is to this question that any discussion of the outlook for the industry inevitably leads.

On this point Mr. Gordon maintained that local transportation rates have been largely makeshift expedients, and that there has been no really serious effort to develop the principles upon which an economically sound local transportation rate structure should be built. The speaker explained that the question of proper rates is only one phase of the general problem of meeting automobile competition. He declared that there is a great need for the perfection of more satisfactory vehicles and for higher standards of service. There is likewise great need for the application of merchandising methods in the transportation business; for the rerouting and relocation of lines that no longer serve efficiently—in fact, for the application of those many methods and practices which have produced improvement on individual properties but which are being adopted only very slowly by the industry as a whole. Although there has been much discussion of the need for improved service and methods in meeting the changed condition brought about by the competition

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of the automobile, the surface has barely been scratched in the application of the many ideas advanced. Until greater progress is made in meeting the requirements of this changed situation there is no substantial reason for questioning the ability of the industry to earn a fair return.

Public Subsidy Expedient Condemned

The speaker condemned the tendency which has been evidenced in recent discussions to grasp at another expedient; namely, some form of public subsidy for transportation properties. If it should ever become apparent that a proper combination of rates and service will not attract sufficient revenue to put the local transportation business on a satisfactory financial basis, he held that any form of general public subsidy would lead to constantly recurring difficulty and would offer little hope of permanent improvement or stabilized finances that would permit the industry to keep pace with a growing community's requirements.

As an alternative for a general public subsidy, the speaker suggested relief from special taxes and imposts as a means of removing from the industry unjustified burdens that directly affect the cost of providing service vital to the community. He held, further, that it would be economically sound, and equitable as well, for a community to consider the track structure and rails as a special form of paving to be assessed, as are other street improvements, against the property directly benefited by the existence of a public transportation facility in a given location. Mr. Gordon explained that the principle involved in relieving the car rider of the fixed charges on the capital invested in street railway track and spreading the cost over the property benefited by the existence of such a transportation facility in a given location is similar to that at present widely advocated for the construction of rapid transit lines, and to the principles at present followed in the operation of buses over pavement in which the capital investment is wiped out through the special assessment method. The rental charge or tax to be imposed upon an operating company for the use of such community-owned facilities, according to the speaker, should be limited to a sum adequate only for the proper maintenance of the facility provided, whether it be a rapid transit line, a street car line or just the surface paving of the street itself.

Results for Fare Changes Discussed

The general subject of fares and fare structure occupied considerable attention during the discussions at the conference. O. A. Smith, passenger traffic manager Pacific Electric Railway, outlined the experience of his property in attempting to establish a rate structure which would bring a satisfactory volume of revenue. The general plan followed is that of zone rates supplemented by various forms of passes. Mr. Smith felt that on the basis of Pacific Electric experience the zone system is both desirable and wise.

Some of the principles involved and the experience to date on the Los Angeles Railway resulting from an increase in fares from 5 to 7 cents was outlined by G. B. Anderson, superintendent of transportation Los Angeles Railway Corporation. When fares were recently increased from 5 to 7 cents cash, or four tokens for 25 cents, there was some decrease in the volume of travel. However, an immediate increase in the amount of service provided, resulted in bringing the travel back nearly to what it had been before the fare increase. On the basis of Los Angeles experience to date, Mr. Anderson expressed the opinion that the combination of an increased fare with a corresponding improvement in service is a step in the right direction in approaching the problem of developing increased revenue.

A brief outline of the conditions existing in San Diego and of the outlook for the transportation property of the San Diego Electric Railway was given by S. E. Mason, general manager. In this southern California city, having a population estimated between 160,000 and 170,000, where wide streets and moderate temperatures offer unusual attractions for the use of automobiles, this company has held its traffic and revenues to a favorable figure through improved service and a combination of zone fares and several forms of passes to attract riders. Mr. Mason pointed out that, although the property has continued to enjoy increasing business, the rate of increase has not corresponded with that of the growth in population.

An unusual example of high-speed interurban operation with one man was described by Julian M. Bamberger, president and general manager Bamberger Electric Railroad, Salt Lake City, Utah. On this property, which is a double-track line approximately 36 miles long, there are ten zones with a fare of 10 cents per zone. All passenger equipment was rebuilt for one-man operation. These cars are run at speeds of 55 to 60 m.p.h. Carload and l.c.l. freight business has been built up by consistent and intensive effort, so that passenger revenue now represents only 55 per cent of the total, whereas it formerly constituted 74 per cent of the entire revenue. Mr. Bamberger expressed the opinion that the industry has in the past feared new ideas and has been more inclined to find reasons why new things could not be done than to meet changed conditions with a serious effort to develop changed methods.

Depreciation Accounting Requires Attention

Subsequent discussion covered a wide range of additional operating questions. These included recent developments in trucks and equipment, particularly the new type worm-drive trucks; results of the trackless trolley experiments in Salt Lake City; handling of complaints; possibilities of pick-up and delivery service on interurban roads; experience with amusement parks and special beach traffic, football traffic, etc.; use of de luxe buses for special service, and depreciation accounting by electric railways. The latter subject was brought up by R. O. Crowe, auditor of the Los Angeles Railway, who maintained that the present Interstate Commerce Commission classification of accounts does not give a true record of costs and is misleading and unfair to the investor with respect to depreciation. Although the limited time available did not permit Mr. Crowe to go into this question at length, he called attention to the seriousness of this problem and declared that electric railways need to give very much more serious attention to the establishment of sound principles of depreciation accounting than has been done in the past.

At the close of the meetings a portion of one afternoon was devoted to an inspection of the "comfort cars" developed by the Market Street Railway in San Francisco, and of the sample four-wheel car built by the Twin Coach Corporation and in experimental service on the Key System Transit Company in Oakland.

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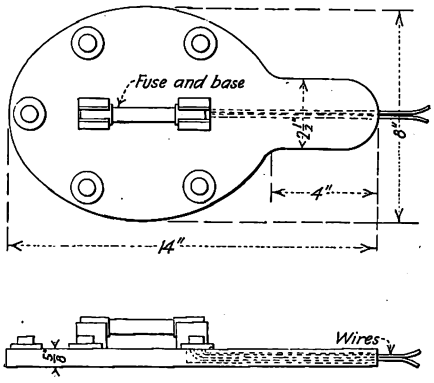
Better Maintenance Through Improved Methods

Fused Portable Lamp Bank

FREQUENT trouble formerly was experienced in the shop of the New York & Queens County Railway, Woodside, N. Y., because of portable lamp banks becoming short circuited or grounded. The shop fuse was always blown when this occurred, which extinguished any other lights on the same circuit. This condition compelled a number of men to stop



Banjo lamp cluster with fuse used in New York & Queens County Railway shop

work until the fuse was replaced. To prevent this the lamp bank shown in the accompanying sketch was designed and constructed. It consists of a piece of white pine $\frac{5}{8}$ in. thick, 14 in. long and 8 in. wide. It is spoon shaped and provided with a handle 4 in. long x $2\frac{1}{2}$ in. wide. Five lamps and a fuse are installed and connected in series for operation on a 550-volt circuit. The handle is bored for the entrance of the wires. The fuse is of such capacity as will protect the five lights only. In case of a short circuit or a ground occurring, the fuse will blow and the shop fuse will not be affected. It has successfully accomplished the results for which it was designed.

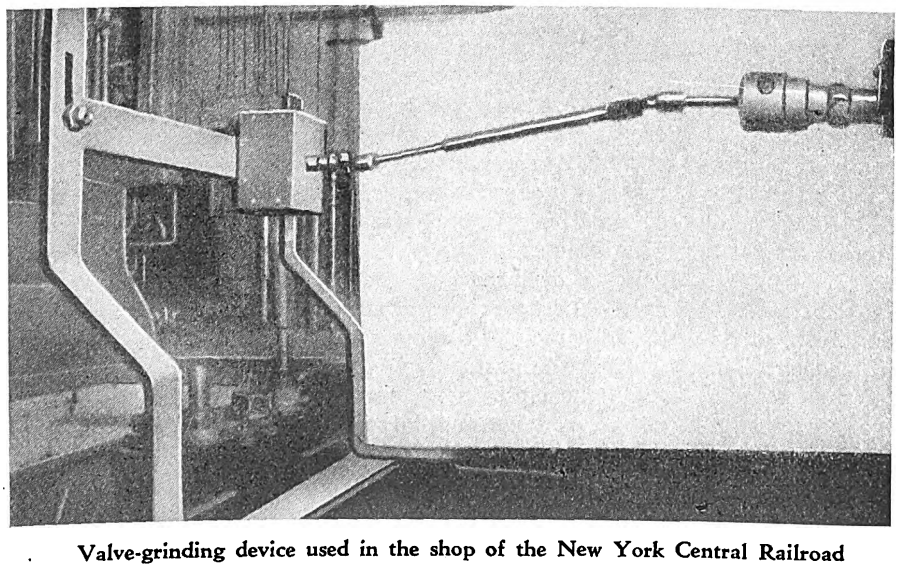
Revolving Oscillating Valve Grinding Device*

By Harvey L. Bullock
Superintendent of Electrical Equipment
Cleveland Union Terminal
Cleveland, Ohio

FOR grinding compressor head valves a power-driven device connected with a small compressed air motor through a telescope shaft and universal joints is in general use in the White Plains shop of the New York Central Railroad. A smaller hand operated model is also used for reseating electropneumatic valves which are used with General Electric Company's PC-10 controllers.

This valve-grinding device, which can be found in many automobile repair shops, is composed of two disks mounted on a horizontal shaft on opposite sides of a pinion, the latter being fitted to the end of a vertical shaft and connected to a spring-cushioned sleeve and screw-driver bit. One disk has six teeth and the other nine. This causes the bit to operate and the unequal number of teeth on the disks causes the bit to make one complete revolution to every five oscillations. The arrangement makes a simple, accurate tool.

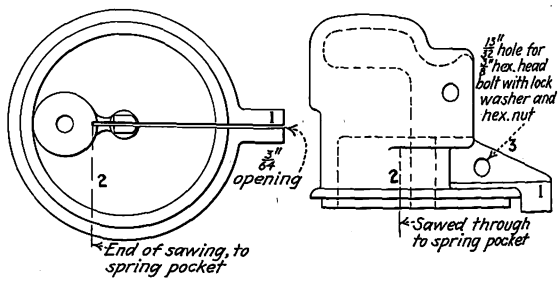
Submitted in Electric Railway Journal Prize Contest.



Valve-grinding device used in the shop of the New York Central Railroad

Clamping Arrangement Keeps Controller Handle Bases Tight*

By F. A. Marsh
Superintendent of Equipment Municipal Railways of St. Petersburg, Fla.



Saw-split and clamping bolt method of keeping controller handle bases tight

TROUBLE from looseness due to wear formerly was experienced on the safety car device type of K-10 controller handle base and pilot valve, as used on the cars of the Municipal Railways of St. Petersburg, Fla. Despite the setscrew which is provided with this equipment, the base sometimes gets loose on the controller drum shaft and tips over until the stop lug drags on the controller housing. This condition has been overcome by stripping the base and cutting the $\frac{3}{4}$-in. saw kerf through the lug and base to the spring pocket, as shown in the accompanying sketch. A $\frac{13}{32}$-in. hole is drilled and by installing a $\frac{3}{8}$-in. hexagonal headed bolt with a lock washer and nut the base is ready for use.

As the controller drum shafts have become worn and are out of true,

Submitted in Electric Railway Journal Prize Contest.

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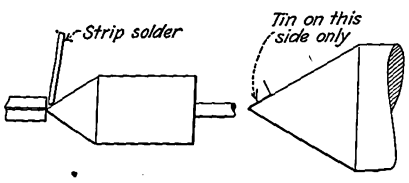
these are built up by brazing and are then milled to the original dimensions. The complete job costs about $1.90 per car, and this small expense has made the device more solid than originally, and has overcome the trouble.

Saving Solder

By Dr. James Silberstein
Chicago, Ill.

To facilitate soldering operations, the solders commonly used for electrical apparatus come in strip or wire form. Many times it is necessary to hold the soldering iron in a horizontal or nearly horizontal position, and then only the upper side at the edge of the soldering iron should be tinned. This results in a considerable saving in solder and also a saving in the time necessary for the soldering operation.

If both sides of the iron are tinned, part of the solder runs through the



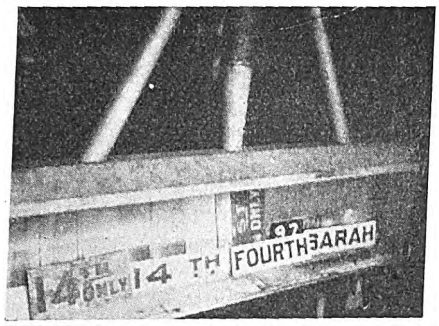
Proper method of applying solder with iron in horizontal position

space between the soldering iron and the metal part against which the iron is held. The part of the solder which runs through and drops on the floor is ordinarily much greater than the part which flows into the joint. The floor spillings are ordinarily not lost, since they can be remelted, but they become dirty and there is danger of getting the contaminated metal mixed with good metal, which of course reduces its value.

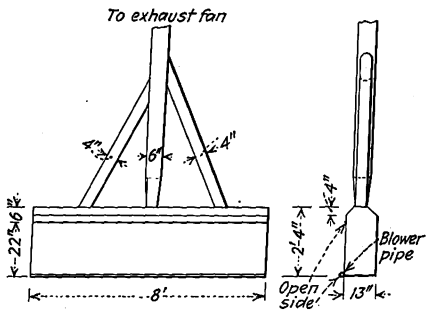
By tinning the upper side of the soldering iron only, the solder flows first into the joint and then any superfluous solder runs out. It is evident that there is a saving not only in solder but in time and labor as well.

Hood for Sign Painting Used in St. Louis

TO REMOVE the paint fumes while lettering destination signs with an air brush using Duco, a convenient ventilating hood has been developed in the shops of the St. Louis Public Service Company. This hood is of sheet metal, 8 ft. long, 28 in. high and 13 in. deep. A half-inch perforated pipe runs along the bottom of the ventilating frame and a stream of air from these openings forces the



Destination signs are stencilled quickly, easily and safely with an air brush and Duco under this sheet metal ventilating hood

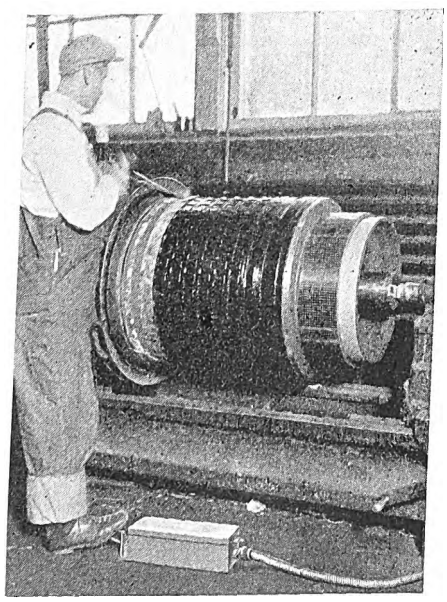


The ventilating hood occupies little floor space, yet is large enough to permit of rapid handling of freshly lettered signs

fumes up the three large vent pipes in the top of the hood. These three vent lines are connected together in a main vent which is equipped with an exhaust fan.

Foot-Operated Belt Shift for Banding Armatures

ONE man can now wind and solder the banding wires on large railway motor armatures with the foot-operated switch shown in the accompanying illustration and a

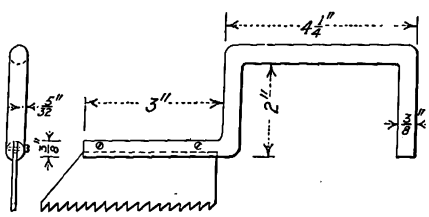


Foot-operated belt shift enables one man to band armatures

pneumatic belt shifting device in use in the Deer Lodge shop of the Chicago, Milwaukee, St. Paul & Pacific Railroad. Owing to the size and length of these armatures and the space required to place and remove them from the lathe, it has been found impractical to employ belt-shifting levers on the lathe drive. To obviate the necessity for a man to control the lathe, an electric foot switch connected by flexible armored cable to a solenoid, which in turn actuates the valve on an air-operated belt shifting engine, is used. The engine is mounted on the ceiling near the motor.

Commutator Slotting Hand Saw

ALL COMMUTATORS are slotted by a power-driven circular saw in the shop of the Richmond Railways, Staten Island, N. Y., but it was found in many instances that small particles of copper remained in the slots and a thin film of mica adhered to the commutator bar after the slotting process was completed. This condition caused failures when the armature was under test,



Frame for hand hacksaw used for commutator slotting

and in several instances service failures. It was, therefore, decided to clean out each slot with a hand saw after the circular saw work had been completed. This is accomplished by the tool shown in the accompanying sketch, which was designed and constructed in the company's shop. The frame is made of ⅜-in. round iron and is 7¼ in. long over all. The handle is 4¼ in. long and is provided with a 2-in. offset. A piece of an ordinary hacksaw blade is used for cutting. The end of the frame is split for a distance of 3 in. and the two pieces clamp the saw blade by means of two machine screws. Blowing out the commutator after the circular saw slotting and cleaning the slots with the hand saw have eliminated the previous troubles. It is claimed that even though a slight additional labor expense is required to complete the slotting process a substantial saving has been effected.

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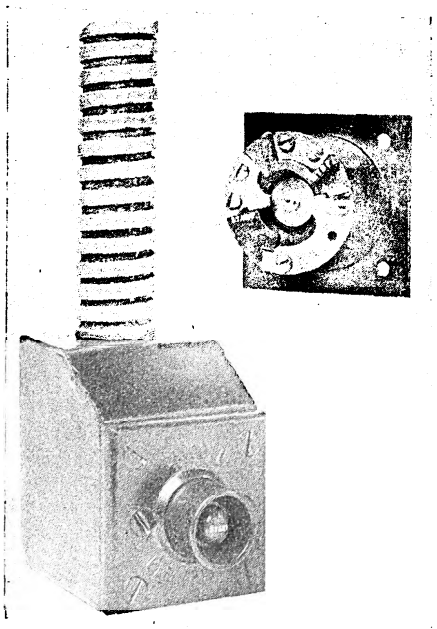
Improved Equipment Suggestions

Safety Push-Button Control

DESIGNED primarily for use with the Lincoln induction motor, but also adaptable for use with any type of push-button starter, a new type of safety push button is announced by the Lincoln Electric Company, Cleveland, Ohio. In this a ball top start button is surrounded by a large cylindrical stop button which projcets over the former. This protects it from accidental contact since it can be operated only by the tip of a thumb or finger inserted inside the stop button. The latter can be operated by a finger or the palm of the hand.



New type of safety push-button control

The colors of the push button correspond with accepted standards of signal colors for controlling railway, vehicular and pedestrian traffic. The start button is a vivid green moulded Bakelite with the word "start" in white letters across the ball top face of the button. The surrounding stop button is a brilliant red moulded Bakelite.

The inner mechanism of the control switch is enclosed in an arc-welded steel box $2\frac{1}{2}$ in.x$3\frac{1}{4}$ in.x$2\frac{1}{2}$ in. in size. All insulated parts are of moulded Bakelite. The exterior is jet black with the exception of the push buttons. Four screws hold the moulded black Bakelite face plate to the container. By removing these screws the operating mechanism may be removed from the case for wiring. The binding posts are indicated by white letters on the moulded black Bakelite, thus preventing chance of error in making connections. An opening in the top of the steel case of $\frac{7}{8}$ in. diameter permits entrance of conduit enclosed wire to the button. For easy attachment two holes are located in the back of the case for bolts, rivets, or screws.

Fan-Cooled Totally Enclosed Shop Motor

DESIGNED to meet exceptionally severe operating conditions, a new type totally enclosed, fan-cooled electric motor is being placed on the market by the Cleveland Electric Motor Company, Cleveland, Ohio. The output of any motor is limited largely by the temperature rise. For this reason a totally enclosed motor is larger and more expensive for a given rating than is the "open type."

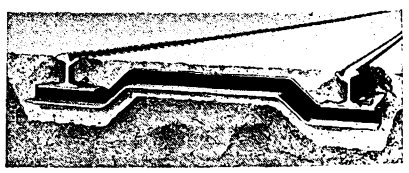
This disadvantage of the totally enclosed motor has already been partly overcome by a recently developed improvement in which the end-covers are open, thus permitting free air-circulation through the motor, the windings being protected by an enclosing jacket of stamped copper having a "running-clearance" hole at either end to permit the shaft to pass through it.

The new Cleveland "Security" ball-bearing type totally enclosed motor, however, goes a step further and eliminates the possibility of even the smallest dust-leakage along the shaft into the windings. The motor is built with a double shell. The inner shell, which contains the entire motor, is enclosed completely and entirely dust-proof. This inner shell is mounted in the outer shell, so as to allow a free air space between them, the shaft passing through both. One end-cover of the outer shell is provided with holes for admitting air.

At the end away from the motor pulley, a fan is mounted in the space between the inner and outer end-covers. This draws in a steady current of air through the holes already mentioned and blows it over the outer surface of the inner shell. Thus, although dust is permanently excluded from the working parts, ample cooling effect is obtained. The makers state that this type of motor permits practically the same rating for a given frame size as an open type motor.

New Shape for Steel Ties Saves Excavation

SAVING 300 cu.yd. of concrete and excavation per mile of single track is the chief feature claimed for the new shape of steel ties just announced by the International Steel Tie Company, Cleveland, Ohio. This tie was developed in conjunction with the engineers of the Capital Traction Company, Washington, D. C. The tie plates are electric-welded to 3 in. x 2 in., 4.1-lb. steel angles. The cross members are bent upward in the form of an elongated arch between the tie plates. This arch strengthens the construction and saves excavation and concrete in a space 7 in. x 3 in. wide, through the entire length.



New steel tie with 7-in. girder rail

High Strength Bronze Welding Rod

AN IMPROVED bronze welding rod, designated as Oxweld No. 21, has been placed on the market by the Oxweld Acetylene Company, New York City. The new rod is recommended for all bronze welding, including the fusion welding of brass and bronze, bronze welding of malleable and gray iron castings, joining of dissimilar metals and building up bearings and other wearing surfaces.

Due to its composition, the new welding rod has a low melting point, and the flow is controlled easily. It produces a weld metal as hard and wear resistant as that formerly made with the manganese-bronze rod. By its use, tough and ductile weld metal having a tensile strength of more than 45,000 lb. per sq.in. can be produced. Properties of this rod eliminate nearly all boiling and fuming of the weld metal. Annoying fumes are reduced.

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News of the Industry

Higher Fare in Grand Forks

Following the conclusion of franchise negotiations with the city of Grand Forks, N. D., rates of fare on the Grand Forks Street Railway were increased on Feb. 1, 1929, as follows: 8 cents cash; seven tokens for 50 cents; sixteen for $1; and $11 worth for $10 when purchased at the office of the company.

Recently the old franchise was amended and passed by the City Commission, and adopted by the company. The terms of the amendments are: extension of time for ten years, which is in addition to present life of franchise or gives a new franchise for twenty years. Permission was allowed to increase the fare to a rate not to exceed 10 cents and authorization was given to operate buses. There was no relief extended in regard to paving requirements, or repairs to paving. The company still continues to pay in the case of new paving a proportionate strip 8 ft. in width in case of single track and 16 ft. in case of double track.

In accepting the amendments as agreed upon by the City Commission, the company paid old disputed paving claims. This settlement was made for approximately one-third of the original amount. The question of the company's liability for procedure in the case of new paving will be determined when new paving projects come up.

Final Draft of Jacksonville Franchise Presented

The City Council of Jacksonville, Fla., on Feb. 26 stood firmly on its action of two weeks before in requiring the Jacksonville Traction Company, under the direction of Stone & Webster, to double-track its line on Main Street, from Twelfth to 32d by declining to reconsider the ordinance which would have permitted the proposed plan of the company to withdraw its rails on Main Street and supplant railway service with buses to Brentwood, Norwood and Panama Park.

To relieve the transportation situation in the outlying districts on the north side of town, the Council adopted two resolutions, one of which requires the company to extend its tracks to Norwood and Panama Park and the other authorizing the public service committee to negotiate with the company for the rent of buses to serve this territory and to charge a 7-cent fare with full transfer privileges.

The other development of the session was the introduction of the proposed new franchise for the company, the principal features of which are the relieving of the company of original paving charges but requiring it to maintain pavement adjacent to its rails and meet the assessment of the present franchise tax of 3 per cent on gross receipts. Action on the franchise, which must be submitted to the voters of the city within 30 days after passage by the Council, can be had at the city primary election in April if the Council sees fit to pass the ordinance at its meeting on March 12.

At a subsequent meeting between the public service and laws and rules committees of the Council and representatives of the company, it was found that only a few changes to clarify various provisions of the proposed new franchise for the Jacksonville Traction Company will be necessary. The only suggestion for a major change in the proposed franchise was made by Peter O. Knight, general counsel for Stone & Webster interests in Florida, who wanted the 3 per cent franchise tax provision cancelled. This proposal was rejected by the Council committees.

The revised draft of the franchise will be sent to Stone & Webster in Boston for approval. After this is received the Council will act on the measure, which then will be presented to the voters probably at one of the city primary elections on April 16 or April 30.

Co-ordination for Cleveland

Proposal just made would include system of Cleveland Railway in system of Van Sweringen interests which contemplates development of rapid transit facilities

A FINANCIAL proposal under which Van Swerengen interests seek to acquire control of all local transportation services in Greater Cleveland, including the Cleveland Railway, was made public on March 7 by Joseph H. Alexander, president Cleveland Railway. The proposal was approved by the Cleveland Railway directors at a special meeting on March 2.

Through a company known as Metropolitan Utilities, Inc., the Van Sweringens propose to acquire not only immediate control of the Cleveland railway but also actual stock ownership over a period of twenty years. Metropolitan Utilities also is to acquire ownership of four other companies. These are:

The Cleveland Traction Terminals Company, which holds a lease from the Cleveland Union Terminals Company, giving it exclusive rights in the traction terminal zone and also exclusive rights in the concession area in the terminal.

The Traction Stores Company, organized to develop trade possibilities created by rapid transit traffic. It now owns and operates three station buildings on the Shaker and Moreland rapid transit lines and holds other property important for future and similar development.

The Cleveland Interurban Railroad, which owns rights-of-way and facilities used in the Shaker and Moreland rapid transit lines and which leases other rights-of-way from the Cleveland & Youngstown Railroad.

The Cleveland & Youngstown Railroad, which owns a part of the right-of-way used by the Shaker and Moreland rapid transit lines, but leased to the Cleveland Interurban Railroad.

In addition the Metropolitan will own or control rapid transit facilities now in process of construction along the Nickel Plate right-of-way between the Union Terminal and East Cleveland and will own or control such other rapid transit lines as the Van Sweringens may decide to build along the rights-of-way of other railroads entering the terminal.

Stockholders in the Cleveland Railway will be asked to deposit their stock with the Cleveland Trust Company, the Van Sweringen proposal to go into effect when 50 per cent of the stock has been deposited. Acceptance of the proposal is practically assured by reason of the large amounts of railway stock held or controlled by Cleveland banks, officers of which are members of the railway board.

The carrying out of the financial agreement will not require an amendment to the Tayler grant, nor will it be subject to any action on the part of the City Council of Cleveland. The Council will continue to exercise control over service and capital expenditures of the Cleveland Railway, but will have no direct voice in the planning and operation of rapid transit services.

It is known that the rapid transit operating plans contemplate operation of the Shaker and Moreland rapid transit lines and the projected Nickel Plate rapid transit, but it has not yet been announced what other rapid transit lines will be built, how much subway construction will be recommended or what changes will be proposed in street car and motor coach routing to make them conform to a uniform transportation system.

The method by which the Metropolitan proposes to acquire control and eventual ownership of the Cleveland Railway is described as follows:

When 50 per cent of the stock has

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been deposited, stockholders will be paid $10 for each share. Interest will be paid by the railway to the depositary and distributed by the depositary to the stockholders at the rate of 6 per cent. Expenses of the depositary will be paid by the Metropolitan.

Stockholders will grant the Metropolitan an irrevocable option to purchase their stock at any time during a twenty-year period at $100 a share plus accrued dividends. The Metropolitan will agree to make an annual payment to the depositary of an amount equal to 5 per cent of the par value of the largest amount of stock at any time on deposit.

This money is to be used to purchase a fixed percentage of stock every year at $100 a share. Thus, if all the stock is deposited, every share will have been purchased by the Metropolitan at the end of the twenty-year period. If there is any failure by the Cleveland Railway to pay a dividend, the Metropolitan may advance to the depositary an amount sufficient to make such payment. If the Metropolitan fails to advance such amount, stockholders may offer their stock to the Metropolitan and the Metropolitan will be obligated to purchase it at $100 a share.

The rapid transit committee of the Cleveland Railway is composed of President Alexander, A. R. Horr and John Sherwin. In a report to the directors they said that their recommendation in favor of the proposal was based chiefly upon the conviction of the members that co-ordinated control and operation of transportation facilities in the metropolitan area will result in decreased cost of furnishing since and will materially increase the factor of safety of the 6 per cent return to which the Cleveland Railway stockholders are entitled under the Tayler grant. The operation of competitive facilities, on the other hand, would inevitably result in waste and excessive costs.

To the committee "it seems clear that if private interests, already embarked in rapid transit enterprises, can see their way clear to bear the burden of the experimental years and undertake the great task of financing rapid transit development as rapidly as the needs of the city justify transit extension and, at the same time, those private interests can be brought into a sympathetic and co-ordinated relationship with the Cleveland Railway without disturbing the relations between that company and the city, on the one hand, and the security of the investment of the stockholders, on the other, the best approach to this new problem of development will have been made."

Supreme Court Recess Without Passing on New York Case

The United States Supreme Court on March 11 recessed until April 8. Among the cases remaining undecided is that involving the issue of the right of the Interborough Rapid Transit to raise car fares in New York City.

Working Order Awaited in Grand Rapids

The Grand Rapids, Mich., City Commission has instructed City Attorney Ganson Taggart to draft the necessary legal procedure to allow the Grand Rapids Railroad to carry out the suggested consolidation of transportation facilities in Grand Rapids by the augmentation to its system of buses and taxicabs. The report of Gerald J. Wagner, city consulting engineer, is the foundation of the service extension and recently the railway, through L. J. DeLamarter, vice-president and general manager, informed the commission that the company was willing to invest in the added service if the city would promise a broad policy of co-operation. With the proposed arrangement that now seems assured of realization, the railway plans to furnish mass, group and individual transportation services for the convenience of all classes.

Operation to Be Continued in Colorado Springs

The Colorado Springs & Interurban Railway, Colorado Springs, Col., will continue to operate regardless of the accumulated deficit of $470,696, according to William Lloyd, president of the board of trustees Myron Stratton Home Corporation, owners of the company. With substitution of buses on some lines and readjustment here and there, they business for 1928 showed a loss of only $57,306 compared with $77,808 during 1927, when abandonment was considered.

Colorado Springs is laid out so that most of the people live within walking distance of the office and business district, and most of those who live a little farther out own automobiles. It is a real tourist city, but during the summer months there are numerous sight-seeing bus concerns that garner the visitors. It is generally conceded, withal, that the railway is coming back into favor.

New Fare Basis Likely in Vancouver

Demands of Vancouver citizens for revision of the agreement with the British Columbia Electric Railway are being presented to the company by a committee of the City Council. In this connection, Mayor Malkin explains that the Council committee will present the city's case for a uniform fare over the whole greater city, for extensions to the transportation services and increased rolling stock. The result of the meeting will be reported to the City Council. If the committee fails to agree with the company, it is possible that discussions will be continued by the full aldermanic board. All hearings must be completed by April 8, 30 days before expiration of the agreement betwen the old city and the railway.

At present the fare in the city limits is 6 cents. The company feels the rate should be increased while the city, which recently amalgamated with Point Grey and South Vancouver, desires a reduction. At present the car fare through the two municipalities which have become part of the city is 12 cents, or 7 cents if strip tickets are used. A compromise believed to be fair would give 6½ cents as a uniform fare for the three areas, if tickets are used, with 7 cents when the fare is paid in cash.

Fare Question Up Again in Washington

Directors of the Capital Traction Company, Washington, D. C., are expected soon to consider renewing their application to the Public Utilities Commission for an increase in fare.

The company applied for the increase of fare on June 14, 1928, and several public hearings were held. In the course of the hearings the commission ordered the Washington Railway & Electric Company made a party to the case. This action was interpreted as meaning that any increase to the Capital Traction would also apply to the railway.

The case was decided on Oct. 24, 1928, when the petition was dismissed without prejudice to the Capital Traction Company to renew its petition at any time subsequent to March 5, 1929. The reason for the action was that legislation looking to a merger of the railways was at that time pending in Congress, and the commission wished to await the outcome of the merger bill.

Responsibility in Philadelphia Accepted by Commission

Full responsibility for the drafting and introduction of the enabling legislation to permit the condemnation of the underlying companies of the Philadelphia Rapid Transit Company by the city has been accepted by the Public Service Commission.

Commissioner Benn, who sponsored the measure, acted in the matter for and by direction of the commission as a whole. This step was taken, the commission explains, to carry out the recommendations of its own expert investigator, Judge McChord, that condemnation was the "only permanently satisfactory solution of the Philadelphia transportation problem." Its own activity in the matter the commission defends as logical and in line with precedent, and as one commentator put it "in this it makes out a case that will be proof against reasonable criticism." The Philadelphia *Ledger* says:

The clearing up of this particular point, however, does not obviate the need for a thorough inquiry into the affairs of the P.R.T. There can be no permanently satisfactory solution of the transit problem here until all these doubtful points are clarified nor until the audit now in progress has restored a confidence that has been greatly shaken by the numerous charges that have been made and by the suspicions that have been raised.

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Consolidation Bills in Chicago Ready for Submission

Four of the legislative bills needed to pave the way for a settlement of Chicago's local transit problems have been completed and will be submitted to the City Council for approval on March 18 or at a special meeting to be held soon after that date. The measures now ready provide for consolidation of local transportation facilities, creation of a metropolitan transportation district and a local regulatory commission, an indeterminate permit and construction of subways by the city. The bills were prepared by the city's attorneys in cooperation with Walter L. Fisher, legal advisor of the citizens' traction settlement committee, appointed by Federal Judge James H. Wilkerson to assist the city and companies in coming to an agreement. Favorable action by the Council will allow the bills to be presented in the Assembly before it adjourns.

A proposal that James Simpson, chairman of the citizens' committee, resign from his position was made in an open letter delivered to members of the City Council recently by John M. Harlan, attorney for F. J. Lisman and associates of New York, who are seeking a twenty-year street car franchise in Chicago. Mr. Harlan based his suggestion on the ground that Mr. Simpson was disqualified to serve in this capacity because of a personal interest in the Chicago Rapid Transit Company. Mr. Simpson is a director of the Commonwealth Edison Company, an associated utility company. In a formal reply to this charge, the head of the citizens' committee declared that he told Judge Wilkerson before he was appointed that he was a director of the Edison company. "I told him that my resignation would be in his hands from the time of my appointment until it is accepted or the job is done," said Mr. Simpson, "and that statement still holds good."

Interborough Against Transit Bill

The Interborough Rapid Transit Company, New York, has attacked the transit control bill now pending before the Legislature, designed to aid in the unification of the city's rapid transit facilities by setting up a board of transit control to take over and operate the lines which are to be merged in a new system. In the preparation of the plan representatives of the Brooklyn-Manhattan Transit Corporation have cooperated with the city and the Transit Commission, but the Interborough has held aloof. Under the tentative plan now before the Board of Estimate the rapid transit lines of the B.-M. T. will be linked with the new Eighth Avenue subway being built by the city and intended originally to be run by the municipality. The Interborough is left to be dealt with later. If in the mean time the Interborough should win its suit for an increase in fare, the city in all probability would proceed to exercise its right of recapture and take over the east-side lines of the Interborough. This would leave that company with only its west-side lines and the unprofitable elevated. As one of the commentators sees it, in that event the Interborough's west-side lines would face the competition of the new Eighth Avenue subway, operating at a lower fare. If the Interborough should lose its fare suit, the city might even then persist in taking over the recapturable half of its subways.

Commission Authorizes Operation in Newark Canal Bed

Operation of a rapid transit line by the Public Service Co-ordinated Transport along the bed of the old Morris Canal in Newark, N. J., in accordance with an agreement reached between the company and the city on Jan. 9 last, has been approved by the State Board of Public Utilities Commissioners. According to the commission, the contract provides for the operation of the new rapid transit line as an addition to the existing transportation lines of the Public Service Company in Newark. Since it will avoid the congested area of Newark, the new line will afford a more rapid service to passengers.

Recommendations Made by Rolling Stock Committees

Members of the standing and twelve special committees of the rolling stock division of the American Electric Railway Engineering Association met in Cincinnati, March 11 and 12.

Hugh Savage, chairman of the current collecting devices committee, stated that equipment men on many properties failed to answer the questionnaires which his committee had sent out. Others gave unreliable information to create a good impression. All of this hampers the committees that are really working for the interest of the industry. The committee recommended three standard sizes of trolley wheels, three standard sized trolley poles, and a standard hardness for manufactured wheels.

In a paper entitled "Proposed Standard Car Change Record," E. J. Jonas, superintendent of equipment of the Cincinnati Street Railway, suggested that the term "car change" be substituted for "pull-in" because it is a more concise and clear description of what takes place when a car fails in service. He also suggested a schedule of classification of pull-ins arranged under a few general groups that give opportunity for thorough analysis of conditions as well as a basis for comparison.

A. T. Clark told of favorable experiences in Baltimore with low viscosity oil in journal bearings. Other chairmen reported on various maintenance problems.

The members were entertained by the Cincinnati committee including several local manufacturers and manufacturers' representatives. They also inspected the Cincinnati Car Company shops and the Winton shop of the Cincinnati Street Railway.

Severe Snows in South

Nashville, the capital city of Tennessee and the middle division, suffered more from snow that has blanketed parts of the South than did west Tennessee. The snow fall at Nashville was about 15 in.; at Gallatin in Sumber County, a city served by interurban lines, the snow fall was 14 in. There were few autos on the streets on Feb. 20 and 21, only the buses and cars operated by the Nashville Railway & Light Company and the milk wagons being very active. Many moved on foot to their work, but the railway was able to maintain its schedules with only little interruption. The snow fall at Memphis and in west Tennessee, approximately 8 in., was the most severe since 1917, but the record at Nashville in 1892 was 17.1 inches in 24 hours. There have been colder weeks than the one recently ended, but very few in which there has been so much sleet, snow and ice. Few of the recent winters in middle and west Tennessee have been severe and in most of them in recent years there has been no snow. The mountainous sections of east Tennessee, of course, have winter snows.

Lexington, Ky., and central Kentucky experienced the heaviest blanket of snow in twelve years. With recurrent falls within 24 hours, the snow fall amounted to 10.3 in. As a precaution against suspension of service the Kentucky Traction & Terminal Company kept the city cars running all night. The interurban system did the same.

Arkansas experienced the heaviest general snow since 1921. The storm prevailed from the Ozarks on the northwest to the Mississippi on the east. The snowfall ranged in depth from 2 in. to almost 12 in., in some parts of the state. Texarkana, on the southwest border, had snow. Little Rock had quite a heavy snowfall, 6½ in. in one night, the heaviest storm of its kind in several years. The Arkansas Power & Light Company kept its snow fighting equipment in continuous operation day and night during the progress of the storm. So seldom are snow sweepers seen in Little Rock that their use by the Arkansas Power & Light Company on the night of Feb. 20 and the day following was of sufficient news value to lead the *Arkansas Democrat*, the afternoon newspaper, to print a picture of the snow sweeper in operation.

The fall of sleet and snow in Little Rock totalled 6½ in., the heaviest in several years.

A. R. Koonce, general superintendent of the railway department, put the snow sweepers in operation shortly after the snow began to fall on the afternoon of Feb. 20 and kept them going throughout the night with the result that railway schedules were maintained as usual.

With the streets covered with sleet and snow, many who usually go to and from work in automobiles were unable to start their cars and others were afraid to tackle the slippery thoroughfares. Thousands were surprised and gratified to discover that railway service was being maintained as usual.

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Carries Entire Worcester Population Every Other Day

The Worcester Consolidated Street Railway, Worcester, Mass., is carrying a series of constructive newspaper advertisements to show the value of railway service to the community. In the latest advertisement the company relates that it carried in its cars and motor coaches last year 37,396,261 passengers. The advertisement says the Chamber of Commerce estimates the population of the city of Worcester at 206,000. Therefore, the company says that on its cars and coaches last year it carried the equivalent of each person in Worcester 183 times or the whole population of Worcester every other day.

Four New Bulletins by Bureau of Information and Service

Special reports are being prepared by the American Electric Railway Association to be available to member companies, as follows:

BULLETIN No. 244—*Wages of Trainmen*—An entirely new edition of the association's regular wage bulletin based on replies of approximately 500 companies to a questionnaire sent out in February, 1929. It shows the present wage scale, the effective date and date of expiration, previous scale, union affiliations of trainmen, number of men employed, contract provisions governing the wage scale, and the average weekly wages earned by regular and extra men under the scale.

BULLETIN No. 245—*Wages of Bus Men*—Gives for bus operators substantially the same information as is contained in Bulletin No. 244 for trainmen, namely: the present scale of wages, the effective date and date of expiration, union affiliation of bus men, if any, number of bus men employed, average weekly wages earned under the scale, etc. Information furnished by about 250 companies is included.

BULLETIN No. 246—*The Regulation of Parking*—A summary of the parking regulations in effect in about 50 American cities showing the extent to which parking is restricted or otherwise controlled. It also indicates the extent to which these regulations are enforced, the attitude of the public toward them, the degree of success attained in expediting the movement of traffic through streets, and whether or not further regulation is contemplated.

BULLETIN No. 247—*Index to Street Railway Valuation Cases 1915 to 1928*—A classified list of references to rulings of courts and public utility commissions in electric railway valuation cases. A total of 107 decisions of public utility commissions and federal and state courts, handed down during the period 1915 to 1928, have been collected and analyzed with a view to showing the trend of decisions on the more important questions comprised in the subject of street railway valuation. Decisions in 26 cities, the District of Columbia and Canada are included.

COMING MEETINGS OF *Electric Railway and Allied Associations*

March 20—**Central Electric Traffic Association, Keenan Hotel, Fort Wayne, Ind.**

March 21—**New England Street Railway Club, Annual Meeting, Boston, Mass.**

April 5—**Metropolitan Section, American Electric Railway Association, 33 W. 39th Street, New York, N. Y.**

April 12—**Maryland Utilities Association, Annual Meeting, Hotel Emerson, Baltimore, Md.**

May 1-3—**Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

May 13-15—**National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

May 15—**Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.**

June 3-6—**National Association of Purchasing Agents, Annual Convention, Hotel Statler, Buffalo, N. Y.**

June 5-7—**Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

June 21-22—**New York Electric Railway Association, Bluff Point, N. Y.**

June 27-28—**Central Electric Railway Association, Michigan City, Ind.**

July 24-26—**Electric Railway Association of Equipment Men, Southern Properties, Lexington, Ky.**

Aug. 15-16—**Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

One-Man Operation Desired in Shreveport

All street cars of Shrevesport, La., will be placed under one-man operation provided a petition filed with the City Council by the Shreveport Railway is granted. A few of the cars now are one-man but most of them are required by city ordinance to have a conductor as well as a motorman. The company wants to go to one-man operation as a matter of economy. It sees a further increase in fares or ultimate collapse unless the request is granted. Repeal of a city ordinance adopted in 1907, requiring two men on cars in the city, is needed.

Information Committee in Pennsylvania Discontinued

Announcement was made on March 13 by Philip H. Gadsden, chairman, that "the work of the Pennsylvania public service information committee had been discontinued." Mr. Gadsden is vice-president of the United Gas Improvement Company of Philadelphia. He praised the work of the committee and said its services were now being handled by the individual companies.

Special Luncheons and Dinners on South Shore Line Diners

Introduction of a new special luncheon and special dinner on the menus of the Chicago, South Shore & South Bend Railroad diners is announced by the management. Suggestions from patrons that special one-price meals be introduced made the change desirable. Sample menus, furnished by the dining car department for the sake of illustration, carry four entrées on the luncheon, and five courses on the dinner.

Three Chicago Employees on Safety Scroll

Three employees of electric interurban railroads serving the Chicago metropolitan area were awarded the Britton I. Budd Medal for the Saving of Human Life on the evening of Jan. 22, when more than 600 employees of the Chicago Rapid Transit Company, Chicago, North Shore & Milwaukee Railroad (North Shore Line), Chicago, South Shore & South Bend Railroad (South Shore Line), Chicago, Aurora & Elgin Railroad ("Sunset Lines") and the Marigold Motor Coach Lines of the Metropolitan System gathered in the grand ballroom of the Palmer House, Chicago, for their seventh annual first aid and safety banquet. The men honored were John B. Andrews of the North Shore; John E. Haney of the South Shore, and Henry W. Matthews of the Elgin line.

This makes a total of seventeen employees of the various transportation companies who have saved human lives as a result of training in first aid principles. Of the three men saved by those to be honored on Jan. 22, two are in no way connected with the utility companies, while the life of one was saved at a place entirely removed from company property.

The medals were presented to the three life savers on behalf of Mr. Budd, president of the companies, by George R. Jones, vice-president of the Public Service Company of Northern Illinois and chairman of the committee of awards. The banquet also celebrated the establishment of a new record in first aid training among public utility employees of the Chicago metropolitan area. A total of 558 employees of the five companies completed the training course during the past year. The Rapid Transit Lines lead with a rec-

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ord total of 317 graduates. All these completing the course received company certificates and American Red Cross diplomas in recognition of their contribution to the safety and welfare of the public.

Higher Fares Sought in Augusta

The Georgia Power Company, which recently purchased the Augusta-Aiken Railway & Electric Company, Augusta, Ga., has petitioned the City Council for an increase in fares to provide for an extensive rehabilitation program. Under the proposed schedule the present 10-cent cash fare would remain, while the token fare of 7 cents now charged would be increased to 8⅓ cents, sales being in quantities of three for 25 cents. The 5-cent ticket for school children would be continued, but the present 5-cent ticket for school teachers would be discontinued, along with the regular 5-cent children's tickets good at other than school hours.

If the fares sought are allowed, the Georgia Power Company is prepared to expend approximately $310,000 in improving the present facilities in Augusta.

Bill Creating Seattle Commission Progresses

With the passage in the Senate of Senate Bill 296, first steps were taken toward creation in Seattle, Wash., of a street railway commission of seven members to take over and operate the Seattle Municipal Railway system. Under the bill, the commission would have complete power in all matters pertaining to the railway system and refunding of bond issues. It is prohibited from incurring general obligation indebtedness against the city.

Senator E. B. Palmer, who introduced the bill, declared that sooner or later Seattle would be forced to go into the general fund to make good a deficit of $1,500,000 incurred when the system was operated on a fare which brought in revenue below the demands, and that, before such a levy would be made, the system would have to be reorganized and placed upon a business rather than a political basis. Senator Heifner took issue with him, declaring that the bill would permit a refinancing and reorganization of the system on business lines and this would place the system upon a self-supporting basis without any need for general fund aid.

The Seattle City Council, meeting in committee of the whole, registered unanimous disapproval of the commission measure, and set on foot an effort to stop the bill's progress. Councilman E. L. Blaine fears that loans made to the street railway by the city light and city water departments might not be repaid should a group of citizens be given charge of the railway system. Even the political wiseacres appear to be unwilling to hazard a guess about the final disposition of the municipal railway matter.

Recent Bus Developments

Commission Sees Need for Bus Regulation in New York

The annual report of the Public Service Commission of New York, transmitted recently to Governor Roosevelt and the Legislature, said that transportation by bus continued to expand at a fairly rapid rate. Besides the many rural and intercity lines operating within the state, a large amount of city service also is being provided. Bus service in addition to railway service is being operated in the following cities: Albany, Binghamton, Buffalo, Cortland, Jamestown, Kingston, Mount Vernon, New Rochelle, Poughkeepsie, Rochester, Rome, Schenectady, Syracuse, Troy, Utica and Watertown.

In the following cities, all of the city transportation service is rendered by buses excepting the local service given in a few cities on interurban electric railroads.

Auburn, Geneva, Glen Cove, Glens Falls, Hornell, Hudson, Middletown, Newburgh, Olean, Oneonta, Oswego, Port Jervis, Rensselaer, Salamanca and White Plains.

The importance of regulation by the commission is found, among other things, in the matter of safety requirements. It is not possible for the commission properly to supervise bus operation with the present available force of two inspectors who are taken from their usual duties of railroad inspection, but it considers inspection of bus operation equally as important as that of steam or electric railroads.

On several occasions the commission has recommended the enactment of more complete legislation dealing with the regulation of bus operation. It regards the existing legislation as fragmentary and unsatisfactory. According to the commission, a new article should be added to the Public Service Commission law, setting forth a comprehensive statement on the subject of bus regulation in similar manner as other utility corporations are now covered by law.

Chicago Ruling Appealed

Petition for a rehearing of the case involving the right of the city of Chicago to compel the Chicago Motor Coach Company to obtain a local franchise for the use of its streets has been filed with the Supreme Court of Illinois by attorneys for the company.

Simultaneously with the filing of the petition with the Supreme Court, hearings were resumed before the Illinois Commerce Commission on the original petition of the motor coach company for permission to operate a total of 34 miles of new bus routes on the west and northwest sides of Chicago. This authority was granted by the commission last October but the Chicago Surface Lines, which had petitioned at the same time for the right to run feeder buses in the same area, appealed to the Circuit Court, which subsequently set aside the commission's order.

The Circuit Court held the commission order to be invalid on the grounds that the Chicago Surface Lines had not been given due notice of the hearings on the bus line's application.

Buses are operated over the new streets pending the outcome of the present hearing.

Sale of Evanston Project Asked

Approval of the sale of the Evanston Bus Company, Evanston, Ill., and the Niles Center Bus Company, Niles Center, Ill., to the Evanston & Niles Center Bus Company, a newly chartered corporation, was asked in a joint petition recently filed with the Illinois Commerce Commission. The Evanston Bus Company, formerly owned by the Evanston Railway, is a subsidiary of the Chicago Rapid Transit Company and the Niles Center Company is controlled jointly by the Rapid Transit and Chicago, North Shore & Milwaukee Railroad. The new company also asked for a permit to operate the respective properties and for authority to issue $350,000 of capital stock.

Expansion of Facilities in Hamilton

By a deal said to have been closed on March 5 and involving a total expenditure of $100,000, the Dominion Power & Transmission Company has acquired several additional bus lines, which will give it control of all bus services entering Hamilton, Ont., except the Gray Coach Lines of Toronto. Lines included in the latest absorption are: United Lines, operating between Hamilton, Caledonia and Simcoe; the Comet Line, operating to Galt; the Pathfinder service to Guelph; and two smaller lines, one operating to Milton, and the other to Binbrook. Acquisition of the Milton Line, however, is deemed important, as this, it is said, will facilitate the round-the-bay service the Dominion Power Company has been endeavoring to provide.

Several months ago the Dominion Power acquired the bus line operating between Hamilton and St. Catharines. Later it took over the Mountain Line, then the Hamilton and Dundas bus services, and also a line operating between Hamilton and Waterdown.

Toronto bus lines strongly opposed the application of the Dominion Company to operate buses over the North Shore route of the bay, but the latest deal will overcome that opposition, it is said.

The local company thus has a fleet

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of 80 buses, including those which supplement the service of the Hamilton Street Railway. It is said the deal was consummated by Denman & Company, bankers of Hamilton.

Experiment in Newport News

Service over the East Hampton railway line at Newport News, Va., will be abandoned for a week by the Virginia Public Service Company as an experiment to determine which is more satisfactory for the section, bus or car service. Under order of the State Corporation Commission, the utility may advertise its intention and for one week substitute buses for cars at the same fare now charged.

More Testimony on Amsterdam Operation

No decision was made by the New York Public Service Commission following an oral argument on March 7 on a rehearing granted the Fonda, Johnstown & Gloversville Railroad over the certificate granted to Charles Vollmer for the operation of a bus line in Amsterdam. Wesley Maider, attorney for the railway, asked the commission to reconsider its order granting the certificate and to amend the certificate, alleging a daily loss of revenue to the railway of $32.16 because of bus operation. Mr. Maider said if this loss continued it would mean abandonment of service by the company, which had invested approximately $4,000,000, covering about 80 miles of tracks in Amsterdam, Gloversville and other territory served.

Arthur Kline, attorney for Mr. Vollmer, disputed the loss of revenue claimed by Mr. Maider. He said residents had petitioned the Common Council to grant the certificates to Mr. Vollmer.

New Service in St. Louis

New competition for the People's Motorbus Company and the St. Louis Public Service Company began on March 6 with the opening of a 15-cent de luxe service to operate between Manion's Park, 8600 South Broadway, and Union Market, Broadway and Morgan Street, St. Louis. A schedule has been arranged under which buses are to leave the terminus at three-minute intervals during the rush hours and five-minute intervals at other times. The line will operate between 6:30 a.m. and 7 p.m. The automobiles are to be manned by members of the International Brotherhood of Teamsters, Chaffeurs, Stablemen and Helpers, Local No. 408.

The People's Motorbus Company Broadway line charges 10 cents while the railway fare is 8 cents. The bid for business being made by the new line depends almost entirely on the promise of the promoters to reduce the running time for the round trip over that of the present service.

Provisions of New York Highway Law Combined

Governor Roosevelt, of New York, has signed the Westall bill, combining into one law all provisions of the highway law relating to motor vehicles. This new law is a product of the committee on reorganization of the state government. It was vetoed last year by Governor Smith, but since then certain controversial points have been eliminated.

The new law places under one cover all of the provisions of state law relating to motor vehicles and traffic and sets up standard state-wide provisions for regulating highway traffic outside of the city of New York. These latter provisions are contained in article 6 of the new law and relate to operation of vehicles, right-of-way, signals, meaning of colors, pedestrians' rights and duties at controlled intersections, turning at intersections, parking, safety zones, cab stands, other vehicles, street surface cars, duties of police authorities, powers of local authorities, penalties.

Under the section "Right-of-Way" it is provided that "when in the performance of duty the following vehicles shall have the right-of-way: United States mail, police, fire, fire patrol, bureau of buildings, repair of public service corporations, ambulances and the military, but this shall not relieve the driver or owner of any such vehicle from liability for injuries inflicted in consequence of the arbitrary or careless exercise of this right."

Under the new law colors are restricted in traffic regulation. Section 84 of the new law reads:

§84. MEANING OF COLORS. Whenever traffic at any intersection is regulated by a traffic control signal, the following colors may be used and none other, and those colors herein authorized shall, when lighted, indicate as follows, except as provided in sections 85 and 86.

Red requires that traffic shall stop and remain standing.

Green requires that traffic shall move.

Amber, when used, shall only warn traffic that the colors in the signal are about to change. No traffic shall enter an intersection controlled by a traffic control signal while the amber is lighted. Amber when used in precautionary signals without other colors, either fixed or flashing, shall mean proceed with caution.

In section 85 it is provided that at intersections whose traffic is controlled by traffic control signals, pedestrians shall cross the street only in the direction of moving traffic and operators of vehicles, when turning, shall yield the right-of-way to pedestrians when so crossing.

A new insertion in the law, under that part where indemnity bonds or insurance policies are required from persons carrying passengers for hire, provides that every person operating a motor vehicle as to which a bond or policy of insurance is required, which in any manner is involved in an accident, shall within five days give written notice of the time and place of the accident to the surety or insurer. Failure to give such notice shall constitute a misdeameanor, but shall not affect the liability of the surety or insurer.

Substitution on Quincy Lines Sought

Authority has been asked by the Illinois Power & Light Corporation of the Illinois Commerce Commission to discontinue railway service on its Maine and Twelfth Streets lines, Quincy, Ill., and to substitute motor coach service. The corporation will pay the city a $50 annual bus license fee and repave all streets where track is removed.

Buses Succeed Cars on Ohio Line

The last car on the Southern Ohio Public Service Company passed over the rails between Newark and Zanesville on Feb. 15. The Columbus and Buckeye Lake end of the line ceased to operate on Jan. 15. This electric interurban road operated between Columbus and Zanesville via Buckeye Lake and Newark for the past 26 years. The Ohio Power Company, which purchased the equipment recently, will continue the operation of buses over substantially the same route.

Temporary Service on Spring Street, Albany

The United Traction Company, Albany, N. Y., will operate buses in Spring Avenue and Hill Street, Troy, under an arrangement to be effected between officials of the company and representatives of the Troy corporation counsel's office. The arrangement will enable a month's trial. If the patronage justifies the service it will be continued.

Permission Sought for Rome Bus Line

The Utica Railway Co-ordinated Bus Line, Inc., filed a petition on March 13 with the Public Service Commission for a certificate for the operation of a bus line in Rome, N. Y., running to the New York Central station. The petition is accompanied by the consent of the Rome Council approved by the Mayor.

Controversy at Menasha Settled

Peace has been declared in the bus license controversy between the city of Menasha, Wis., and the Wisconsin-Michigan Power Company and through operation of buses was renewed on Feb. 23. When the City Council raised the fee from $50 to $300 for each bus and required licenses, the company announced that unless a settlement could be reached all buses would be removed from the Appleton to Neenah and Menasha runs. The license matter was settled by agreement upon a fee based on a charge of a mill per ton-mile. This is the fee charged by the state to public carriers operating on state highways.

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Financial and Corporate

Louisville Appraisal Presented

Most liberal of five sets of figures by Public Utilities Bureau $2,000,000 under company's claim

AFTER months of work, the Public Utilities Bureau's report on the appraisal of the Louisville Railway, Louisville, Ky., has been handed to the Board of Public Works and Mayor William B. Harrison.

Based on the report covering its investigation of the valuation of property of the railway to establish a rate base to determine a fair and reasonable rate of return, the board submits the following findings:

1. That the rate base on the capitalization of net income for the year ended Dec. 31, 1928, was $12,713,943.

2. That the rate base on original cost of ledger value (book value) for the year ended Dec. 31, 1928, was $21,934,317.

3. That the rate base on the historical cost for the year ended Dec. 31, 1928, was $26,188,718.

4. That the rate base on the outstanding capitalization for the year ended Dec. 31, 1928, was $22,533,210.

5. That the rate base on the reproduction cost new less depreciation for the year ended Dec. 31, 1928, was $26,061,707.

6. That the trend of costs for material used for electric railways increased 103 per cent—1928 over 1913, and the construction costs for electric railways increased 42 per cent—1928 over 1913.

7. That statistical data covering period from 1921 to 1928, inclusive, as shown under exhibit No. 7, indicates the following trend of demand for service of the Louisville Railway.

(a) All passengers carried by street cars showed only 5 per cent increase.

(b) Total passengers carried by street cars and buses showed an increase of only 6 per cent.

(c) Total street car and bus-miles operated were increased 21 per cent.

(d) Total street car-hours operated showed 17 per cent increase.

(e) Passengers carried per car-mile decreased 12 per cent.

(f) Passengers carried per car-mile for combined service of street cars and buses showed a decrease of 14 per cent.

(g) Riding habit per population for street cars showed a decrease of 25 per cent.

(h) Riding habit for combined services of street cars and buses showed decrease of 24 per cent.

In discussion the valuations of property, the bureau said, "unfortunately, no precise definition of fair value has ever been laid down, either by the various statutes providing for rate regulations or by any court in the United States, in passing on the constitutionality of rates from the time of the celebrated case of Munn vs. Illinois State, decided by the Supreme Court in 1876, up to the O'Fallon case now before the United States Supreme Court for a decision." It said further:

The Magna Charta of "fair value" in the opinion of the Supreme Court in the famous case of Smyth vs. Ames, decided in 1898, was that, as a general principle, a company is entitled to earn a fair return on the "fair value of its property used in public service."

It announced that reasonable rates from the standpoint of investors must allow a fair return upon the fair value of the property.

The bureau found that the price index of 1928 over the average from 1913 to 1922 is equal to 28 per cent; this was arrived at by taking the average price indexes of the electric railway construction costs of the American Electric Railway Association for 1913—equal to 100 per cent—down to 1922. This average was 159.2 per cent and the average price index for 1928 was 203.1 per cent. By applying the 28 per cent, the increase in prices, times $20,677,712 produced the total value of the property Dec. 31, 1922, at $26,467,470. Then additions and betterments were added to Dec. 31 last with additions and deductions for price changes and this produced $28,217,700.

Conferences Ahead

From this, the bureau said, it deducted $1,138,714 for property not used and useful and $1,540,047 for the depreciation and reserve account carried, making a figure of $25,538,939.

No allowance was made in this, the bureau said, for intangible values such as going concern value, but the inclusion of cash totaling $329,482 was made as were materials and supplies totaling $320,297, making the total rate base on the factors of the particular study of $26,188,718.

The bureau found five values for the company's property on assumptions which must be weighed in arriving at a value, according to the accepted rulings of the Supreme Court.

Conferences are planned between the board and the bureau over some of the figures, conferences between the Mayor and the board with the railway officials, and then after the various phases have been threshed over, a stand by the city for a certain agreed value of the company's property. The highest value found by the bureau is still nearly $2,000,000 under that claimed by the railway in its recent letter to the Mayor.

$11,281 Deficit for Colorado Municipal Line

Fort Collins' municipally-owned railway showed a deficit for 1928 of $11,281 plus the interest on $75,000 outstanding street railway bonds, and $2,709 for street paving improvement district assessments. The total receipts of the system in the Colorado city for the year were $19,106. The expenditures totaled $30,388. Of the total receipts, $17,539 was received for fares. The expenditure made for labor was $17,384.

Change of Trustee Sought for Massachusetts Road

The petition of the American Trust Company, Boston, to resign as trustee under a mortgage made June 19, 1906, by the Lowell & Fitchburg Street Railway, Lowell, Mass., to secure an issue not exceeding $100,000 face value 20-year gold bonds of the railway was heard by Judge Sanderson, of the Supreme Court, on March 5.

The principal of the bonds was payable in 1926, but a bondholders' committee requested that no foreclosure proceedings be instigated at that time. In the petition just filed a new trustee is sought since all members of the bondholders' committee are residents of Gloversville, N. Y., from which a trustee is desired to avoid expense in case a foreclosure sale is necessary.

The railway is operated by the Eastern Massachusetts Street Railway at a small profit. Representatives of the bondholders' committee said that it would be to the best interest of the bondholders to have an individual trustee appointed. Judge Sanderson said he had never known of a non-resident trustee being appointed for a Massachusetts company. Subsequently, the court dismissed the action by consent of counsel.

Ogden Receiver Dismissed

The receivership of the Utah-Idaho Central Railroad, Ogden, Utah, has been lifted by the federal court. Recently the road was refinanced, and the dismissal of the receiver followed the presentation of evidence to show that the outstanding debts of the road had been liquidated. P. H. Mulcahey was receiver for the road.

Patronage Increases in Milwaukee in 1928

During 1928 the transportation system of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., carried 215,823,326 passengers, an increase of 5,036,753 over 1927. This fact was disclosed in the annual report which showed gross earnings for the entire company of $29,510,946 against $27,507,550 for 1927 and a net income of $4,833,750 against a net income in 1927 of $3,966,905. No separate earnings statement for the railway is included.

Ten new street cars and five street car type buses were purchased for the Milwaukee city system, and ten modern cars formerly in interurban service were reconstructed for use on the South Milwaukee suburban line. Eleven cars of a larger and more modern type were placed on the Racine city system. Improved service with electrically-heated one-man safety cars was provided on several Milwaukee lines, and service extensions were made to a number of outlying districts, principally by means of auxiliary bus operation. The company began work Dec. 3 on a rapid transit

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project that will, by means of a contemplated subway terminal and 2.8 miles of new line on private right-of-way, provide high-speed local service between the heart of the city and the rapidly growing urban district to the west.

The Milwaukee Northern Railway, a subsidiary, was merged with the Milwaukee Electric on April 30, 1928. The former Northern company operated a city street car line in Milwaukee and interurban service to Sheboygan.

One of the outstanding railway projects of 1928 was the relocation and grade separation of about a mile of track in the western section of the city of Milwaukee. This project gives Milwaukee its first four-track electric railway line. Two tracks are used exclusively by the Wells-West Allis suburban cars, and the other two by local and interurban rapid transit lines.

The company's Milwaukee-Racine-Kenosha interurban railway line became a rapid transit route on July 15 when this service was routed over 9½ miles of new private right-of-way immediately south of Milwaukee. Arrangements were made in 1928 for freight car interchange between the company's East Troy-Burlington rapid transit line and three transcontinental steam railroads.

Beginning July 4 and continuing to the end of the tourist season the company operated two daily motor coach trips covering many points of interest about the metropolis. These tours were conducted as part of an international system of co-ordinated local sight seeing trips known, from the color of the coaches employed, as Gray Line Tours. International publicity was given the Milwaukee trips in circulars distributed throughout the territories served by the Gray Line system. The company also took over operation of the popular sight seeing trips, conducted daily throughout the summer in connection with excursions by steamer from Chcago.

35,775,749 More Passengers

Another record year scored by Chicago Surface Lines. Total rides 1,621,215,876, including transfers. Gross earnings more than $62,000,000

STREET car riding in Chicago increased to the extent of 35,774,749 rides last year, according to the report of the Chicago Surface Lines for the twelve months ending Jan. 31. Substantial gains also were made in earnings and in service.

Total rides, including transfers, were 1,621,215,876 and revenue rides, not including transfers, 892,814,620—the latter an increase of 10,355,973 more than the previous fiscal year. Each month of the year, with the exception of April, June and December, showed a gain over the corresponding month of the preceding year. Service was increased 728,354 passenger car-miles.

Life, health and disability insurance was established for all employees and an increase in trainmen's wages amounting to 1 cent an hour was effective after June 1, but residue receipts were $13,430,555, an increase of $37,299 over the previous year.

Gross earnings were the highest in the history of the company, amounting to $62,391,622, an increase of $766,870 as compared with the previous year.

These increases by Chicago street cars, it is pointed out, were made in spite of the fact that the electric railway industry of the country showed a decrease for the year of 1.10 per cent and that steam railroads reported the smallest number of passengers since 1905. In summing up the report, Henry A. Blair, president, said:

Although for two years the Chicago Surface Lines has been operating under temporary franchise extensions without ability to provide adequately for present needs or to plan for the future, it still holds first place among the electric railways of the country as an outstanding example of efficient operation, increasing business and maintenance of the property.

As pointed out in the accompanying report, service was improved and new records were established in the operation of equipment, in car-miles and in accident prevention. Due to economy and efficiency in operation, residue receipts show an increase over the previous year in spite of the added burden of more than $600,000 in increased

CHICAGO SURFACE LINES STATISTICAL DATA FOR THE FISCAL YEARS ENDED JAN. 31

	1925	1926	1927	1928	1929
Rate of fare, cents	7c-6⅔	7c-6⅔	7c-6⅔	7c-6⅔	7c-6⅔
Revenue passenger	830,151,540	842,201,453	876,249,663	882,458,647	892,814,620
Passenger receipts	$57,284,602	$58,076,487	$60,436,705	$60,892,995	$61,597,374
Total earnings	58,081,678	58,785,880	61,173,601	61,624,752	62,391,622
Operating wages	29,246,390	29,012,641	29,812,518	30,280,959	30,348,351
Other operating expenses and taxes	17,328,569	17,615,564	18,058,971	17,950,536	18,612,715
Residue receipts	11,506,717	12,157,674	13,302,111	13,393,256	13,430,555
Less: Joint account expenses	450,000	130,297	363,934	657,038	554,449
	$11,056,717	$12,027,376	$12,938,176	$12,736,217	$12,876,105
5 per cent on purchase price	8,127,158	8,169,099	8,173,948	8,190,354	8,210,205
55 per cent to city	1,611,257	2,122,052	2,620,325	2,500,224	2,566,245
45 per cent to companies	1,318,301	1,736,224	2,143,902	2,045,638	2,099,655

FINANCIAL STATEMENT OF CHICAGO SURFACE LINES FOR YEAR ENDED JAN. 31, 1929

	1929	1928
Earnings:		
Passenger cars	$61,597,374	$60,892,995
Chartered cars	4,447	4,837
Newspaper cars	9,606	16,608
Freight earnings	.....	888
Hospital car service	1,590	2,088
Advertising	300,961	290,263
Rents of buildings, etc	173,018	174,741
Sale of power	99,552	98,056
Interest on deposits	192,124	134,438
Miscellaneous	12,950	9,838
Gross earnings	$62,391,622	$61,624,752
Expenses:		
Way and structures	$2,899,168	$3,006,276
Equipment	4,070,336	4,247,925
Renewals	4,991,329	4,929,980
Power—maintenance	394,378	387,445
Power—operation	3,755,123	3,683,540
Conducting transportation—trainmen	21,938,572	21,789,269
Conducting transportation—other	3,273,154	3,246,443
Traffic	98,495	120,177
General and miscellaneous—damages	1,871,748	1,848,742
General and miscellaneous—other	2,108,764	2,071,698
Taxes	3,560,000	2,900,000
Total expenses	$48,961,067	$48,231,495
Residue receipts	*$13,430,555	*$13,393,256
Dividend:		
Chicago Railways Company—60 per cent	*$8,058,333	*$8,035,953
South Side Lines—40 per cent	*5,372,222	*5,357,302

*Includes city's 55 per cent of net divisible receipts, as defined by ordinances.

COMPARISON SHOWING GROWTH OF SYSTEM SINCE UNIFICATION

	1929	1915	Per Cent Increase
Gross earnings	$62,391,622	$31,966,049	95.18
Operating expenses	$48,961,067	$19,889,276	146.17
Taxes	$3,560,000	$1,439,279	147.35
Operating wages paid	$30,348,351	$10,560,039	187.39
Total wages paid	$33,295,118	$12,379,615	168.95
Revenue passengers carried	892,814,620	627,731,550	42.23
Total rides	1,621,215,876	1,115,312,129	45.36
Average fare per revenue passenger	6.90c	4.99c	38.28
Average fare per ride	3.80c	2.81c	35.23

TRACK MILEAGE OF CHICAGO SURFACE LINES

During the fifteen-year period of unification the companies have constructed 122 miles of new extensions (single track equivalent) at a cost of $6,683,715 and reconstructed 553 miles of single track at a cost of $33,622,017 of which $25,498,790 was paid out of the renewal funds and $8,123,226 was new capital. Track mileage of all companies, compared with the previous fiscal year, is as follows:

	Total Miles Single Track 1-31-28	Extensions 1928	Abandoned 1928	Net Extensions 1928	Total Miles Single Track 1-31-29	*Reconstructed 1928
Chicago Railways	597.09	0.42	0.01	0.41	597.50	20.48
Chicago City Railway	339.01	0.15	....	0.15	339.16	12.36
Calumet & South Chicago Railway	128.05	0.07	....	7.00	128.12	4.20
The Southern Street Railway	17.45	....	....	....	17.45	.....
Total	1081.60	0.64	0.01	0.63	1082.23	37.04

*Includes track taken up and replaced on account of sewers, special straight track renewals, etc.

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taxes, $500,000 expended in premiums for life, health and disability insurance for all employees and $250,000 more paid out in increased trainmen's wages.

While all of this is most gratifying it is but an indication of the greater service these properties could render in this community under adequate franchise provisions, permitting their co-ordination with other transportation agencies and the building up of a comprehensive system. Fortunately, some progress is being made in this direction and it is the hope that the near future will see the laying of the foundation for development here of the greatest local transportation service in the world.

Accident prevention work during the year resulted in a decrease of 12 per cent in fatal accidents, making a total reduction of 25 per cent for two years. The number of fatalities was the lowest since 1914, notwithstanding the increase of 45 per cent in the number of riders since that time.

A new world's record for the operation of every car on five successive days was established on Dec. 17 to Dec. 21 inclusive when 3,639 cars were in service.

No Abandonment in Piqua

Announcement has been made by the Dayton & Troy Traction Company that no attempt is to be made at present to eliminate the electric railway system in Piqua, Ohio. Several weeks ago it was stated that the company would petition the City Council for permission to cease operating the Piqua service, due to an alleged loss of $1,000 a month. The franchise to operate the Piqua lines is combined with the franchise permitting the company to operate its interurban system through the city.

Purchase of Oklahoma Belt Line Proposed

The Oklahoma Railway, Oklahoma City, Okla., has applied to the Interstate Commerce Commission for authority to acquire by lease and purchase of capital stock the Oklahoma Belt Railway, a 5-mile line in Oklahoma City. The applicant, an electric line, controls the belt railway, for which it paid $25 a share for 5,910 shares. As indicated previously in the ELECTRIC RAILWAY JOURNAL, the belt line will be electrified.

Successor to Company in New York City Organized

The Second Avenue Railroad Corporation, New York City, has been chartered by the Secretary of State as a reorganization of the Second Avenue Railroad with capital of 34,000 shares no-par value stock. George E. Warren, Stamford, Conn., John F. B. Mitchell, Flushing, N. Y., and C. Lansing Hays, Brooklyn, are directors and subscribers. Merrill, Rogers, Gifford & Woody, New York City, are attorneys for the corporation. Approval of the terms of the reorganization by the Transit Commission was noted recently in the JOURNAL.

Railway Serving Rockaway Resorts to Be Scrapped

Valued in 1927 at $350,000, the Ocean Electric Railway, which carried passengers from Rockaway to various parts of the peninsula for 25 years, has been sold for $500 to H. E. Salzburg, Manhattan dealer in electric machinery. The Long Island Railroad operated the Ocean Electric. It reported that the contract called for complete removal of all the equipment within 90 days. Mr. Salzberg declared he had bought the franchise rights on the Belle Harbor-Rockaway Park and the Far Rockaway sections for $33. At present the peninsula is served by bus lines.

Appraisal in Kansas City

The Public Service Commission issued an order on March 12 directing its engineers to appraise the properties of the Kansas City Public Service Company, Kansas City, Mo., and requiring its accountants to audit the company's books. This is the usual procedure following an application for a new schedule of increased fare. Action on the schedule sought will be delayed 120 days to permit the appraisal and audit to be completed.

Eastern Massachusetts Elects

At the annual meeting of the Eastern Massachusetts Street Railway stockholders, Edward M. Hamlin and E. Sohier Welch were elected directors, filling vacancies caused by the retirement of H. R. Hardwick and Frederick H. Baird.

The stockholders voted to change dates of the payment of dividends on the first preferred, sinking fund, preferred "B" and adjustment stocks from semi-annual to quarterly dates. The first preferred, sinking fund, and preferred "B" stocks will be payable Fed. 1, May 1, Aug. 1, and Nov. 1. Dividends on the adjustment stocks will be payable the first day of January, April, July and October, except in April, 1929, when a semi-annual dividend of 2½ per cent will be paid. The company has declared an initial dividend of 37½ cents on the common, payable on April 1 to stock of record, of March 15.

Lester Watson, director and trustee, said that the management has made every effort to counteract this decline and is going ahead with increased use of buses. He said that fare reduction might in some cases stimulate riding and that the management was now considering a radical change in this direction on one of its divisions.

Encouraging Report to Stockholders of Michigan Line

In spite of a parallel bus line competition, the United Suburban Railroad, Grand Rapids, Mich., successor to the defunct Holland & West Michigan Interurban Company, had a successful year in 1928. Plans for improving the service during the coming year were made at the recent annual meeting.

Additional Stock for Springfield Construction Program

An increase of $500,000 in the 6 per cent preferred stock of the Illinois Power Company, Springfield, Ill., was authorized on March 8 at the annual meeting of the stockholders. The additional stock, which increases the capital stock of the company from $1,500,000 to $2,000,000, will be sold to the public to provide funds for the $800,000 construction program of this year. Approval of the Illinois Commerce Commission must be secured for the increase in the capital stock.

A. D. Mackie, first vice-president and general manager, reported gross earnings of $2,732,116 for the year 1928, an increase of $105,000 more than the previous year. The sum available for the surplus was $185,970, after all operating expenses, taxes, bond interest, depreciation, dividends and retirement of preferred stock had been paid. Depreciation took $150,000 and taxes $187,534. He also explained that the surplus was almost exhausted by repairs following the big sleet storm of December, 1924. The report showed that 3,380 stockholders were paid dividends amounting to $228,246.

In the transportation department, 1,100,000 fewer persons were carried in 1928 on the street cars and buses than in 1927.

During the past year improvements costing $474,000 were financed by the sale of 6 per cent preferred stock. Indebtedness was decreased by $53,000, that amount of the 7 per cent securities being retired.

Line to Be Abandoned in Buffalo

The Public Service Commission on March 12 approved the declaration of abandonment by the International Railway, Buffalo, N. Y., of its shuttle line in Best Street between Genesee and Elm Streets, a distance of 7,320 ft.

New Chairman of Directors in Columbus

Benjamin W. Marr, for ten years a director of the Columbus Railway, Power & Light Company, Columbus, Ohio, has been elected chairman of the board of directors and chairman of the executive committee of that company. Mr. Marr will have complete charge of the company's affairs and will direct its policy in relation to the public. Since assuming the duties of his office, Mr. Marr has stated that the proposed increased rates will not go into effect without the city's sanction. He also stated that the books of the street railway would be open to anyone the city wished to employ to examine them.

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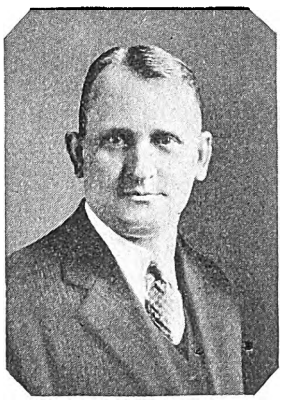
Personal Items

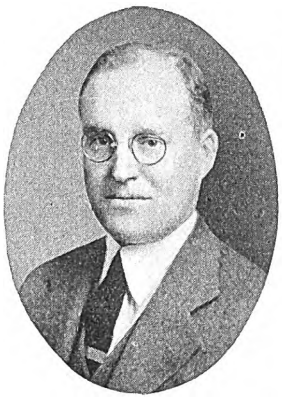
Promotions in Cincinnati

Joe R. Ong in charge of research; Harley L. Swift, assistant general manager; Jesse E. Carnes, assistant superintendent of transportation

THREE new directing positions have been created in the operating section of the Cincinnati Street Railway, Cincinnati, Ohio. The positions are, director of research, filled by Joe R. Ong, formerly transportation engineer; assistant general manager, filled by Harley L. Swift, formerly superintendent of substations; and principal assistant superintendent of transportation, filled by Jesse E. Carnes, formerly superintendent of motor coach operation.



Jesse E. Carnes



Harley L. Swift

Joe R. Ong

The changes made necessary by these appointments were as follows: H. C. Genrich was promoted from chief electrician to superintendent of substations; Homer H. Sorter was promoted from coach supervisor to superintendent of motor coach operations.

Howard Nestor, formerly a supervisor, has been made assistant superintendent of transportation in charge of night operation, while N. Wickersham continues as assistant superintendent of transportation in charge of day operation.

Carl J. Wendt has been made superintendent of schedules. He had formerly been assistant in the office of the transportation engineer.

In commenting on these appointments, Walter A. Draper, president, said:

> These changes are made necessary by the expanding business of the system and the continued need of more modern methods. Research plays an important part in all business of today and the experimentation with types of equipment and the study of scientific and adequate schedules has made necessary the research department. The complete reorganization of the power system with nineteen instead of the previous smaller number of substations and the proper correlation of the street car and motor coach branches of the transportation department required an organization in which the duties were more definitely outlined.

P. M. Wentworth Honored by Stone & Webster

P. M. Wentworth, of Orlando, Fla., has been named district manager of the companies comprising the southeastern district under the executive management of Stone & Webster of Boston. The companies include the Jacksonville Traction Company, Key West Electric Company, Tampa Electric Company, Columbus Electric & Power Company, Savannah Electric & Power Company, the Florida Motor Lines, the Orange Belt Motor Lines, the Orlando Rapid Transit Company and the South Terminal Company. Since 1927 Mr. Wentworth has been executive vice-president of the Florida Motor Lines and affiliated companies, moving to Orlando from Sidney, Nova Scotia, where he was manager of the Cape Breton Electric Company, Ltd. Mr. Wentworth will maintain his headquarters at Orlando.

Personnel of Los Angeles Company

Officers of the Pacific Electric Motor Transport Company, Los Angeles, Cal., are C. W. Cornell, president; L. B. Young, manager; L. E. St. John, secretary-auditor, and J. L. Smale, treasurer.

This company was organized to provide a complete store-door, pick-up and delivery freight transportation service in co-ordination with existing rail lines, particularly the Pacific Electric Railway, referred to recently in the JOURNAL.

WALTER J. MCCARTER has been appointed to a newly created position with the title of assistant educational director of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. He will continue as supervisor of training in the transportation department.

O. C. Wright Succeeds Michael O'Brien in St. Louis

Under a recent reorganization of its equipment and shops divisions, O. C. Wright becomes general superintendent of equipment St. Louis Public Service Company, St. Louis, Mo. He succeeds Michael O'Brien, retired. Mr. O'Brien, as master mechanic, was in charge of the shops.

With the exception of Mr. Gray, other officials mentioned in the change in the equipment department have been in the company's service for some time. They are:

Shop Superintendent C. M. Gray, who formerly was shop superintendent for the Pennsylvania Railroad, Indianapolis, Ind.

Superintendent of Car Stations A. Riley, who will have charge of the repair work at the various car stations on the system.

Automotive division in charge of Adam Ebinger, superintendent of garages.

Engineer of Equipment C. W. Young, who will have charge of the drawing rooms and engineering work.

Engineer of Tests M. M. Ridker, who will direct all test work and chemical analyses.

Almost immediately upon leaving college Mr. Wright entered the employ of the Pennsylvania Railroad at Columbus, Ohio, as a special apprentice in the maintenance of equipment department. He finished the four-year course of apprenticeship at Fort Wayne, Ind. Finishing his apprenticeship he held various positions in the Pennsylvania's organization; he was electrical engineer and engineer of motive power at Pittsburgh, Pa.; for eight months he served as master mechanic at the Logansport, Ind., shops and then was made division superintendent at Cambridge, Ohio. Next he served one year as superintendent of motive power at Chicago. For four years he was district master mechanic at Fort Wayne, Ind., with three divisions under his jurisdiction. Later he went to Indianapolis. Going with the St. Louis Public Service Company, Mr. Wright devoted the remainder of 1928 to a study of the company's equipment problems under Sam Greenland, whom he had served in Indiana.

Mr. Wright was born at Marion, Ind., on June 20, 1883. He received his primary grade and high school training in the public schools of his home city. Later he attended Purdue University School of Electrical Engineering from which he was graduated in 1905.

Under the old plan of organization the master mechanic reported directly to the assistant general manager. Mr. Wright, who came to the Public Service Company from the Pennsylvania Railroad in May, 1928, will have direct supervision over the company's shops and will not only keep the present equipment in service, but will design new equipment and direct any construction program undertaken by the company.

Mr. Wright's predecessor, Michael

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O'Brien, will enter private practice with his son, Edward J. O'Brien, a consulting mechanical engineer. Michael O'Brien was born in the city of St. Louis. After serving an apprenticeship as a machinist in the shops of Smith-Beggs & Rankin, Corliss engine builders of St. Louis, he became, in 1889, assistant power house engineer of the Citizen's Railway, now part of the St. Louis Public Service Company, and one of the first St. Louis horse car lines to adopt the cable. After eighteen months in this position he resigned to become deputy boiler inspector of the city of St. Louis, but after one year as boiler inspector he returned to the Citizens Railway as chief engineer of its cable power house. In 1896, when the cable was discarded for electricity, Mr. O'Brien became master mechanic of the company.

In 1900, Capt. Robert McCullough, who had been president and general manager of the Citizen's Railway, went to Chicago as vice-president and general manager of Chicago's southside surface lines. He shortly took from St. Louis, Mr. O'Brien, as master mechanic of the Chicago property and Harvey B. Fleming as chief engineer. In 1904, just before the St. Louis World's Fair, Captain McCullough returned to St. Louis as vice-president and general manager of the St. Louis Transit Company and Mr. O'Brien was brought back to St. Louis as master mechanic.

Since 1904 Mr. O'Brien has been continuously master mechanic of the St. Louis Transit Company and its successors, the United Railways, the receiver of the United Railways and the St. Louis Public Service Company.

D. P. McConnell With Public Service

Daniel P. McConnell, long in newspaper work, has become identified with the publicity department of the Public Service Railway, Newark, N. J.

His newspaper career was interrupted when he was appointed deputy commissioner of parks and public property at Camden, in May, 1927. Mr. McConnell resigned his city position to accept the job of publicity assistant for the southern division with headquarters in Camden.

Entering the newspaper field when 17 years old, Mr. McConnell spent 16 years with the old Camden *Post-Telegram*. He was also court and legal reporter for the *Evening Courier* for a few months and represented the Philadelphia *Public Ledger* in Camden for eight years. At one time he was sports editor of the *Post-Telegram*.

GEORGE R. TRUE, a member of the claims department of the Chicago Rapid Transit Company, Chicago, Ill., for the past eighteen years, was recently appointed claims agent for the company. He began his service with the elevated lines in 1911 as claims adjuster. Prior to that time he had been engaged in newspaper work in New York City.

G. M. Gadsby Heads Utah Property

George M. Gadsby has been made vice-president of the Utah Light & Traction Company, Salt Lake City, Utah, succeeding D. C. Green. Mr. Gadsby is also the new president and general manager of the Utah Power & Light Company. Early in the present year he resigned as president of the West Penn Power Company to become associated with the Electric Bond $ Share Company, New York. He had spent more than ten years with the West Penn system at Pittsburgh.

Mr. Gadsby obtained his first practical engineering experience as chemist with the water department at Marietta, Ohio, and early in his career was employed as chemist for the Warren Water Company, a subsidiary of the American Water Works & Guarantee Company at Warren, Pa. From there he went to Pittsburgh, subsequently to Little Rock, Ark., and later to New York. Two years later—in 1917—Mr. Gadsby returned to Little Rock to engage in business, but before he had established himself he was requested to return to Pittsburgh as assistant to A. M. Lynn, president West Penn Power Company.

G. M. Gadsby

While engaged in public utility work in Pennsylvania he has been very active in association affairs. He has also acted for two years as chairman of the special power survey committee representing the Pennsylvania Electric Association in work with the "giant power" survey board and work in conjunction therewith by the Public Service Commission.

H. Hobart Porter Honored

H. Hobart Porter, engineer and industrialist, has been elected chairman of the Engineering Foundation, 29 West 39th Street, to succeed Lewis B. Stillwell. The new chairman is president of the American Water Works & Electric Company and of the Brooklyn City Railroad. He is chairman of the board of the West Penn Electric Company and is vice-president of the Queensboro Gas & Electric Company. He is a director of several power companies and railways.

OBITUARY

GEORGE D. WALDEN, assistant superintendent of tracks United Electric Railways, Providence, R. I., from 1917 until July, 1927, died recently. Early in his career he entered the employ of the Metropolitan Street Railway, Boston, becoming in time assistant superintendent and finally division superintendent of transportation. During this time the Metropolitan Company was consolidated with the West End Street Railway. Mr. Walden went to Providence as a track foreman in May, 1904. During his years of services he had charge of special track work in Pawtucket, on the Providence-Woonsocket line and later assisted in city installation work in Providence.

JAMES A. DORSEY, for many years superintendent of lines Connecticut Valley Street Railway, died in his home in Northampton, Mass., on Feb. 22, at the age of 60 years. After concluding his service with the Connecticut Valley system he was employed by the Boston & Albany Railroad for ten years.

MATTHEW GRISWOLD, who retired as manager of the Erie Works of the General Electric Company on Jan. 1 of this year because of ill health, died on Feb. 10. On Nov. 11, 1911, he severed his connection with the Griswold Manufacturing Company to become acting manager of the Erie Works of the General Electric Company. He was made manager of the plant on Dec. 12, 1912. Mr. Griswold was born in Erie in 1866. He was graduated from Sheffield Scientific School, Yale, in 1888.

JOHN A. GUIHER, prominent northeastern Iowa attorney, former member of the State Railroad Commission, and remembered in utilities circles for his association as arbitrator in the dispute between the Des Moines Railway and its employees in 1907, died Feb. 26 in Miami, Fla. Mr. Guiher recently was special master-in-chancery in settlement of dispute between the Des Moines Union Railway and the Hubbell interests.

FAYETTE S. CURTIS, formerly president Old Colony Railroad and later vice-president New York, New Haven & Hartford Railroad, died at Boston, Mass., on Feb. 15. Mr. Curtis, a civil engineer in railroad work, was identified first with the Albany & Susquehanna Railroad. In 1874 he was appointed chief engineer New York & Harlem River Railroad and in 1876 was appointed to a similar capacity with the New York, New Haven & Hartford. In 1900 he was elected vice-president of the New Haven road which position he resigned in 1907 to become president of the Old Colony Railroad. Mr. Curtis was 86 years old.

J. C. NORD, for 37 years with the Denver Tramway, Denver, Col., died on March 1. For fifteen years Mr. Nord was chief clerk in its transfer office. He started in 1891 as a conductor.

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Equipment Orders in Project

Seattle may purchase 80 new cars. $135,000 Substation for Baltimore. New York, New Haven & Hartford to order new passenger equipment. Improvements in Sacramento

NEGOTIATIONS for the construction of 80 new street cars for the Seattle Municipal Railway will probably be resumed in the near future, according to Councilman E. L. Blaine, chairman of the finance committee, of Seattle, Wash. The order for these cars was placed Aug. 10, 1926, but the actual construction was not started, however, because of financial conditions. The city of Seattle has recently obtained a favorable court decision in the Von Herberg suit, and has been advised that if Von Herberg will not appeal and will agree to discontinue these proceedings, that the financing of the 80 street cars will be reconsidered. The new cars are to be of lighter construction and are designed for faster acceleration and speed.

Baltimore Substation

The United Railways & Electric Company, Baltimore, Md., will start work in the near future on a new substation to be erected at White and Glen Oak Avenues. It will cost approximately $135,000 and will enable the company to improve its facilities in the Hamilton, Blair Road and Carney sections. The station will be of the manually operated type, and considerable attention will be given to the construction of the building. The actual cost of the building is estimated to be approximately $26,000. This substation is scheduled to be completed by the last of June.

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has placed in service a new $40,000 sheltered loading station for street cars and motor buses at 27th and Hopkins Streets. The station is on private property, extending from Hopkins Street to 27th Street, a distance of about 100 ft. east of the intersection. Double-loop tracks accommodate 12th and 27th Street cars, and a drive is provided for North Milwaukee buses. A small building on the property will contain a light lunch concession. The opening of the station is said to clear up one of the most serious traffic conditions in the city.

Sacramento Improvements

The Pacific Gas & Electric Company, San Francisco, Cal., has announced provisions of the 1929 budget of the company, calling for the purchase of seven new street cars of the latest design and thirteen passenger buses for use in Sacramento, as well as the construction of a new substation and extensive additions and improvements to present facilities.

The entire expansion program in the Sacramento district calls for a total expenditure of $1,848,995. The separate items projected for consummation here this year are:

Seven new street cars for use in Sacramento, $91,000; seven 40-passenger coaches, $79,000; four 29-passenger coaches, $34,000; two 21-passenger coaches, $12,000; new substation in southeast Sacramento, $110,000; extension of lines to serve the new substation, $65,000; rebuilding of facilities in substation A at Sixth and H Streets, $62,000, and new paint shop at 29th and M Streets, $15,300.

The passenger coaches and buses likewise will be in operation in the outlying residential districts of Sacramento as extension service from street car lines.

The $110,000 substation in the southeastern section of the city will be started in the near future, when the $65,000 task of extending electric lines to serve the station also will be undertaken.

The $62,000 program for rebuilding the facilities in the substation at Sixth and H Streets will be commenced at once. The entire switching apparatus will be changed and a number of modern improvements and additions will be made.

The projected $15,300 paint shop at 29th and M Streets, which will be used for painting street cars and buses, will be started soon. Plans for the building are being prepared. It will be of brick construction and probably about two stories high.

The United Electric Railways, Providence, R. I., has just completed the installation of a 3-in. gasoline pipe line at its Elmwood and Melrose garages. This line runs from the siding on the Narragansett Electric Company's property on Melrose Street, through the Melrose garage and to the Elmwood garage—a distance of approximately 1,725 ft. This line will enable the company to unload a 10,000-gal. tank car in about 2¼ hours.

This company has also completed alterations in its Elmwood carhouse, whereby all of the middle section has been turned over for use by the bus department, thus providing accommodations for housing and repairing of 30 additional buses. The middle section has been remodeled to accommodate storage and repairs for 36 cars.

Cars for New York, New Haven & Hartford

The purchase of three motor cars and six multiple-unit trailer cars has been authorized by the New York, New Haven & Hartford Railroad. This is part of authorized expenditures for car equipment amounting to approximately $6,500,000. This sum includes the purchase of 90 passenger coaches, 10 combination coaches, 15 apartment mail cars, 6 diners, 20 gasoline-electric cars and 24 trailers for gasoline-electric cars.

The Public Service Co-ordinated Transport, Newark, N. J., is trying out new illuminated signaling devices, which indicate when the bus or car is about to turn either to the right or left. A bus will be equipped with two of these appliances—one on each side of the front. If the experiments now being made prove satisfactory, it is said that they will be installed on all street cars and buses in the Public Service system.

The properties of the Sacramento Short Line have been recently acquired by the Sacramento Northern Railway, Sacramento, Cal., which company has a program for the expenditure of $318,000. $86,000 of this amount is to be charged to operating expenses, and $252,000 to capital account. This does not include $600,000 required to complete the construction of the 16-mile Holland branch, which will in all probability be ready for operation about May 1. The Tidewater Southern Railway has a program calling for the expenditure of $165,000.

The Pacific Gas & Electric Company, San Francisco, Cal., will make extensions to its pole-treating and distributing plant, Stockton, Cal., to cost approximately $65,000. The Citizens Transit Company, Oil City, Pa., has placed an order for three new 29-passenger Dodge buses, at a cost of approximately $10,000 each. With the delivery of these new vehicles, the total number of buses owned by the company will be brought up to 27. The Southern Ohio Public Service Company, Columbus, Ohio, has placed an order for five 20-passenger parlor car type Studebaker buses, and two de luxe street car type Studebaker buses.

Material Purchases

The volume of equipment and material purchases seems to be on the continual increase. The Pittsburgh Railways, Pittsburgh, Pa., has placed orders recently for 25,000 ft. of ¼-in. copperweld span wire, 41,000 ft. of 5/16-in. copperweld span wire, 12,500 ft. of 7/16-in. copperweld span wire, 21,000 ft. of ¼-in. galvanized span wire, 164,000 ft. of No. 10 weatherproof copperweld solid wire, 5,000 ft. of 5/16-in. galvanized span wire, 4,000 ft. of three-conductor weatherproof cable, and 5,000 No. 00 15-in. line ears. This company has also placed orders for 1,800 fir crossarms, 900 insulator pins, 1,000 12-in. bonds, 300 24-in. trolley protecting armors, 500

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16-in. bonds, 400 insulators, 8 section insulators, 400 lb. of copper-coated welding rod, and 75 30-ft. creosoted yellow pine poles.

Line materials ordered by the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., include ten cars of poles, two cars of wire and cable, and one car of crossarms.

The Chicago Surface Lines, Chicago, Ill., has placed orders for 250 No. 000 right-hand malleable-iron switches and 550 No. 000 left-hand malleable-iron switches, 100 No. 000 65-ft. radius, 33-deg. malleable-iron galvanized crossovers, and 600 lightning arresters.

Track Equipment

Track materials ordered recently include 13,000 white oak ties, 24,000 screw spikes, 13,000 tie plates, and 285 kegs of track bolts, by the Twin City Rapid Transit Company, Minneapolis, Minn. This company has also ordered one Ingersoll-Rand type 20 portable electric driven air compressor. Other track material ordered includes 400 gross tons of 7-in. 93-lb. T-rail, 600 gross tons of 7¼-in. 102-lb. T-rail, 100 gross tons of 7-in. 114-lb. guard rail, 2,000 welding portions for T-rails, one electric over steam railroad crossing, and one No. 14 S, ½-cu.yd. Smith Paver-Less railway motor.

Pittsburgh Railways, Pittsburgh, Pa., has placed orders for 1,600 tons of 7-in. 122-lb. rail, 1,600 tons of 9-in. 134-lb. rail, 10,000 ties, 300 tons of 80-lb. T-rail, 800 pair splice bars, 1,000 kegs of track spikes, 100 kegs of track bolts, 10,000 tierods, 100,000 tie plates, and 1,850 railroad crossing bolts. This company has also placed orders for 1,386 miscellaneous parts for switches and boxes, 20 sewer drops, 50 sewer drop covers, 20 kegs of tierod washers, 2 concrete cribs, and 16 pieces of special work.

Car Remodeling

For car remodeling, the Twin City Rapid Transit Company has placed orders for 12,000 ft. of 1 x 1¼-in. Philippine mahogany lumber, 200 gear blanks, and 120 steel billets, 6½ in. square by 52 in. long. This company has also placed orders for 80 tons of pig iron and 30,000 lb. of Viscoline lubricant. The Milwaukee Electric Railway & Light Company has ordered eight second-hand cars.

The Pittsburgh Motor Coach Company contemplates the purchase of two 29-passenger parlor coaches. The Pittsburgh Railway is remodeling fifteen low-floor type cars from one-man operation to one-man, two-man operation. This company is also remodeling one high-floor double-end car from two-man operation to one-man operation.

The Chicago Surface Lines has ordered 100,000 vitrified paving brick and 300 grinding wheels. The Milwaukee Electric Railway & Light Company is constructing a substation at the Six-and-a-Half Mile Road. The Pittsburgh Railways has received one 40 series Cincinnati all-steel press brake and one power press.

Mexico Imports Equipment

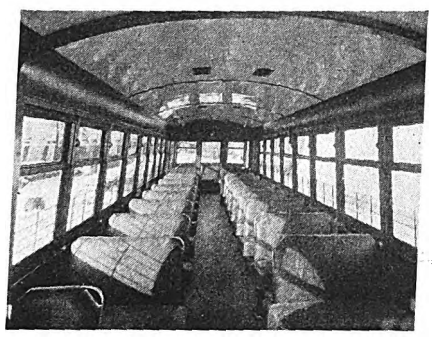
Importation of street cars, poles, wire and electrical equipment through Laredo, Tex., into Mexico showed a material improvement over 1927, according to a report recently completed by customs officials. During 1928 45 carloads of trolley cars were imported through Laredo, in addition to 38 carloads of poles, and 17 carloads of electrical supplies. A total of 26 carloads of wire was also imported by this country, as well as rails, wheels and miscellaneous items.

Beech Grove Car Delivered

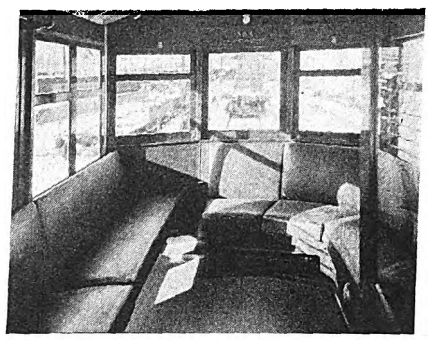
The Beech Grove Traction Corporation has received a one-man motor, city type, passenger car from the Cincinnati Car Company, Cincinnati, Ohio. Mention of the order of this car was made in Nov. 3 issue of Electric Railway Journal. The car is of the single-end, double-truck type, 39 ft., 8 in. long, weighs 25,400 lb. and seats 49 passengers.

The body of this car is of semi-steel construction with an arch roof and sliding-end doors. The insulating material used is cork and the floor aisles are covered with linoleum. The exterior of the car is enamelled a chrome to the rail and an apple green to the roof. The roof is a red color. The interior trim is cherry stained walnut. The seats are attractively finished in brown Spanish leather.

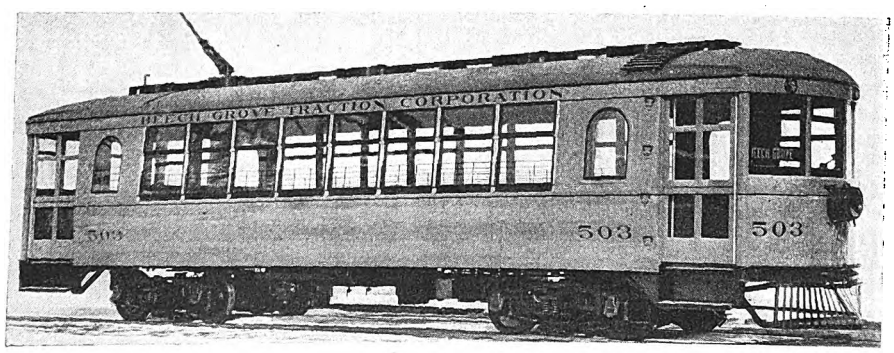
The trucks are equipped with inside hung motors and 26-in. steel wheels. Plain type journal and armature bearings are used. The wheels and trucks are deadened to reduce noise. A light inside the car and a tail light are connected to a three-cell battery which operates when the trolley circuit is broken. Additional details are given in the accompanying specifications.



The interior trim is stained walnut and the seats are upholstered in brown Spanish leather



The rear end of the car is partitioned off and equipped with side seats giving a seating capacity of 49 passengers



The car recently delivered to the Beech Grove Traction Corporation, Indianapolis, Ind.

Weights:	
Car body	11,690 lb.
Trucks	7,600 lb.
Equipment	6,100 lb.
Total	25,400 lb.
Bolster centers	21 ft.
Length over all	39 ft. 8 in.
Length over body posts	30 ft. 6 in.
Truck wheelbase	5 ft.
Width over all	8 ft. 6⅜ in.
Height, rail to trolley base	10 ft. 5 11/16 in.
Window post spacing	33 in.
Body	Semi-steel
Roof	Arch
Doors, sliding	End
Air brakes	Safety Car Devices Company
Armature bearings	Plain
Car signal system	Storage battery
Compressors	2-c p 25
Conduit	Flexible
Control	K 35
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote
Door mechanism	Consolidated
Energy saving device	Economy
Fare boxes	Cleveland
Finish	Enamel
Floor covering	Linoleum over center floor
Gears and pinions	Spur
Glass	Plate
Hand brakes	Cincinnati Car Company
Heat insulating material	Cork
Heaters	Consolidated
Headlights	G.E. J. 65
Headlining	Agasote
Interior trim	Cherry stained walnut
Journal bearings	Plain
Journal boxes	3 x 6
Motors	Westinghouse No. 508, inside hung
Painting scheme	Chrome to rail, apple-green to roof and red roof
Registers	Cleveland
Roof material	Canvas
Sash fixtures	Edwards
Seats	Hale & Kilburn
Seating material	Brown Spanish leather
Slack adjusters	Gould
Steps	Stationary
Step treads	Oak, edged with aluminum
Trolley catchers	Ohio Brass Company
Trolley base	Ohio Brass Company
Trolley wheels	Slide
Trucks	Cincinnati Car arch bar
Wheels, type	Steel, diameter 26 in.
Wheelguards or fenders	Steel pilot

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Specifications on Regina Cars

Seven one-man, motor, passenger cars have been ordered by the Regina Municipal Railway, Regina, Sask., from the Ottawa Car Manufacturing Company, Ottawa, Ont. These cars, mention of which was made in the Jan. 26 issue of the JOURNAL, are the single-end, double-truck, city type and seat 48 passengers. Each car weighs 34,000 lb., is 41 ft. long and 8 ft. 3 in. wide. The bodies are of all steel construction with arch roofs and folding-end doors. The interiors are trimmed in birch and the cars are finished in mahogany with cream trim.

The trucks are spaced on 17-ft. 7-in. centers and are equipped with 25-hp. motors and 26-in. rolled steel wheels. The armature bearings on all of the cars are of the plain type but only five of the cars are equipped with plain type journal bearings. Roller journal bearings are installed on two of the cars for test purposes. The cars are equipped with back-up signals and track scrapers. Additional information is given below.

Weights, car body	17,400 lb.
Trucks	10,000 lb.
Equipment	6,600 lb.
Total	34,000 lb.
Bolster centers	17 ft. 7 in
Length over all	41 ft.
Length over body posts	26 ft. 4 in.
Width over all	8 ft. 3 in.
Height, rail to trolley base	10 ft. 9 in.
Window post spacing	30 in.
Body	All steel
Roof	Arch
Doors	Folding end
Air brakes	General Electric
Armature bearings	Plain
Axles	A.E.R.A. standard 4½ in.
Car signal system	Consolidated
Compressors	General Electric
Conduit	Flexible and metal
Control	General Electric K 35
Couplers	Portable 3 x 1½ in.
Curtain fixtures	National Lockwasher Company
Curtain material	Pantasote
Destination signs	Colored lights also lettered
Door mechanism	Rear treadle, front manual
Energy saving device	Economy meters
Fare boxes	Cleveland
Finish	Duco
Floor covering	⅜ x 1-in. hard maple mat strip
Gears and pinions	Tool steel
Glass	Plate and non-shatterable
Hand brakes	Peacock
Hand straps	Hand rails
Heat insulating material	Cork
Heaters	Forced draft and General Electric
Headlights	Golden glow
Headlining	Agasote
Interior trim	Birch
Journal bearings	5 cars plain, 2 cars S.K.F. roller
Journal boxes	Cast iron for 3¾ x 7 in.
Lamp fixtures	Compensating
Motors	25 hp. General Electric No. 264A
Painting scheme	Mahogany, cream trim
Roof material	No. 10 canvas
Safety car devices	Semi automatic
Sasn fixtures	Brass satin finish
Seats	Ottawa Car Manufacturing Company
Seat spacing	30 in.
Seating material	Rattan
Slack adjusters	General Electric
Steps	Folding
Step treads	Honeycomb
Trolley	Ohio Brass
Trolley base	Ohio Brass
Trolley wheels	Kalamazoo
Trucks	Canadian Car & Foundry Company
Ventilators	Nichols-Lintern
Wheels, type	Rolled steel, diameter 26 in.
Wheelguards or fenders	H.B. Lifeguards

Weekly Business Conditions

Commercial transactions during the week ended March 9, as indicated by check payments, was greater than in either the preceding week or the corresponding period of 1928, according to the weekly statement of the Department of Commerce. Steel plants during the same week showed larger operating activity than in either the previous week or the similar week of last year. The output of bituminous coal during the latest reported week, while somewhat lower than in the preceding week, was considerably larger than in the corresponding period a year ago. The production of lumber showed a gain over the preceding week and no change from the corresponding week of 1928. Petroleum output was running considerably in excess of last year. Freight-car loadings covering the latest week for which data are available showed a gain over the similar week of last year.

The general index of wholesale prices showed a practical decline from the previous week, but was higher than a year ago. The price of copper averaged higher than in either period, while the price for iron and steel, showing no change from the previous week, was higher than in the corresponding period of 1928. Loans and discounts of federal reserve member banks showed further expansion as compared with both the preceding week and the similar period a year ago. Interest rates on call loans averaged higher than in either period. Bond prices averaged lower than in either the preceding week or the similar period of last year.

Weekly Business Indicators

(Weeks ended Saturday. Average 1923-25 = 100)

	1929 Mar. 9	1929 Mar. 2	1929 Feb. 23	1929 Feb. 16	1928 Mar. 10	1928 Mar. 3	1928 Feb. 25	1928 Feb. 18
Steel operations	122.4	118.4	117.1	114.5	108.0	109.0	111.0	112.0
Bituminous coal productions	.....	114.5	120.6	122.5	106.6	103.0	104.4	96.2
Lumber production	.....	101.4	96.4	84.1	99.1	101.4	108.6	106.4
Petroleum production (daily average)	.....	129.8	129.3	128.4	113.1	113.2	112.8	113.4
Bldg. contracts 37 states (daily average)	.....	124.5	93.1	85.1	110.0	111.0	122.2	114.9
Price iron and steel, composite	87.9	87.9	87.6	87.6	87.6	86.5	86.0	86.0
Copper, electrolytic, price	.....	139.1	129.0	129.0	100.7	100.0	100.0	100.0
Check payments	157.8	124.8	145.5	119.1	126.6	123.7	105.3	110.1
Bank loans and discounts	131.4	130.9	129.5	129.9	121.2	121.2	120.4	121.1
Interest rates, call money	218.2	187.9	169.7	169.7	103.0	109.1	103.0	109.1
Business failures	120.4	131.9	101.0	117.0	125.3	126.8	118.7	127.8
Interest rates, time money	177.1	177.1	177.1	177.1	105.7	105.7	105.7	105.7
Federal reserve ratio	89.9	90.2	91.4	90.1	96.0	95.6	96.4	95.5

Railroad Electrification in Spain

The commission appointed by the Spanish government to decide which sections of the Spanish railroads should be electrified in the near future has decided that the following lines fall into this category: Madrid-Alvila, Madrid-Segoria, Medina, Valencia-Cuenca; Madrid-Villanueva de la Reina; the lines in Catalonia, Valencia-Encina; Miranda-Bilbao and the line from Santander to the Pyrenees. The length of the lines in question is approximately 1,375 miles and it is estimated that 150,000 hp. will be required for their operation. Electric trains are already running on the Pajares railway, the Barcelona-Manresa-St. Jeandes Abesses and the Bilbao-Arenas lines. The electrification of the Ripoll-Puigcerda, and Estella-Vitoria-Alsasua lines has been completed and electric trains will shortly be in operation.

METAL, COAL AND MATERIAL PRICES F.O.B. REFINERY

Metals—New York	March 12, 1929
Copper electrolytic, cents per lb.	19.775
Copper wire, cents per lb.	21.625
Lead, cents per lb.	7.25
Zinc, cents per lb.	6.7
Tin, Straits, cents per lb.	48.375
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.425
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.425
Central, Ill., screenings, Chicago, net tons	1.075
Kansas screenings, Kansas City, net tons	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.35
Weatherproof wire base, N. Y., cents per lb.	22.375
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.6
White lead in oil (100-lb. keg), N. Y., cents per lb.	13.5
Turpentine (bbl. lots), N. Y., cents per gal.	63.5

To Exhibit Waste-Campaign Facts

A nation-wide chain of individual industrial exhibits for employees and officials will be an educative feature of waste-campaign week in April. A booklet, describing exhibit campaigns of the Westinghouse Electric & Manufacturing Company, and the Newport News Shipbuilding & Drydock Company, is being distributed to more than 200 manufacturing plants by the local sections of the American Society of Mechanical Engineers and every section is trying to have the plants in its vicinity stage such a campaign in April.

Woodruff Key Standard Proposed

A proposed American standard for Woodruff keys, keyslots and cutters has been recently completed by a subcommittee of the sectional committee on the standardization of shafting. This proposed American standard is now being submitted to the sectional committee for approval. The standards are in tentative form for discussion and suggestions will be welcomed by the committee. They should be mailed to C. B. LePage, assistant secretary, The American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL,
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Looking to the Future

SPEAKING a short time ago before the public utilities committee of the Philadelphia Chamber of Commerce, and more recently before the Boston Chamber of Commerce, General W. W. Atterbury, president of the Pennsylvania Railroad, expressed a far-sighted view of the country's transportation problems that is worthy of more than passing attention on the part of local transportation men. It is in the fact that General Atterbury seems to recognize, particularly in his Philadelphia address, the close relation that exists between the development of railroad terminals and the local transportation facilities of a large city that his remarks are of greatest interest to readers of the JOURNAL.

As a matter of fact, it becomes increasingly evident that one of the major factors, if not the most important single problem in planning for the present and future of the country's long-distance rail carriers, is that presented by the terminal situation in large cities. In its physical aspects alone, terminal planning presents to the railroads, as well as to large communities themselves, many serious and highly controversial problems. But when viewed from the standpoint of economics, and particularly when considered in combination with the economic problems of local transit, the situation becomes complicated indeed. In his Philadelphia address General Atterbury dealt primarily with a conception of a 50-year transportation program for the Pennsylvania Railroad. But he also advanced the idea of co-ordination of all forms of transit in the city as a means of utilizing most efficiently all facilities now available or to be constructed in the future.

At first this may seem merely a recognition by a steam road man of a principle which the local transportation industry has set up for some time as fundamental. But it is easily possible to attach far broader significance to General Atterbury's remarks than may seem evident on the face of things. It seems worthy of note that this public discussion of the community transportation situation by a man who occupies a place in the public eye and in railroad circles as prominent as does the president of the Pennsylvania Railroad, follows an intensive study of the whole terminal situation in the entire area lying between Philadelphia and New York. Furthermore, it follows closely on the announcement of a $100,000,000 electrification program in this area resulting from these studies, which is designed to meet the transportation requirements of a New York metropolitan area expected to contain 30,000,000 people by 1950, and to extend from New Brunswick on the west well out on Long Island on the east.

In addition to all of this, about the same time that General Atterbury was speaking in the east, there came the announcement from Cleveland that the Van Sweringens are engaged in developing in that city a combined terminal and community transportation project which is to include the Cleveland Railway and future rapid transit lines, as well as the trunk-line railroad terminal plan which they originally undertook to work out. When these facts are taken together they indicate an approach to the idea of co-ordination of community transit which transcends in its extent any ordinary conception of recent years.

Most significant of all, therefore, is the evidence here indicated of the way in which present-day railroad planners are looking at the terminal transportation situation. Even on the face of things, the projects in the New York and Cleveland areas are gigantic in proportions and daring in their conception—in keeping with the modern tempo of business and industrial development of the country. But, in addition, they seem to go further than the railroad man has been inclined to go in the past, in recognizing the relation between transportation within a community, the development of the community itself, and consequently the terminal problem of the railroads.

Whether or not this attention to intra-community transportation on the part of the railroads will be accompanied by recognition of certain basic economic principles that have been established after long and in some cases disastrous experience, remains to be seen. Present indications and railroad precedents, however, do not point in that direction. The question that may be expected to loom up with increasing importance in the future, if railroads undertake to play a major part in community transportation, is that of whether rights-of-way for local transit facilities should be or can be financed with private funds. To attempt to do so is a step in the wrong direction, for it is a step away from the principle that local transit rights-of-way of a city constitute merely specialized forms of streets for the movement of its citizens and should be financed by assessment against the property benefited by their construction.

Public Relations—Plus

SEVERAL weeks ago in a large Southern city the Chamber of Commerce was preparing to elect a new board of directors. Among the names under consideration was that of the public relations official of the local railway. The president of the company was already a member of the board and his re-election was a foregone conclusion. This meant two votes for the railway interest in addition to a much coveted honor for the young public relations man.

In the meantime, however, officials of a civic club which had never had any representation on the board sought recognition. An appeal was made to the electric railway president by the secretary of the club. Without a minute's hesitation the railway official, one of its most valuable members, offered his place on the board, but

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the publicity man heard of this and promptly said that if there was any "stepping down" he was going to do it. The net result was the election of a member of the civic club to replace the publicity official.

The story does not end here, however. Another claim for representation equally as just then came up. This from one of the largest railroads in the country which had its general offices in the city and employs thousands of workers in its shops. Again the electric railway president offered to resign. The sequel to this was the election to the board of the railroad executive and the elevation of the electric railway president to the post of vice-president of the Chamber. This meant, of course, the loss of voting power by the man chosen to represent the electric railway.

Recognition of this disposition of the electric railway men to efface themselves is best expressed perhaps by the letter written to the publicity man by the secretary of the civic club, who said: "The good will shown by you and other officials of this company is one that makes us all feel proud to live in a community where there are so many broadminded men and men that are willing to sacrifice personal ambitions and honor for the benefit of the community and to the end that they are always willing to do what is right and fair, regardless of their interests." If the man who received this letter were to admit that it warmed the cockles of his heart, that certainly would be nothing against him.

Not a Job for Amateurs

ADVERTISING constitutes one of the electric railway's major means of reaching the public. It is generally agreed that a properly conducted advertising program wins rides and creates public good will. When guided by experienced hands, such publicity plays an important and essential part in the conduct of a public transportation business under present-day competitive conditions.

Recent advertising campaigns by a number of electric railways in this country and Canada, as outlined in last week's issue of ELECTRIC RAILWAY JOURNAL, indicate remarkable development in this field. The Portland Electric Power Company some time ago completed an extensive newspaper campaign, selling the company's service, at the same time celebrating the property's twentieth anniversary. Service and safety were featured throughout the entire campaign, these features being linked with the growth of the company during the past twenty years. The Kansas City Public Service Company recently concluded an advertising series with an ad paid for by the employees, featuring a creed expressing the employee's duty to the public.

The Montreal Tramways devised an unusual means of awakening the interest of Montreal's citizens to historic and interesting points in and near Montreal, and has furnished authentic and accurate information that would be appreciated by visitors to the city. The British Columbia Electric Railway has conducted an extensive educational campaign through poster advertising. The New York State Railways has used newspapers extensively to discuss with the public its policies and plans. These and many other companies operating local transportation systems have presented their messages clearly, simply and frankly and have displayed striking ingenuity in winning the attention and the interest of the public.

Of even greater significance, however, is the fact, as indicated by recent campaigns, that electric railways are fast learning that poorly-executed advertising is not only of little value but may actually become seriously harmful in its effect on the public. Current advertising shows, on the whole, a wholesome absence of the plaintive or complaining type of "poverty" copy which only recently was too often found in electric railway advertising. Typical recent electric railway advertising attracts attention, induces constructive thinking and avoids criticism. These features indicate the work of experts, not amateurs. They emphasize the fact that the inexperienced have no more place in the management of electric railway advertising than they have in the management of an electric railway itself.

Duplicate Tracks Dilute Service

EXAMINATION of the routes of street railway companies in many cities discloses an evil which is far too common, and toward the correction of which relatively little has been done. This is best described as surplus or duplicate trackage near the centers of cities, resulting in many instances from competitive construction during the promotional days of the industry. It is likewise far too common in these cities to find the needs of large sections of outlying territory inadequately served with public transportation, due to the fact that financial resources are drained by the necessity for running unprofitable duplicate service on streets sometimes only a block or two apart.

This situation holds back the progress of an entire property. In the first place it becomes necessary to maintain many miles of unnecessary track and paving. But even more important from the standpoint of the effect upon earnings, this condition is frequently found to result in a dilution of traffic to the point where headways are excessive. The net result is that there are several lines in close proximity, serving the same general residential section and running into the same general business district, on all of which the service is unattractive because of long headways between cars.

During the past several months the importance of frequent headways as a factor in attracting riding has been strikingly demonstrated. One of the most outstanding examples of this is in Chicago, where despite the general trend in the industry toward a more and more unfavorable load factor, the Chicago Surface Lines has been able to build up off-peak riding through greater frequency of service during those hours. The relative importance of speed and headway as factors in winning increased business is difficult of determination, but it is quite probable that under certain conditions the importance of frequency cannot be over-stressed.

A recent experiment by a railway in a medium-sized city throws into sharp relief the situation resulting from unnecessary duplication of lines in the same territory. On this property one of two such lines was changed to one-man operation and the service increased by a large percentage. On the parallel line the former service was retained. As a consequence of the cut in headway on the one-man line, there was a large immediate increase in revenue and in the revenue per car-mile operated. At the same time there was a drop in revenue on the parallel line which had not been changed. Observations made in the district soon disclosed that in many instances passengers were walking several blocks, *crossing* the line which maintained its former headways, and patronizing

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the line two blocks away which offered frequent service. In other words, they were willing to walk two extra blocks to the line on which they were sure to get a car with little waiting, rather than to take their chances on waiting for a car to come on the line which was closer to their homes.

Thus it seems more than probable that needless duplication of lines in many cities is causing dilution of service which tends to drive away much-needed revenue. Of course there is usually serious objection from property owners and business people on the affected streets, to the elimination of existing tracks, even though the line is proved to be a needless and unjustified duplication. For some strange reason, property owners and business men assume the right to demand retention of a car line though they have for many years been deaf to its difficulties, and contribute not a penny toward its revenues. The reason is, of course, quite clear. They recognize the property value that is created by the existence of a permanent transportation line in the street. Perhaps a new line of attack is necessary. If the surplus trackage is of such value to them, why not propose that they purchase this track from the railway on the condition that service will be maintained? The possibilities resulting from acceptance of such a proposal provide an interesting field for speculation.

"Horse-Car Days"

CONTRIBUTING to the *American Mercury* seems to have become a habit with Raymond L. Tompkins of the United Railways & Electric Company, Baltimore, Md. This time Mr. Tompkins is in no way captious. His subject is "Horse-Car Days." It does not seem possible that Mr. Tompkins could have drawn much on his own recollection for the facts he sets down. He is too young for that. And the facts are too multifarious for him to have been an observer of any considerable number of them. But again he proves himself to be an able raconteur.

Many men still living were witnesses to some of the events he recounts. In fact, any number of such men could be named. They are practical fellows, and while discarded horse cars may be difficult to find, as Henry Ford learned during his recent search for a museum specimen, there are still a few of them tucked away here and there. And there are some that are not tucked. True, they may not be exactly horse cars, but they are still in service, more's the pity.

It would be reasonable to wager that Tom Minary, octogenarian, who in his day could flick flies off a horse's ears with a whip along with the best of them, has an old horse car stowed away somewhere in Louisville. Unlikely is it that from the recollection of Horace Lowry, son of the late Tom Lowry, has faded the picture of the early struggles in the Flour City. Many who are still alive can recall the dreadful epidemic of epizootic of which Mr. Tompkins writes. And there are many who recall the proceedings of the first street railway convention with its topics so remote from the subjects that are discussed today. The veterinary and the horseshoer have given way to the engineer and the economist, but the problem of making a cent go as far as it will is even more acute today than it was in the horse-car days. Those were the days when a nickel had real purchasing power.

There is no occasion to take issue with Mr. Tompkins. He has done a good job. In fact, the period about which he writes seems but yesterday to many transportation men. And the list of men still in the industry who are able to recall them is a long one. Fondly as they may recollect the happy days of long ago the oldest of the Old Guard must admit that the progress of the local transportation industry in the past 45 years has made reminiscences of the first convention but a memory indeed.

A Sound Demand for Revision of Fares

MILWAUKEE can afford to deal liberally with its railway in the matter of fares. The company has dealt generously with the city. It has anticipated the city transportation requirements. Not only has it kept up the city lines to a high degree of perfection, but it has co-ordinated bus operation with them and has planned suburban transit on a liberal scale designed to anticipate the future growth of Milwaukee as a metropolis. All that the company asks is that the Railroad Commission shall fix boundaries of a single-fare area and adopt rates which would put the city and suburban transportation system on a self-supporting basis. Certainly, this is reasonable.

The Milwaukee company's investment in its railway has increased from $16,694,409 in 1920 to $28,263,980 in 1928. Not in any year since 1920 has the company earned an adequate return on its investment in the railway. Where there have been deficits from railway operation, they have been made up from the revenues of the electric department. Economically, this is an anomalous situation. The promise of the company is that if standards of service and rates of fare to be prescribed are so calculated that they will yield an increased return upon the railway and bus service, the company will reduce electric rates by an amount not less than the estimated increase in railway revenue. Present fares are 7 cents with transfer, and eight tokens for 50 cents.

The whole matter is before the commission because of the demand for an extension of the single-fare limits to include former North Milwaukee, now a part of Milwaukee. To meet this demand would eliminate zone fares on that line. The position of the company is that the zone system of fares is most fair and equitable. It regards this as tenable economically.

Like nearly every other American city, Milwaukee has suffered because of the need of keeping available for service equipment to meet the occasional peaks in traffic. This necessitates a large amount of money being tied up in equipment over and above that required to carry the regular load. For instance, in January of this year from 50,000 to 70,000 more casual riders were carried on certain days than in a similar month last year. The position of the company is that under present rates regular riders are discriminated against. The feeling is the occasional rider should pay a fare higher than that of the regular patron, and that the regular riders should pay the minimum rate that is possible. This is sound. It will be interesting to review the basis on which the commission disposes of this matter, since that decision will probably involve not only the regulatory body's idea of fairness to the railway, but also of fairness to the frequent and the occasional user of the transportation service. It is an old question, this one of the demand for extension of fare limits, but apparently each time it arises it must be settled anew.

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Elaborate

Shop and Yard Facilities

Provided for Philadelphia Subway

Fern Rock terminal is conveniently located at north end of Broad Street subway. Architectural treatment of buildings, landscaping of grounds, flexible track arrangement and an array of modern machinery are the outstanding features

Aero Service Corporation, Philadelphia

Aerial view of the Fern Rock terminal yard and shops showing the general layout of the buildings and tracks. The inspection shop is at the left and the main repair building at its right. Note also the portals, the entrance building, the storage building at the rear, the two track loops, the steam railroad connection, the road encircling the main building, the floodlight towers at each corner and the steel and concrete fence which encloses the area

This article is the fourth and last of a series, describing the new Broad Street subway in Philadelphia. The first, published on Feb. 9, showed the relation of the subway to the existing and future transit facilities of the city, and gave operating and construction details. The second article, in the Feb. 23 issue, described the 150 cars bought by the city, and the third, published on March 9, gave details of the power distribution and signal systems.—EDITOR.

CARHOUSING and maintenance facilities for the new Broad Street subway, designed and built by the Department of City Transit of Philadelphia and being operated by the Philadelphia Rapid Transit Company, are provided at the extreme north end of the line. The terminal, known as the Fern Rock yard and shops, was constructed and equipped at great cost and is outstanding in many respects. The architectural treatment of the buildings and the landscaping of the grounds were carefully detailed and the resulting appearance is unusually attractive for a car shop. The terminal is made even more distinctive on account of the flexible track arrangement for the yard and shops, the large number of modern machines and tools, and the provisions made for expansion.

ADVANTAGES OF THE SITE SELECTED

The site selected for the storage yard and shops is bounded by Chew Street, Nedro Avenue, Marvine Street and the Reading Railroad right-of-way, and embraces an area of approximately 32 acres. Its nearness to Broad

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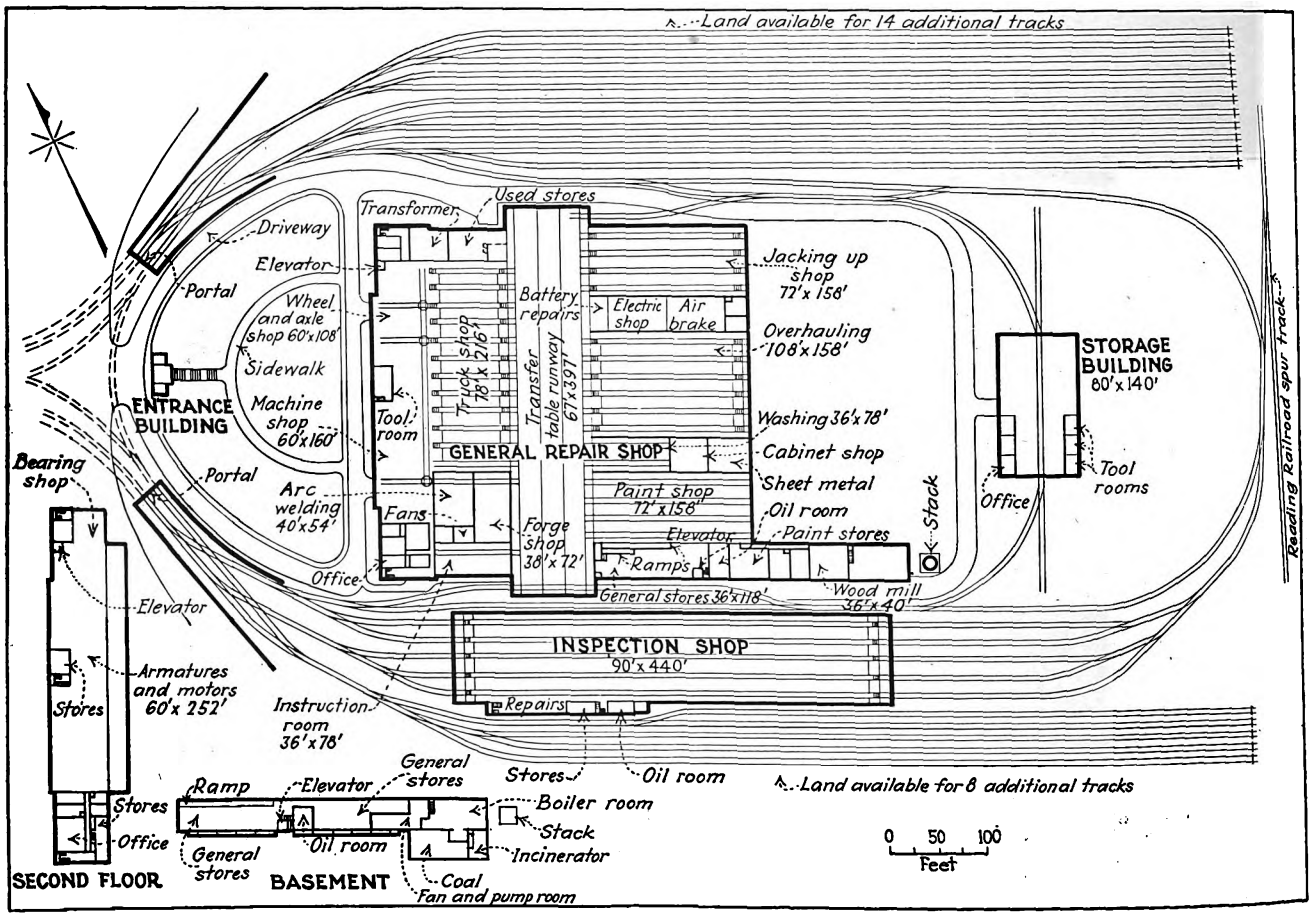
Street, the favorable topography and the adjoining railroad made the site particularly suited for the terminal. With the exception of a few houses on the northern front, the track was totally undeveloped, with no streets opened through it, although the city's street plan provided for five north and south streets and one east and west street, running through the property. It was decided to divert Eleventh Street so as to skirt the western part of the tract, to arrange the yard grade so that another street could be opened beneath the tract when necessary, and to remove the others from the street plan. The plot to the subway through the two Grange Avenue portals, which are located within the yard. By this arrangement ample space was left between the two parts for the shop buildings and other necessary storage area. The general plan of track and buildings is shown in an accompanying illustration.

The initial track arrangement includes eleven storage tracks on the north side of the plot and five on the south side, all stub ended. In addition, there are five tracks which pass through the inspection shop and which are joined at the rear to a track which circles around the



Complete track and building layout of the Fern Rock Terminal, showing the flexible track arrangement and the various departments and shops within the buildings

required a fill on the east end, the spoil from the subway excavation being used for this purpose.

The terminal facilities include a shop for the periodic inspection of all cars operating from this yard; the general repair shop for overhauling and repairing all cars operating on the Broad Street subway, or that may operate on its future extensions, tributaries and connecting lines; an open track storage for cars when not in use; a storage building and yard space for materials used in maintenance of permanent way, buildings, station equipment, etc.; and a steam railroad connection for the receipt and shipment of freight.

Storage Tracks Accessible from Subway and Shops

Convenient and direct access to all storage tracks and to the inspection and repair shops was sought for and attained in the yard design. The plan selected divides the storage yard into two parts, one on the north side of the plot and one on the south side, each equally accessible rear of the general repair shop. This track has a spur on the north side which goes to the transfer table runway in the general repair shop, and also a branch to the Reading Railroad spur. Another track, between the general repair shop and inspection shop, has a siding which goes through the south end of the transfer table runway and also joins the circling track at the rear. A second track, which passes through the storage building, joins the north and south storage yards. It is possible to run a train completely around the shop, as a loop track within the portals has been provided.

The initial track installation provides storage for approximately 165 cars. The ultimate development of the yard area, which has been kept free of all poles and overhead wires, will permit the storage of about 450 cars. Land is available on the north side of the plot for fourteen additional tracks, and on the south side for eight tracks.

Entrance for automobiles, trucks and other vehicles, is made over a driveway, entering from the west end of the

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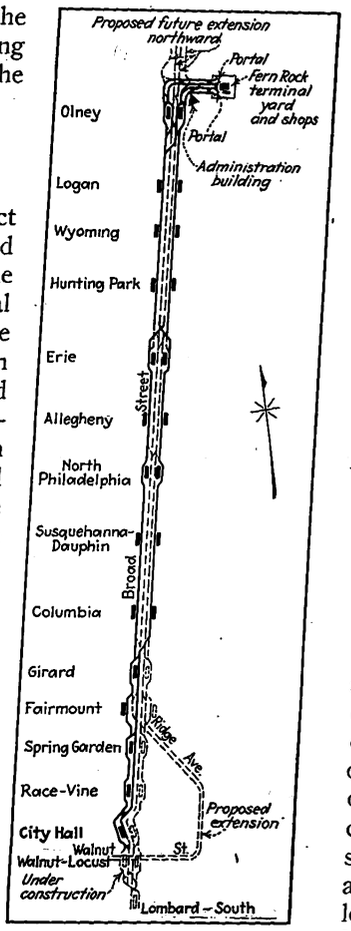
yard, as shown in the diagram of the terminal. The driveway encircles the repair shop, thereby avoiding crossing any tracks except the spurs which enter the repair shop.

Buildings Designed for a Residential Neighborhood

The yard and shops are in a purely residential district and the buildings were designed and the plot landscaped to add, rather than detract, from the neighborhood. The result can best be judged by studying the architectural treatment of the buildings, and the general effect in the accompanying illustrations. The entrance building, which is typical, shows the close attention to detail that was paid in the design. The pearl gray tapestry brick construction with white limestone trim, the diamond pattern in the panel over the doorway, the specially designed cartouche in this panel, the polished granite base, the iron gates in the doorway, the iron grille work in the narrow windows on each side of the doorway, the imposing gateway fixtures, the general shape of the building with its two wings, the walls projected to the driveway entrances and the iron gates for the driveway, all contribute to the pleasing effect obtained. A harmonizing treatment is given the general repair building and the inspection shop also, as may be seen in the views of these buildings. The pattern was not confined to the fronts of the buildings, but was continued on the sides and rears. The area immediately in front of the general repair shop has driveways and a semi-circular lawn with sidewalks passing around the lawn to the foot of a stairway leading to the entrance building. The remainder of the area is tapered to these sidewalks and also has a lawn. A flagpole in the semi-circular plot, together with shrubbery and trees, carefully located, adds to the general effect. The portals and retaining walls are in white, and harmonize with the sidewalks and stairway. The entire terminal area has been cleared of unnecessary material and graded to give a pleasing appearance. An iron and concrete fence, in keeping with the general architectural plan, surrounds the entire area. The completed yard, with its fence, graded track areas and harmonizing building designs, may be seen in the aerial view.



The terminal yard is located at the extreme north end of the Broad Street subway. The administration building, north of the Olney Avenue station, is also shown on this map

Long Inspection Shop

The usual frequency of inspection requires that 5.3 per cent of the total number of cars pass through the inspection shop each 24 hours. Maximum service from the equipment demands that the largest possible number of cars be made available for rush hour periods, and as inspections can usually be made in several hours, they can be made between the morning and evening rush periods. To this end the inspection shop was made long enough to accommodate a full train, and each track connected for entrance or exit at either end. It is not expected that during the first few years of operation the trains will exceed six cars, and the inspection shop was built to accommodate trains of this length, with provision made for further extensions to accommodate eight-car trains.

The building has five inspection tracks, spaced 18 ft. between center lines to provide ample working space between the cars. All tracks are built over pits, with the floor between tracks depressed 1 ft. below the head of the rail. Double-folding doors, motor operated, are installed at both the front and the

Five tracks extend the full length of the inspection shop, which is long enough to accommodate six-car trains. The tracks are spaced on 18-ft. centers, giving adequate room for the workmen

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rear of the building, each track having its individual doors. The machinery required in this shop is housed in an offset along the south side, which also provides for oil storage, general storage, work benches, office space and locker rooms for the men assigned to this building.

Arrangement of Shops in General Repair Building

The plan of the general repair shop embodies the use of a car transfer table to move cars into and out of the shop and to move cars and trucks to the various departments during the course of repairing, overhauling and painting. The building is approximately 360 ft. by 380 ft., with an L extension along the south side, 36x 160 ft. The transfer table travels 397 ft. across the entire width of the building and sufficiently beyond each side for the connections to the yard tracks. The wheel and axle, machine, truck, arc-welding and forge shops are located on the west or front side of the transfer table runway, with the motor, armature and bearing departments on the second floor, over the machine and wheel shops. On the rear or east side of the runway are located the jacking, battery, electric, air-brake, overhaul, cabinet, sheet metal, washing and paint shops.

The shops are so arranged in the building that a car can be completely overhauled with a minimum of handling. Cars entering the shop are moved by the transfer table to the jacking shop, where the bodies are lifted by 20-ton cranes and the trucks removed. The trucks then are taken to the shop on the opposite side of the transfer table runway, where they are dismantled. The motors are hoisted to the second floor by a high overhead crane operating over a well and are repaired on this floor. A separate shop for the armatures and another for the bearings further divide this repair work.

Adjoining the truck shop are the wheel and axle, machine, arc-welding and forge shops, in which the truck repairing and overhauling are completed. When the

Shop Equipment Installed in the Fern Rock Shops of the Broad Street Subway, Philadelphia

Truck Shop

4 cranes—15-ton, single hoist, floor-operated, 33 ft. 5½ in. span	Box Crane & Hoist Corp.

Wheel and Axle Shop

1 wheel press—600-ton	Chambersburg Engineering Co.
1 car wheel borer—48-in.	Niles-Bement-Pond Co.
1 combination journal and axle lathe	Niles-Bement-Pond Co.
1 axle grinder—14 in. x 96 in.	Norton Grinding Co.
1 wheel lathe—No. 2	Niles-Bement-Pond Co.
1 hoist—2-ton	Box Crane & Hoist Corp.
1 axle straightening press—200-ton	Chambersburg Engineering Co.
1 two wheel grinder—18 in. x 3 in.	Hisey-Wolf Manufacturing Co.
1 axle testing tank—3 ft. x 3 ft. x 10 ft.	*
1 heater for testing tank—gas fired, 5-hp.	B-Line Boiler Co.

Machine Shop

1 crane—5-ton, single hoist, floor-operated, 18 ft. 9 in. span	Box Crane & Hoist Corp.
1 semi-universal turret lathe No. 1	Acme Machine Tool Co.
1 engine lathe—16 in. x 10 ft.	Monarch Machine Tool Co.
1 engine lathe—20 in. x 16 ft.	Monarch Machine Tool Co.
1 engine lathe—24 in. x 14 ft.	Monarch Machine Tool Co.
1 drill press—15-in.	W. F. & J. Barnes Co.
1 drill press—21-in.	W. F. & J. Barnes Co.
1 radial drill—5-ft.	Carleton Machine Tool Co.
1 universal milling machine—No. 3	Cincinnati Milling Machine Co.
1 crank shaper—24-in.	Gould & Eberhardt
1 two wheel grinder—14 in. x 2½ in.	Hisey-Wolf Manufacturing Co.
1 bolt threading machine—2-in.	Acme Machinery Co.
1 hack saw—6-in.	Peerless Machine Co.

Machine Shop Tool Room

1 tool room lathe—16 in. x 8 ft.	Monarch Machine Tool Co.
1 drill grinder—No. 51	Oliver Instrument Co.
1 universal tool grinder—No. 2	Norton Grinding Co.

Forge and Welding Shops

3 down-draft forges	Champion Blower & Forge Co.
1 mechanical sledge	Chambersburg Engineering Co.
1 binder—Model D, 8-in.	J. R. Kerlin Co.
1 combination punch and shear—No. 20.	Heney Pels & Co., Inc.
1 single frame hammer—800 lb.	Chambersburg Engineering Co.
1 coal bin	*
1 fitting plate	*
1 stock rack	*
3 anvils—175-lb.	Paragon
1 air compressor—500 cu.ft., straight line, with 100-hp. synchronous motor	Ingersoll-Rand Co.
1 electrical welding outfit	Westinghouse Electric & Mfg. Co.

Motor Shop

1 crane—5-ton, single hoist, cage-operated, 37 ft. 7 in. span	Box Crane & Hoist Corp.
1 crane—5-ton, single hoist, floor-operated, 37 ft. 7 in. span	Box Crane & Hoist Corp.
1 engine lathe—20 in. x 10 ft.	Monarch Machine Tool Co.
1 drill press—15-in.	W. F. & J. Barnes Co.
1 two wheel grinder—14 in. x 2½ in.	Hisey-Wolf Manufacturing Co.
1 armature storage rack	*
1 armature extractor	*
1 lye tank—3 ft. x 3 ft. x 6 ft.	*
1 pinion tank—3 ft. x 3 ft. x 4 ft.	*
2 boilers—gas fired, 5-hp.	B-Line Boiler Co.
1 vertical broaching press—30-ton	Chambersburg Engineering Co.
1 transfer truck—3-ton	Easton Car & Construction Co.

Armature Shop

1 dust arrester	Pangborn Corp.
1 cleaning cabinet	*
1 two wheel grinder—14 in. x 2½ in.	Hisey-Wolf Manufacturing Co.
1 engine lathe—24 in. x 12 ft.	Monarch Machine Tool Co.
1 horizontal press—300-ton	Chambersburg Engineering Co.
6 armature stands—Peerless type A	Electric Service Supplies Co.
1 commutator slotter—No. 204257	General Electric Co.
1 universal armature machine—Peerless No. 48623	Electric Service Supplies Co.
1 mica shear	Electric Service Supplies Co.
1 bar bender—Segur No. 45636	Electric Service Supplies Co.
1 kinker vise	Electric Service Supplies Co.
1 wire skinner	Electric Service Supplies Co.
1 coil winder—Browning	Mutual Foundry & Machinery Co.
1 wire reel rack—Browning	Mutual Foundry & Machinery Co
1 coil spreader—30-in.	Mutual Foundry & Machinery Co.
2 coil taping machines	Electric Service Supplies Co.
1 electric bake oven	Electric Service Supplies Co.
1 dip pond	*
5 transfer trucks—3-ton	Easton Car & Construction Co.

Bearing Shop

4 babbitt pots—500 lb.	Westinghouse Electric & Mfg. Co.
1 tin pot	General Electric Co.
1 lye tank—3 ft. x 3 ft. x 4 ft.	*
1 boiler—gas fired, 5-hp.	B-Line Boiler Co.

Jacking Shop

4 cranes—20-ton, double hoist, floor-operated, 33 ft. 5½ in. span	Box Crane & Hoist Corp.

Battery Repair Shop

1 water still—gas fired, 2½ gal.	F. J. Stokes Machine Co.
1 cap sink	*
1 battery charging outfit	Electric Products Co.

Air-Brake Shop

1 boiler—gas fired, 5-hp.	B-Line Boiler Co.
1 lye tank—3 ft. x 3 ft. x 6 ft.	*
1 two wheel grinder—14 in. x 2½ in.	Hisey-Wolf Manufacturing Co.
1 valve finishing machine—Foster	Special Bolt Corp.
1 valve testing rack	Westinghouse Traction Brake Co.
1 drill press—15-in.	W. F. & J. Barnes Co.
1 pipe threading machine—2-in.	Bignall & Keeler Machine Works
1 hoist—1-ton, monorail	Box Crane & Hoist Corp.

Pattern and Wood Shop

1 oilstone tool grinder	Oliver Machinery Co.
2 electric glue pots	Oliver Machinery Co.
1 carpenter's bench	Oliver Machinery Co.
1 patternmaker's bench	Oliver Machinery Co.
1 jointer—16-in.	Oliver Machinery Co.
1 trimming knife—No. 2	Oliver Machinery Co.
1 patternmaker's lathe—24 in. x 16 ft.	Oliver Machinery Co.
1 band saw—36 in.	Oliver Machinery Co.
1 cut-off saw—16-in., straight line	Oliver Machinery Co.
1 variety saw—14-in., shaftless	Oliver Machinery Co.

Sheet Metal Shop

1 drill press—15-in.	W. F. & J. Barnes Co.
1 two wheel grinder—14 in. x 2½ in.	Hisey-Wolf Manufacturing Co.
1 gap punch—½-in.	Niagara Machine & Tool Works
1 bending brake—8-ft.	Dreis & Krump Manufacturing Co.
1 forming roll—8-ft.	Niagara Machine & Tool Works
1 squaring shear—8-ft.	Niagara Machine & Tool Works

General Equipment

1 transfer table—75-ton	*Box Crane & Hoist Corp.
1 freight elevator—8,000-lb., storeroom to basement	Otis Elevator Co.
1 freight elevator—8,000-lb., wheel and axle shop to motor shop	Otis Elevator Co.
1 elevating hand truck—3,500-lb.	Lewis Shepard Co.
1 storage battery lift truck—4,000-lb.	Baker-Raulang Co.
1 storage battery lift truck—2,000-lb.	Wright Hibbard I. E. T. Co.
1 storage battery crane truck—3,000-lb.	Baker-Raulang Co.
12 skid platforms—33 in. x 48 in.	Stuebing Cowan Co.
2 oil storage cabinets—6-tank, 120 gal. each, No. 64	S. F. Bowser & Co., Inc.

*Designed by the Department of City Transit, Philadelphia.

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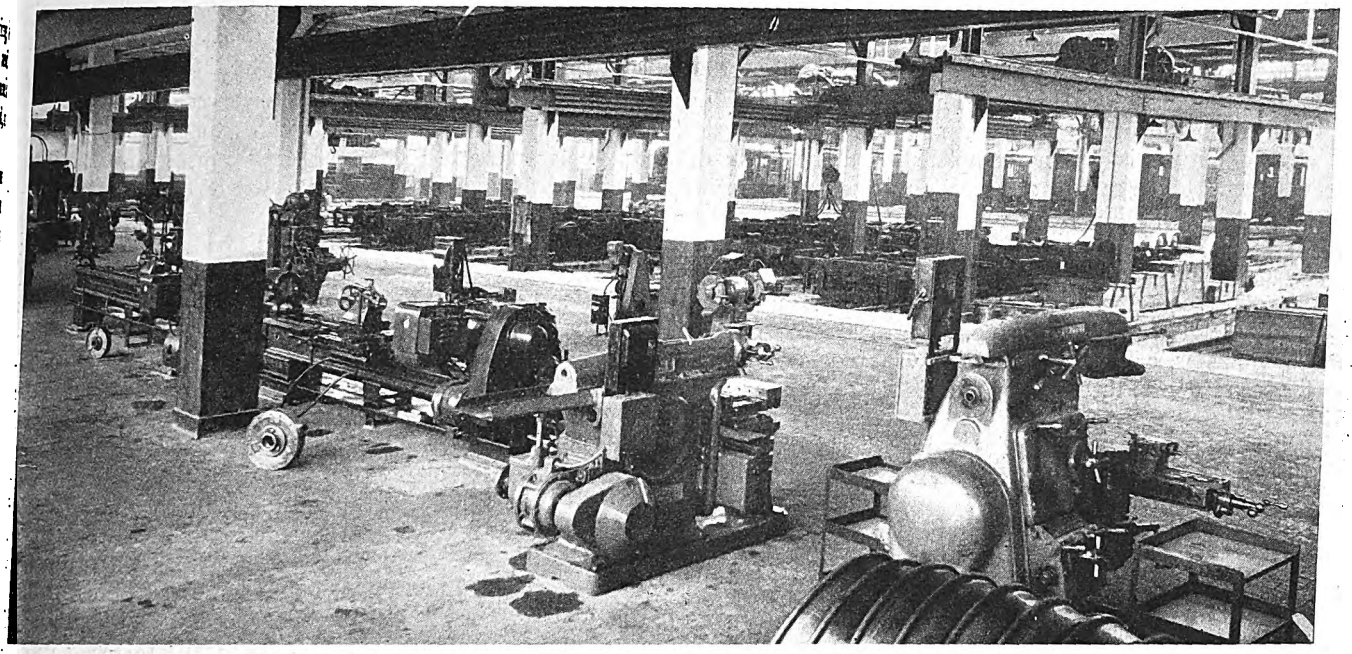


Interior of the general repair shop, showing a portion of the machine shop in the foreground and the truck repair section beyond

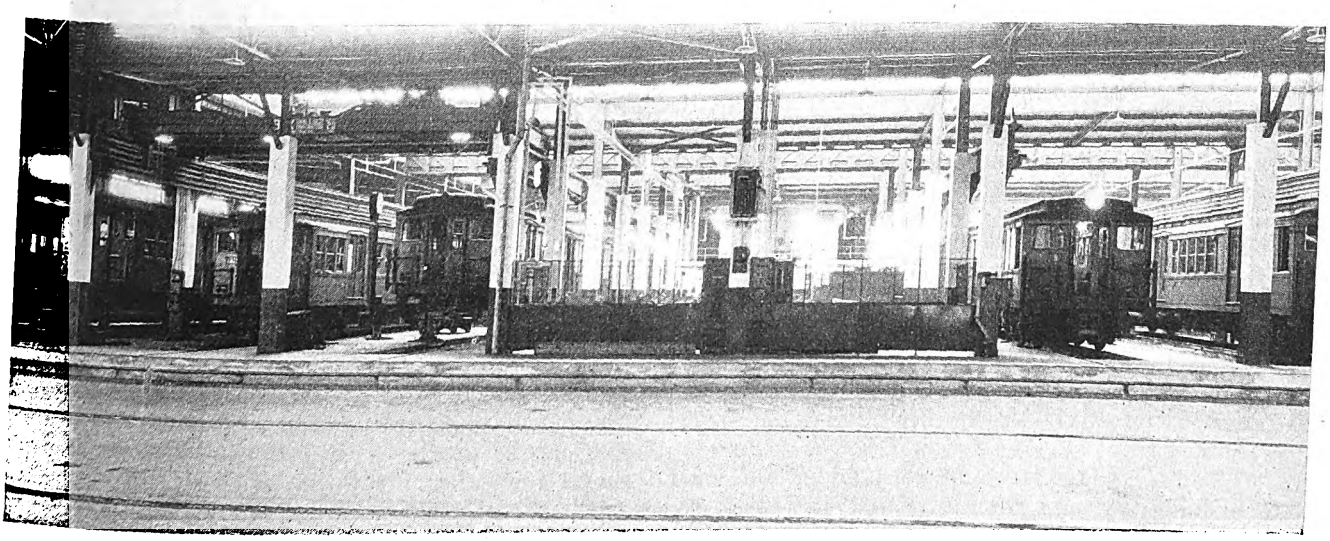
trucks are fully assembled again they are returned to the jacking-up shop and placed under the car bodies. The cars then progress from this department along the east half of the building, passing from the jacking shop to the overhaul, car-washing and paint shops, in turn. The miscellaneous repair departments on this side, conveniently located to the main departments, are the battery repair shop, the electric shop, the air-brake shop, the cabinet and upholstery shops and the sheet metal shop. When completed the car is again run onto the transfer table and moved to one of the spurs leaving the building.

Shops Completely Equipped

Repairing and overhauling are simplified by the array of modern machines and tools in the various departments. A list of the more important ones is given in the table on page 468. The jacking-up shop has four 20-ton, double-hoist, floor-operated cranes, each with a span of 33 ft. 5½ in. The transfer table was specially designed for this building and is 67 ft. in length, operating in a bay with a clear span of 84 ft. The table operates on four rails and is so designed as to give a depth of pit of 19 in. that does not obstruct the movement of workmen across it. The table is designed for a live load of 150,000 lb., permitting the handling of the largest capacity freight cars in the delivery of car wheels, brake shoes and other heavy supplies.

The truck shop, which is 78x216 ft., has twelve tracks, all but one having pits. Two of these tracks are extended into the wheel and axle shop. They are intersected by a long track, extending the full length of and beyond the truck shop and are joined to it by turntables. The wheel and axle shop is equipped with a 600-ton wheel press, a 48-in. car wheel borer, a combination journal and axle lathe, an axle grinder, a wheel lathe, a 200-ton axle-straightening press and a two-wheel grinder.

The forge and arc-welding shops have a track which extends from the transfer table runway to the machine shop. The track is joined also to the long track paralleling the truck shop by a turntable. The equipment of these two shops includes three down-draft forges, a mechanical sledge, a combination punch and shear, an



East or rear section of the general repair building, with the transfer table runway in the foreground. At the left may be seen the jacking shop in the center the battery repair and electrical shops, and at the right a portion of the overhaul department

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800-lb. single-frame hammer, three anvils, an air compressor system and an electrical welding outfit.

In the machine shop are found numerous lathes, drill presses and other machines. The tool room adjoining this shop has a lathe, a drill grinder and a tool grinder. The equipment is just as complete in all the other departments. The motor, armature, bearing, battery, electric, air-brake, cabinet and sheet metal shops all have the necessary machines for repairing the cars efficiently. Throughout the building a number of special machines and other equipment have been installed. Among these are a metal working machine, an armature extractor, a sand blaster, a large wheel lathe, vaporproof lamps and fireproof doors, these lamps and doors being used in the paint shop.

Ample storeroom facilities are provided on the main floor and in the basement of the L extension. The general storeroom is connected with the main floor and the basement storeroom by ramps. Individual rooms are set aside for oil and paint, and all other materials are systematically stored in numerous bins and racks. This extension also has a wood mill, a heating plant and an incinerator for burning the refuse collected from the subway stations, as well as waste materials from the shop. Several sub-storerooms are located throughout the buildings, to serve the individual departments.

The administration building has quarters for the trainmen and operating staff of the system

The shops have a number of locker rooms for the employees, all conveniently located, and in the front of the main building is a large instruction room. Ample office space also is provided in this building.

The portion of the shop to the west or front of the transfer table runway will not be expanded, partly because of the building arrangement selected and partly because the greater portion of machinery required for the maintenance of the initial equipment of cars is sufficient to care for a much larger number. However, additional capacity in the jacking shop, overhaul bay, paint room, etc., can be provided when needed by extending the main building to the east. The general repair shop can be expanded to care for more than 600 cars if necessary.

The storage building at the rear of the general repair building is intended for storing maintenance-of-way materials, primarily. It has an office and three tool rooms, and is equipped with an overhead traveling crane. The building measures 80x140 ft., and has ample room for storing the rails, special work and other materials.

Power for the Fern Rock terminal is supplied at 13,200 volts from the Louden Street substation. A 13,200-volt bus structure, located in a transformer room in the general repair shop, contains electrically-operated switching equipment for the lighting and power transformers. The lighting transformer is a 200-kva., three-phase, 13,200/550-volt unit, and feeds a lighting transfer switch on the main switchboard. Individual switches control the lighting for the various sections of the shop buildings, the entrance building, and the tower floodlights in the yard.

The lighting feeders through the shop buildings and yard are three-phase, 550-volt, and at various points single-phase, 550/250/125-volt transformers are connected to this line. The secondaries of these transformers are connected to lighting cabinets that control the lighting circuits. The intensity of the general lighting of the shop buildings is approximately 4 foot-candles.

Three single-phase, 200-kva., 13,200/550-volt transformers supply the shop power. The secondaries are connected directly to the main switchboard which contains the switches and breakers for the shop and crane feeders. Two panels of this board are for 600-volt, direct-current feeders for the transfer table, and for overhead trolleys used for moving the cars in the shop buildings.

The power feeders from the main switchboard feed several large machines and cutout panels located at various places in the shop buildings for feeding the smaller machines. Each machine has the necessary compensators, controls and safety switches to safeguard the operators.

A direct-current switchboard is located in the inspection shop for the control of the overhead trolleys in that building. The total connected lighting load for the yard and shops is approximately 180 kva., and the total connected power load approximately 450 kva.

At each of the four corners of the yard is located an 80-ft. tower on which floodlights are mounted. In addition, five floodlights are mounted on the roof of the entrance building to illuminate the front of the building at night. With these four towers and the lights on the entrance building, the entire terminal is brilliantly illuminated at night, with a minimum of shadows. Thirteen 1,000-watt and fifteen 500-watt lamps are used for the floodlighting. The 550-volt feeders to the towers are connected through magnetic switches on the main switchboard, and these magnetic switches are controlled from the entrance building, making it possible to light any one of the towers from this building.

The five story administration building at the corner of Broad and Grange Streets is built on the roof of the subway, with 2½ stories below the ground level. It has a polished granite and limestone base, pearl gray semi-glaze brick walls, limestone trim and terra cotta ornamentation and cornice. The upper floors house the administrative and operating staffs of the city-built subway-elevated system. Provision has been made for the trainmen. The receiver's department for handling the receipts is in the basement, while the lower floors are used for locker rooms and small shops. For the convenience of trainmen there is an underground passage 600 ft. long on the roof of the subway connecting with the Olney Avenue station.

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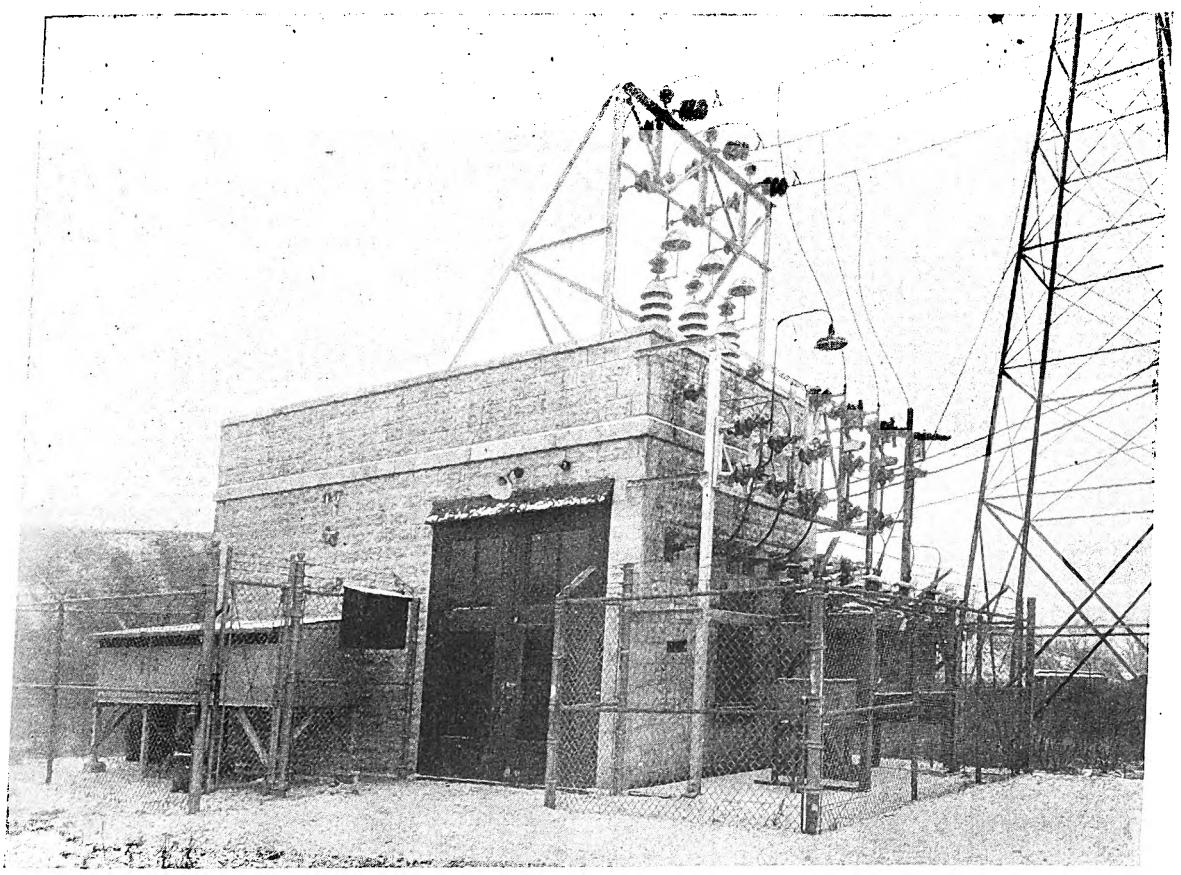

Exterior of Nemahbin rectifier substation, showing at left the sheet-iron housing for load-shifting resistors

Maintenance Problems with Mercury-Arc Rectifiers

Three rectifier substations of the Milwaukee Electric Railway & Light Company are among the first fully-automatic installations for railway service in this country

By O. M. Ward

Superintendent of Operation The Milwaukee Electric Railway & Light Company Milwaukee, Wis.

FOR APPROXIMATELY two years three fully-automatic 550-kw., 600-volt mercury-arc rectifier substations, located at Nemahbin, Oconomowoc and Pipersville, have been in service on the Milwaukee-Watertown interurban line of The Milwaukee Electric Railway & Light Company, a route which serves an important farming district to the northwest of Milwaukee. The substations in which they are installed are about 6.5 miles apart, and are all connected through 600-volt trolley feeders of the interurban line, which also are fed by manually-operated rotary-converter stations. The company also has a number of rotary-converter substations on other interurban lines which carry approximately the same peaks and deliver about the same annual output.

The original rectifier installations did not include load-limiting or load-shifting resistors. Difficulties experienced in these substations under sustained peak loads made the addition of such equipment necessary; its installation was completed late in 1927 and has materially

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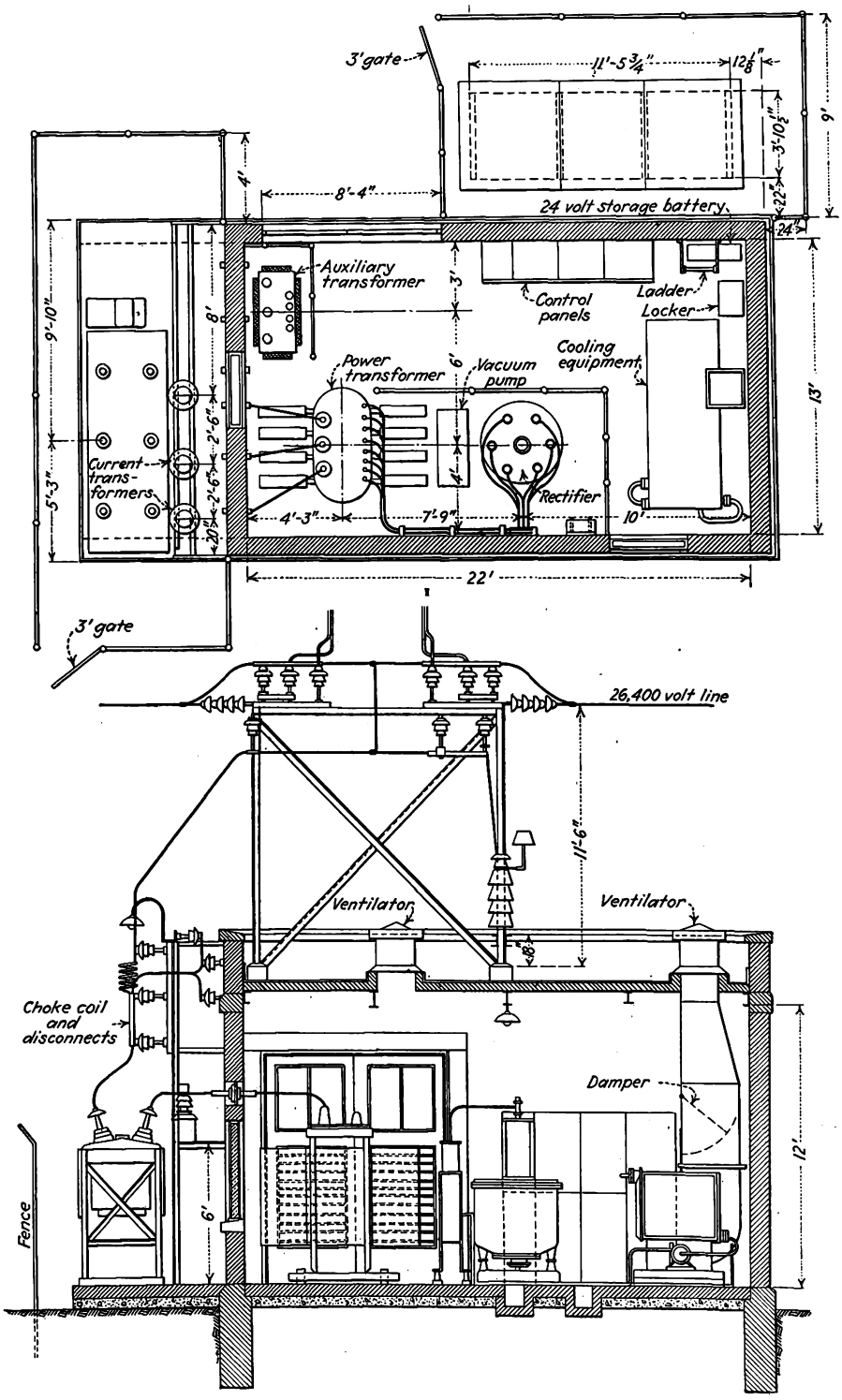


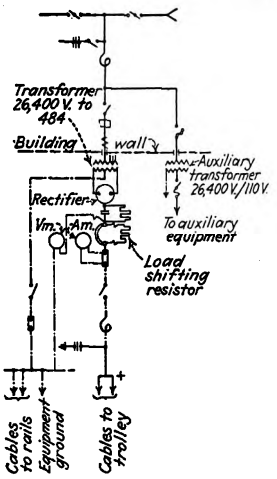
Ground plan and elevation through typical automatic substation on the Milwaukee-Watertown line, showing rectifier and auxiliary equipment

improved the operation. Without the load-limiting resistors the higher current demands put the stations off the line, resulting in very poor trolley voltage in the vicinity, with a corresponding reduction in possible train speeds. With the load-limiting resistors inserted in the feeder circuit, a station is never disconnected from the line and a fairly good trolley voltage can be maintained during high-demand periods.

Three-car trains starting near a substation may impose a demand of 3,000 to 3,500 amp. The load-shifting resistor used is a one-step type, that is, all of the resistance is cut in or cut out at once. The resistor shunting breaker opens when the demand reaches 1,800 amp. and closes when the load decreases to approximately 1,000 amp. The resistors, located outside the substation buildings, are protected from the weather by sheet steel coverings, open at the bottom. The equipment is accessible for inspection and repairs; trouble in the resistors cannot be transferred to other station equipment, and the heat dissipated by them does not affect the temperatures of the transformer and rectifier.

Water Circulating System Used

The rectifier stations have self-contained cooling systems, because no regular water supply is available. Water is circulated by a motor-driven



One-line diagram of electrical connections for 550 kw. mercury-arc rectifier units

pump through the water jacket surrounding the tube tank and through a radiator of the automotive type. The cooling system is at one end of the station. A motor-driven fan forces air drawn into the room at the opposite end past the step-down transformer and rectifier, through the radiator, and finally discharges it outside the building. A non-freeze solution of water and high-grade alcohol is used in the cooling system during the winter, the air-circulating fan being taken out of service. Fan, radiator, and pump are grounded, necessitating the use of distilled water with a non-conducting, non-freeze solution, such as alcohol, to prevent electrolytic action. Insulation of the radiator and pump has been under consideration, but it was decided that it would introduce a hazard. The equipment was arranged with the idea of keeping building size at a minimum, and there is not sufficient space to guard properly an ungrounded fan and radiator. Some difficulty has been encountered from corrosion in the water pipes and water jacket. It has been partially overcome by use of condensed water with an alkaline tendency. Caustic soda is added to distilled water to give a concentration of about five parts of sodium hydrate per million. A pH indicator (hydrogen

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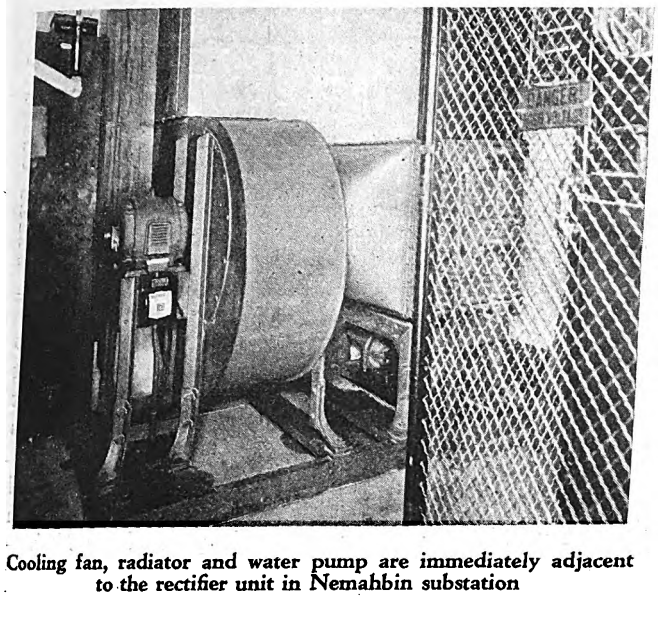
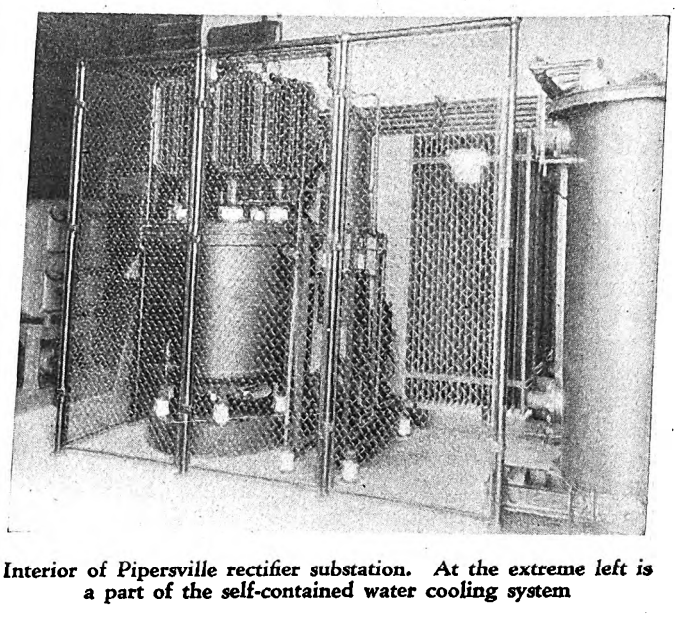


Cooling fan, radiator and water pump are immediately adjacent to the rectifier unit in Nemahbin substation

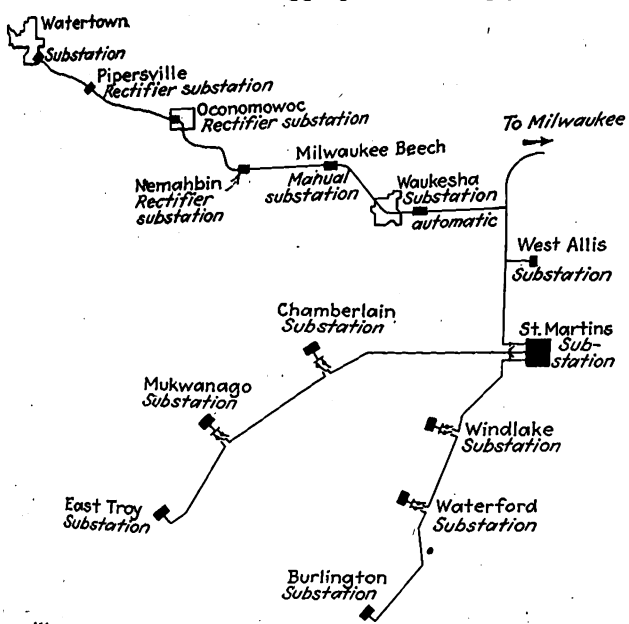


Interior of Pipersville rectifier substation. At the extreme left is a part of the self-contained water cooling system

ion concentration—being a measure of acidity or alkalinity) is used to measure the quality of the water. With the above solution a pH 9 is secured.

The water system is open to the atmosphere, admitting sufficient oxygen to cause some corrosion. Experiments are being made, using water of greater alkalinity. The water is tested and treated occasionally, but the work has not been followed up long enough yet to reach conclusions as to its effectiveness. Naturally, there is a limit to the alkalinity which can be used without materially increasing the conductivity of the water. It may be necessary to install an oxygen extraction breather on the water system opening to the atmosphere. Present experience indicates that the water jacket must be painted once a year because of the corrosion. Inasmuch as to paint the water jacket the tube tank must be raised out of the outer shell, considerable time is needed. In the future a redesign of equipment arrangement may make it possible to do work of this character without moving the rectifier off its insulators.

To prevent iron rust clogging the water pipes, a trap has been installed in the cooling system. This trap consists of a pipe tee connected in the water pipe. The tee is larger than the pipe line. To the third opening in the tee is connected a capped pipe that points downward. The velocity of the water in the tee is reduced and the suspended solids will settle into the trap. With a valve in the trap the dead-end pipe may be cleaned without disturbing the water in the cooling system.



Pipersville, Oconomowoc and Nemahbin rectifier stations are located on the Milwaukee-Watertown interurban line, while Chamberlain, Wind Lake and Waterford rotary-converter substations supply power to the East Troy and Burlington lines

Performance Better in Second Year

The record of the rectifier stations for the second year of service shows great improvement over the first year. Most of the rectifier service delays were caused by auxiliary equipment failures. These are not so serious as trouble in the rectifier, as when it becomes necessary to open the tube tank to the atmosphere, the rectifier must be out of service for quite a long time until the vacuum can be brought back to normal during the baking-out process. A distinct improvement in the rectifier operation would be made if the ignition rod spring could be done away with. This spring, as well as the contacts on the top of the ignition rod, has caused considerable trouble. To work on either necessitates the breaking of the vacuum in the tube tank.

In the rectifier installation the absence of movable parts and the quietness of operation appear to have advantages. However, the auxiliary equipment for the rectifier should be improved. If some simple method for determining the height of the mercury in the tube tank could be devised and used, this also would help materially in keeping the rectifier in continuous service.

500,000 Leaflets Distributed Describing "L's" Advantages

RECENTLY the Chicago Rapid Transit Company, operating the elevated lines in the city of Chicago, made a special effort to acquaint the people living in territory adjacent to the lines with the advantages of the service and the use that can be made of it in traveling to points of interest in the city. Nearly 500,000 leaflets describing points of interest reached by the "L" were distributed in the territory a half mile on either side of the lines.

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Rail Traffic 90 Per Cent, Bus 10 Per Cent in European Cities

FIGURES recently compiled, showing the relative volumes of traffic on various local transportation facilities in a number of the larger cities of Europe, indicate that the electric railways continue to carry the bulk of the load, although the bus has become increasingly popular in recent years. Except for the cities of London and Paris, where special conditions prevail, the electric railways are carrying about 90 per cent of the total traffic and the buses about 10 per cent.

In London there are about 5,226 buses operated and 2,000 street cars, and in Paris 1,371 buses and 3,183 street cars. London buses carry 40 per cent of the total number of passengers, while the street cars carried 30 per cent and the subways and the local steam railroads together about 30 per cent. For Paris the figures are respectively 40 per cent, 42 per cent and 38 per cent.

NUMBER OF BUSES AND STREET CARS IN EUROPEAN CITIES

City	Population	Number of Buses	Number of Bus Routes	Bus Route, Mileage	Street Cars—Motor Cars	Street Cars—Trailers
London...	7,500,000	5,226	512	1,691	2,000	...
Paris.....	2,800,000	1,371	...	.....	2,291	892
Berlin.....	4,000,000	431	33	192.1	2,085	1,793
Hamburg.	1,460,000	58	13	75.6	848	867
Amsterdam	730,000	95	9	30.0	394	336
Cologne...	720,000	34 and 29 trailers	11	230.3	528	702
Rotterdam	580,000	40	7	24.9	341	146
Frankfort.	540,000	41	7	23.9	376	463
Hanover..	540,000	10	2	4.6	276	332
The Hague	490,000	30	5	14.0	275	248
Bremen...	400,000	21	4	33.3	222	244

When street car service began in London, about the time when traffic became congested the municipal government passed a law prohibiting the entrance of the cars into the downtown section, covering an area of 12.24 square miles. Only buses are permitted to operate in this part of the city. It was thought that by prohibiting the street car from entering this district the traffic congestion would be minimized, but this object has not been realized. Traffic congestion in the old downtown section of London has now reached such proportions that the condition is almost intolerable.

In Paris the area of the business section where street cars are not admitted is much smaller. The average length of a bus route here is also considerably shorter. The traffic by bus in Paris is, because of this, considerably less than in London. However, here too the effect has been the same as in London. The downtown section of Paris, where the street cars do not operate, presents the same congested appearance, and energetic efforts must be made to keep traffic moving.

Buses with three axles are prohibited from operating in the densely crowded downtown area of Paris, where it is considered that it would be impossible for them to operate safely. In this particular district the subway is looked for to bring relief. This form of transportation is being extended rapidly.

The present pressing problem of traffic congestion in London and Paris is due primarily to the tremendous increase in the number of private automobiles. The intensive use of buses in these cities also contributes somewhat to the congestion. It is now believed that the bus, due to its mingling with other vehicles and its frequent stops, retards traffic more than street cars do, particularly if the latter are used with street loading platforms such as are found in many American cities.

DISTRIBUTION OF TRAFFIC IN EUROPEAN CITIES

City	Population	Number of Passengers—Street Car	Suburban Railroad	Subways	Bus	Percentage Rail	Percentage Bus
Berlin.....	4,000,000	77,100,000	35,000,000	21,100,000	19,300,000	87.5	12.5
Cologne...	720,000	14,700,000	1,950,000	.....	500,000	97.0	3.0
Leipzig....	680,000	21,700,000	400,000	.....	180,000	99.2	.8
Dresden...	620,000	19,600,000	130,000	.....	880,000	95.7	4.3
Breslau...	600,000	10,200,000	.....	.....	570,000	94.7	5.3
Frankford on Main	540,000	13,600,000	135,000	.....	1,200,000	92.0	8.0
Dusseldorf	440,000	11,300,000	580,000	.....	170,000	98.6	1.4
Amsterdam	730,000	122,739,337	.....	.....	10,656,181	92.0	8.0
Rotterdam	580,000	70,000,000	.....	.....	10,000,000	87.5	12.5
The Hague	490,000	63,422,011	.....	.....	3,404,400	95.0	5.0

In Germany bus traffic plays only a minor part as compared with the street cars. In Berlin 12.5 per cent of the total traffic is carried by bus and 87.5 per cent by rail. Elsewhere in Germany the proportion of bus traffic is even smaller.

According to *De Ingenieur,* the journal of the Royal Institute of Engineers in the Netherlands, it has been found that in Rotterdam, the main port of the Netherlands, 10,000,000 passengers are carried yearly by privately owned buses while the street cars take care of approximately 70,000,000; thus 87½ per cent travel by street car while 12½ per cent prefer, or must use, the bus. It has been estimated that in the near future, when certain extensions have been made to the rail systems, 93,000,000 passengers in that city will be carried by street cars and 9,000,000 by buses.

In Amsterdam 122,739,337 passengers were carried by street cars during the year of 1927 and 10,656,181 by buses, or 92 per cent and 8 per cent respectively. For The Hague these figures for 1927 were respectively 63,422,011 and 3,404,400, or 95 per cent were carried by street cars and 5 per cent by motor buses.

The April Issue of

ELECTRIC RAILWAY JOURNAL

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OUT NEXT WEEK

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Higher Speeds Effective

in New Bedford

By Harold E. Potter

Assistant Superintendent of Transportation Union Street Railway
New Bedford, Mass.

By adjusting the schedules on several lines the Union Street Railway has made its service more attractive and at the same time materially reduced its operating costs

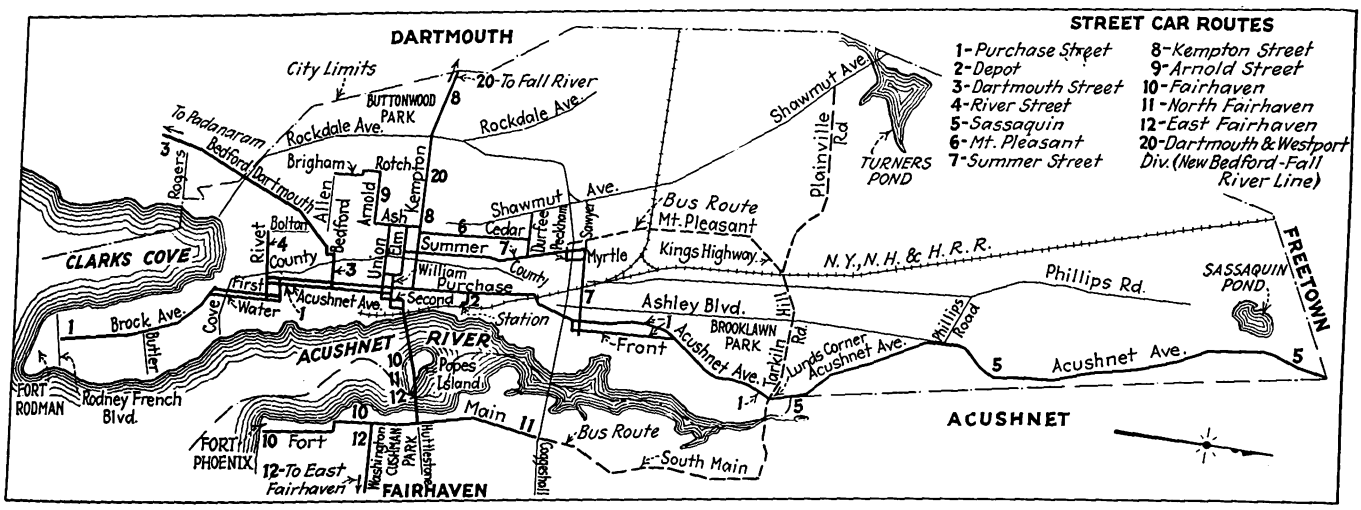

Fig. 1—Street car and bus lines of the Union Street Railway, New Bedford, Mass.

FOR a number of years the Union Street Railway, New Bedford, Mass., has maintained a traffic department which devotes the greater part of its time to analyzing riding requirements and making time-tables to meet the needs of the public. Not only has this given service where, when and as required, but it has been the means of saving the company from expending thousands of dollars in performing unnecessary service.

Recently the efforts of this department have been concentrated on the problem of increasing the schedule speeds on certain lines of the system. These increased schedule speeds have resulted in quicker transportation to the patrons, and in a number of cases operating costs have been decreased appreciably. Before placing any new schedule in operation, the traffic department makes a thorough study of the riding, first, to provide a satisfactory, speedy service to the patrons, and second, if possible, to provide more economical operation. The company realizes that while the patrons appreciate a speedier service this service is not always satisfactory unless the cars are almost certain to arrive and depart on schedule time. For this reason the company, in many instances, has followed the policy of using the slack time as layover time instead of eliminating car-hours in a way that might result in operating on an erratic headway. On the Kempton Street line, for example, ten-minute layovers are allowed in rush-hours, insuring regular service.

When the company recently changed several of its lines from two-man to one-man operation, in no instance was this higher schedule speed reduced. The operators were trained to lose no time in handling their cars and to maintain the regular schedules.

All time-tables have been so constructed that they may be adjusted readily to changes in traffic requirements without disrupting the regular basic schedules. Headway may be changed from fifteen to ten or to twenty minutes without making out entirely new time-tables. This type of schedule has been of great assistance to the supervisory force in increasing or decreasing the service as riding requirements vary. All supplementary time-tables are made out so they interlock easily with the regular weekday schedules. The trainmen are provided with pocket folders that include all the regular schedules of the system, to assist them in operating intelligently.

Before putting any important time-table change into effect the company always advertises the change for a week in all local newspapers. Thousands of cards or time-tables also are distributed to the patrons by the trainmen. An additional supply of these time-tables is always kept available for patrons. Twenty-four-hour

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COMPARISON OF OLD AND NEW SCHEDULES

Route No.	Line	Schedule Speed in Miles per Hour Old	Schedule Speed in Miles per Hour New	Round Trip Running Time in Minutes Old	Round Trip Running Time in Minutes New	Headway in Minutes Old	Headway in Minutes New	Number of Regular Cars Operated Old	Number of Regular Cars Operated New	Per Cent Increase in Schedule Speed	Per Cent Saving in Cars Operated	When Schedule is Operated
1	Purchase Street	8.58	10.30	90	75	5	7½	17	10	20.0	41.2	Sundays and holidays.
4	Rivet Street	6.98	8.73	30	20	15	20	2	1	25.1	50.0	Sundays and holidays.
5	Sassaquin	10.96	14.25	90	40	45	45	3	1	30.0	66.6	Every day.
7	Summer Street	6.80	7.65	45	40	15	20	3	2	12.5	33.3	Sundays and after 7 p.m. every day, except Saturdays.
10	Fairhaven	7.04	7.92	45	40	15	20	3	2	12.5	33.3	
12	East Fairhaven	10.49	12.59	90	75	30	30	3	3	20.0	....	Every day.
20	D. & W. Division (New Bedford-Fall River)	13.72	16.47	120	100	30	30	4	4	20.0	....	Every day.
4–11	Rivet Street and North Fairhaven	8.22	8.22	60	60	15	20	4	3	....	25.0	After 7 p.m. every day, except Saturdays.
6– 8	Mt. Pleasant and Kempton Street	7.39	7.39	60	60	15	20	4	3	....	25.0	

switchboard service also is maintained. Patrons may telephone the company at any time during the day or night for information concerning schedules. A large chart, placed under the glass near the switchboard operator, supplies this information.

Each Line Carefully Analyzed

In the case of the Purchase Street line the riding was carefully analyzed and charted, and the number of seats furnished compared with the number occupied. The study revealed that riding on Sunday mornings was light, and the possibility of increasing this schedule speed suggested itself, since traffic congestion at that time is practically nil. A 7½-minute headway was proposed to replace the five-minute headway and a chart, reproduced as Fig. 2, prepared to show what the effect would be. As a result the new schedule was put into effect. A 20 per cent

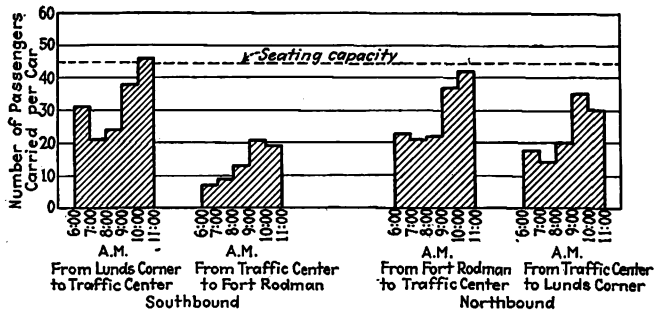

Fig. 2—Chart showing the average number of passengers that would be carried with the proposed 7½-minute headway on the Purchase Street line on Sunday mornings

increase in schedule speed, an increase from five to 7½ minutes in headway, and a decrease in cars from seventeen to ten were some of the outstanding results of the change. The time-table was so constructed for this schedule that it can readily be linked to the regular weekday schedule at noon time. After the schedule had been in effect for a time the riding was again analyzed and adjustments made in accordance with the riding requirements. Fig. 3 shows the results of one of the checks made.

On the Rivet Street line, following a similar analysis, the Sunday morning schedule speed was increased from 6.98 m.p.h. to 8.73 m.p.h., a 25 per cent increase. The headway was increased from fifteen to twenty minutes and only one car was needed for this schedule instead of two. The usual weekday schedule is maintained after noon until 7 p.m. when, except on Saturdays, the schedule again calls for 8.73 m.p.h. In addition, by joining this line with the North Fairhaven line, and having a car make one trip on Rivet Street and then one trip to North Fairhaven, it was found that the headway could be changed from fifteen to twenty minutes and the number of cars from four to three. Routings through the center of the city were not changed so that patrons board the cars at the usual places. As the schedule speed of the Rivet Street line is rather low and that of the North Fairhaven line somewhat high, this schedule has proved to be an excellent combination.

Two Other Lines Combined

After 7 p.m., except on Saturdays, the Mount Pleasant line is joined with the Kempton Street line, producing similar results. Special operator's trip sheets have been prepared so that the car operators can separate the revenue when two lines are joined together. When twenty-minute headway is in effect, the leaving times are arranged to correspond as closely as possible to those of fifteen-minute headway. For instance, on fifteen-minute headway the cars on this line leave the center of the city at 4, 19, 34 and 49 minutes past the hour, while on the twenty-minute time they leave at 5, 25 and 45 minutes past the hour. An analysis of the results of the twenty-minute headway showed no appreciable decrease in riding, which leads to the possible conclusion that the evening rider is a necessity rider.

By increasing the schedule speed of the Summer Street line from 6.80 m.p.h. to 7.65 m.p.h. on Sunday mornings and after 7 p.m. on weekdays, except Saturdays, the speed has been increased 12.5 per cent, the headway increased from fifteen to twenty minutes, and the number of cars reduced 33⅓ per cent. A notable result was an increase of 26 to 35 per cent in the number of seats occupied.

The same results were accomplished on the Fairhaven line by increasing the schedule speed from 7.04 m.p.h. to 7.92 m.p.h. on Sundays and after 7 p.m. on weekdays.

To insure a positive ten-minute leaving time of cars operated on the Kempton Street line, an additional car

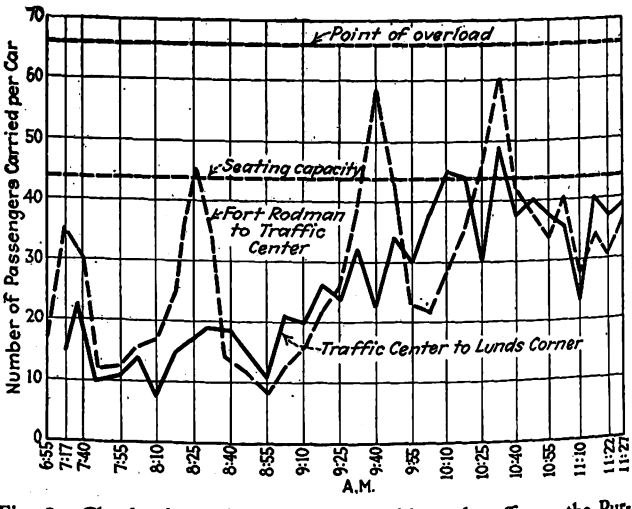

Fig. 3—Check of Sunday morning northbound traffic on the Purchase Street line with the 7½-minute headway in effect

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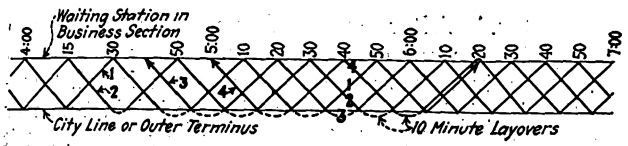

Fig. 4—Graphic time-table for the Kempton Street line during the evening rush period, showing how the ten-minute headway is guaranteed by adding a car and allowing ten-minute layovers at the city limit

has been provided during the evening rush hours, but the schedule speeds have remained unchanged. The extra time caused by operating this additional car is used at the end of the line in the form of layover time. Of course the crews do not always get this ten-minute layover time, because of traffic congestion or other delays, but this method insures a positive ten-minute headway to the public. This regular headway has eliminated overcrowding, and instead of running a single trip extra at night, which cost the company a two-hour wage guarantee to operate, this car is now operated the full two hours as shown in the accompanying graphic time-table, Fig. 4, at no additional cost to the company.

The Sassaquin line operates through a thinly populated territory at the northern end of the city to a midway point called Lunds Corner, which is 3 miles from the center of the city. Formerly, all Sassaquin cars when arriving at Lunds Corner continued to the center of the city. By so doing they operated over 3 miles of track over which the regular five-minute Purchase Street headway was being maintained. A careful survey and analysis was made of this line which showed that nearly 50 per cent of its patrons either started or terminated their rides at Lunds Corner. It also was determined that the five-minute headway on Purchase Street could easily accommodate the Sassaquin patrons riding between Lunds Corner and the center of the city. It was decided, therefore, to terminate the Sassaquin cars at Lunds Corner and to run a shuttle service between that point and the city limits.

By terminating the Sassaquin cars at Lunds Corner it was possible for the company to reduce the Sassaquin line service from three two-man cars to one one-man car, and at the same time to maintain the 45-minute headway. Only one-third of the former car-hours are operated now. The speed has been increased from 10.96 m.p.h. to 14.25 m.p.h., and the car-miles have been reduced 84,870 miles per year, a saving of approximately 42.8 per cent. The elimination of duplicate mileage alone saves approximately 127,305 kw.-hr. per year, amounting to $1,273.05.

One of the regular cars was converted, out of the savings, into a de luxe type, with heavy leather air cushion seats. The converted car, put into operation because patrons were obliged to transfer at Lunds Corner, has caused much favorable comment. A waiting station is located at the transfer point so the patrons are not greatly inconvenienced by the change. Also time-tables are issued so the passengers know when to expect a car. The entire change has saved the company several thousands of dollars and has provided a service equally as satisfactory as the former.

On the East Fairhaven line a high schedule speed could not be maintained positively because of a bus connection at the Mattapoisett terminus. However, it was increased from 10.49 m.p.h. to 12.59 m.p.h., or 20 per cent, and the running time was decreased from 45 to 35 minutes. The saving of nearly ten minutes is used as layover time at the ends of the line. In the city, a centrally located spur track is used for this layover purpose. Schedules in wooden frames have been posted on white poles located along the line to inform the patrons of the time cars are due.

Interurban Speed Increased 20 Per Cent

The schedule speed of the Dartmouth and Westport Division interurbans, running between New Bedford and Fall River, has been increased from 13.72 m.p.h. to 16.47 m.p.h., or 20 per cent. The running time for the round trip of 28 miles has been decreased from 120 to 100 minutes, and the slack time of twenty minutes is used as layover time in New Bedford. Because the riding of this line varies from hour to hour, and the traffic congestion in the two cities causes some delays, it was thought advisable not to try to eliminate cars operating at a higher schedule speed. The company felt that it would rather guarantee its patrons a positive leaving time, even though it was necessary to pay the trainmen when laying over. All patrons of this division are informed when the cars pass various points along the line by pocket cards. These cards are circulated by the trainmen and copies are always available. While no saving has been accomplished on this line, the quickened service has been thoroughly appreciated by the public.

While the main object of all these changes has been to increase the schedule speed of the cars on the various lines of the system, it has in many instances produced a surprising saving in car-hours, car-miles and operating costs. A summary of the changes made with the results obtained, in increased schedule speeds and cars saved, is given in an accompanying table. Although cars were reduced on several lines and headways lengthened the service has been made more attractive because of the higher speeds.

London Improves Cars to Increase Earnings

EARLY in 1925 the London United Tramways, London, England, commenced re-equipping its cars in an attempt to give a faster, more luxurious service and at the same time increase its earnings. As a test, four cars were re-equipped and placed in operation on the Shepherd's Bush-Uxbridge route. These cars proved so popular that the company rebuilt 40 cars for this service.

The two 35-hp. motors on the cars were replaced by two 50-hp. motors, resulting in an increased schedule speed from 8.5 m.p.h. to 10.5 m.p.h. or an improvement of 23.5 per cent. This speed was obtained in service calling for a possible eight stops and a usual four stops per mile. The lower decks of the cars were fitted with cross-seats in moquette (plush) and rubber flooring. The rubber flooring proved successful from the standpoint of noise reduction, but it is so difficult to keep it dry in wet weather that hardwood is likely to be used in other modernizing work.

The cost of re-equipping these cars was approximately $2,425 per car. This included new motors, line switch and cross-seats. The investment is bringing good returns inasmuch as the earnings have increased appreciably in addition to the operating gains.

In view of such results the management is planning to rebuild another 50 cars in the same way except that the car dimensions will not permit the use of cross-seats. On the allied Metropolitan Electric Tramways, 40 cars used on the Golder's Green-Finchley suburban route have

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been re-motored, and another 60 cars have been re-motored and equipped with new cross-seats. The South Metropolitan Electric Tramways, another allied company, has fitted sixteen cars with moquette cross-seats. One hundred cars of these companies have also been fitted with short tooth gears as a successful means of noise reduction.

In general, the management's observations are that these improvements in comfort, speed and noise reduction are having a marked effect in bringing traffic back to the railways. Today the tram is beginning to set the pace for road traffic with a schedule speed of more than 10 m.p.h., including stops. It is claimed that it will undoubtedly be able to do still better when the legal maximum running speed is raised from the present 20-m.p.h. limit.

Illinois Association Meeting Well Attended

Co-ordination of rail and bus services, one-man car operation, mercury-arc rectifiers, and developments in new street cars share interest of delegates at two-day session

COMPETITION of the private automobile is the most significant factor affecting the success of electric railway operation today, declared J. W. Welsh, general secretary American Electric Railway Association, in addressing the opening session of the joint convention of the Illinois utility associations in Springfield on March 14. It is remarkable, however, that since 1923 the total rides on public transportation vehicles have remained practically constant at approximately 16,000,000,000 per year while the automobile registration has doubled.

Hon. Louis L. Emmerson, Governor of Illinois, addressing the convention Friday, pronounced it his belief that the powers vested in the Illinois Commerce Commission under present laws are sufficient to insure intelligent regulation. "I regard this commission," he said, "as a court which, when made up of men of the highest integrity, should function without executive suggestion or interference." Public ownership of utilities, the Governor declared, is coming rapidly; but in a way never anticipated by the early utility promoters. "It is called customer ownership and employee ownership. As the average citizen becomes more familiar with investments in securities of corporations, and as utilities see more clearly the value of customer ownership, the day will approach when most of the stockholders of your companies will be the people who use your service. When that day comes you will have found not only a new and important source of capital, but, in addition, an understanding, helpful and friendly public."

The riding tastes of the public have so changed that those in the transportation business have adopted the motor bus in increasing numbers, stated E. A. Roehry, general manager St. Louis Electric Terminal Railway, in his paper, "Co-ordination of Rail and Bus Service." "The results of experimentation with the self-propelled motor bus have been satisfactory to a considerable degree. In fact," continued Mr. Roehry, "it is no longer a question as to the advisability of co-ordinating bus service with rail operation, but rather the extent to which the motor bus should be used that is disturbing the present-day operator." After enumerating certain advantages to be derived from bus operation, Mr. Roehry hastened to add: "The bus does not offer a panacea for all transportation ills, it has not qualified in any brilliant manner as a traffic stimulator, it is not always profitable, but it does offer the advantage of developing new territory and serving where street cars could not be used.

"It is now accepted by municipal and transportation authorities," he added, "that the agency charged with mass transportation in any community should have control of all methods with a co-ordinated system of street car and bus transportation so planned and operated as to fit local conditions peculiar to each community."

During the past few years the use of mercury-arc rectifiers as conversion equipment on electric railways has increased very rapidly, and from present indications will probably displace the rotating machines to a great extent, according to A. W. Baumgarten, division engineer Chicago & Joliet Electric Railway. On his property a 500-kw., full automatic, closed cooling system rectifier has been in almost continuous operation since that time, displacing two 250-kw., manually-operated motor-generators. The installation, according to Mr. Baumgarten, has resulted in a saving of 13 per cent in energy, the elimination of two men and the cost of maintenance and operation of 25 miles of transmission line. The estimated total saving is $9,576. Plans are now in progress for the substitution of a 1,000-kw., full automatic mercury-arc rectifier for three motor-generators now in use on the system.

Late trends in street cars and equipment were discussed by W. C. Wheeler, engineer of equipment Chicago Surface Lines. Commenting on the tendency toward refinement of car design and the study of equipment possibilities indicated by the many developments carried on by railways and equipment manufacturers, Mr. Wheeler summarized the outstanding accomplishments to date. Better looking and better performing cars, which will in turn mean faster schedules and more comfortable riding, are being produced, he stated.

In his paper on one-man car operation G. W. Welsh, vice-president and general manager East St. Louis Railway, said that at the present time, there are on his property 39 one-man cars operating over six routes during the rush hours. Twelve two-man tripper cars also are used during the rush hours, making the service 100 per cent one-man in the non-rush hours and 75 per cent one-man at peak periods. According to Mr. Welsh, the installation of one-man service has reduced total platform wages from 27.7 per cent to 21 per cent of the gross in spite of the decline in revenue and an increase in wages.

H. O. Crews, supervisor of public relations Chicago Surface Lines, sketched briefly the use by his company of motion pictures to carry to parents and children a more informative picture of the operating difficulties and safety problems which confront the street railway operator of today, and concluded with a showing of the company's latest film release, "Safe Highways."

Officers elected for the ensuing year are Charles H. Jones, Chicago, South Shore & South Bend Railroad, Michigan City, Ind., president; G. A. Richardson, Chicago Surface Lines, first vice-president; R. B. MacDonald, Tri-City Railway of Illinois, Rock Island, second vice-president; and George W. Schwaner, Springfield, secretary-treasurer. The executive committee will be composed of the officers and A. P. Titus, J. F. Egolf and J. R. Blackhall.

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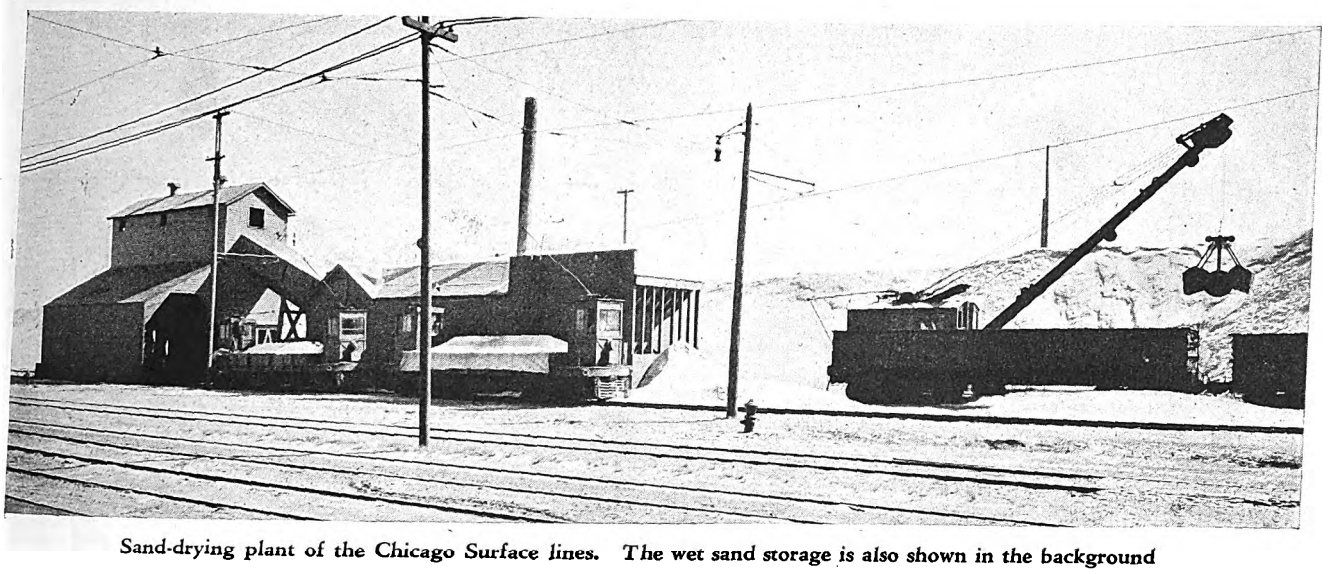
Efficiency of Sand Drying Tested

Data obtained by Chicago Surface Lines on the operation of a sand-drying plant of 38,000 tons per year capacity



Sand-drying plant of the Chicago Surface lines. The wet sand storage is also shown in the background

EXTENSIVE experiments have been made by the Chicago Surface Lines to determine the efficiency of its present method of sand drying as a basis for deciding between coal and gas as fuel in its sand drying plant. The present plant is of the large coal-fired type. The hourly output of dried sand averages from 10 to 18 tons. During the past year 38,000 tons of sand were dried and a reserve supply of 34,000 tons was stored for future use. The drier consists of a revolving drum 48 in. in diameter and 14 ft. 9 in. long. At one end of this drum is a combustion chamber which has a 34x36-in. grate and is 39 in. high from the grate to the arch. The walls are constructed of 9 in. of high grade firebrick and 4 in. of common brick. In the rear of this furnace is a 30-in. diameter opening through which the products of combustion pass directly into the charging end of the drying drum. After passing through the drum they enter a stack about 40 ft. high located at the discharge end of the drum.

Air for combustion, as well as auxiliary air necessary to carry on the drying operation, is supplied by means of a 30-in. No. 6 Buffalo centrifugal cupola blower driven from the line shaft, which also drives the drum and numerous conveyors. A portion of the air supplied by this blower is delivered to the combustion chamber just under the arch, the remainder being delivered under the grate.

In operating the drier the fire is kindled each morning in the furnace by means of scrap wood and after a few minutes coal is added. After about 30 minutes of firing the furnace and drum have reached the required operating temperature. The conveyor system is then started, taking the wet sand from the supply hopper into the drum for drying. The drum is lined with fins so that when it rotates the sand is carried up its side and dropped. The heated air which is forced through the drum evaporates the moisture so that when the sand reaches the end of the drum it is dry.

The sand to be dried is stored in large piles in the yard and is taken from storage to the feed hopper by means of an electric bucket shovel. One hopperful is about the amount turned out by one shift. A normal day's operation is one shift, but there are periods when two and sometimes three shifts have had to be used to meet the demand. A normal day starts about 7:30 a.m. and ends at 4:30 p.m., but only about 7½ hours out of the nine are productive. The 1½ hours non-productive period includes a half hour for firing in the morning, a half hour lunch period and a half hour for cleaning and rekindling the fire after the noon period shutdown.

In making the efficiency test the weight of the wet sand charged into the hopper was determined by weighing it in a freight car. The total coal fired was weighed on a small platform scale. Samples were taken of each batch of coal weighed, the final cumulated sample being crushed and quartered at the end of the test. This quartered sample was then analyzed and tested.

Samples were also taken periodically of the wet and dried sand, these being analyzed for their moisture content. Half-hourly readings were taken of the temperatures of combustion leaving the drier. The carbon dioxide content of the flue gases also was taken every half hour.

The total weight of wet sand charged during the test was 127,400 lb., and the total weight of the coal fired was 1,939 lb. The moisture content by weight of the wet sand was 4.01 per cent and the moisture content by weight of the dried sand was 0.38 per cent. An 8.8 per cent carbon dioxide in the flue gases indicated that the drier operates with 139 per cent excess air.

In determining the heat output, the following computations were made. From the accompanying tables it will be seen that the sand consumed 127,400 × 0.0599 ×

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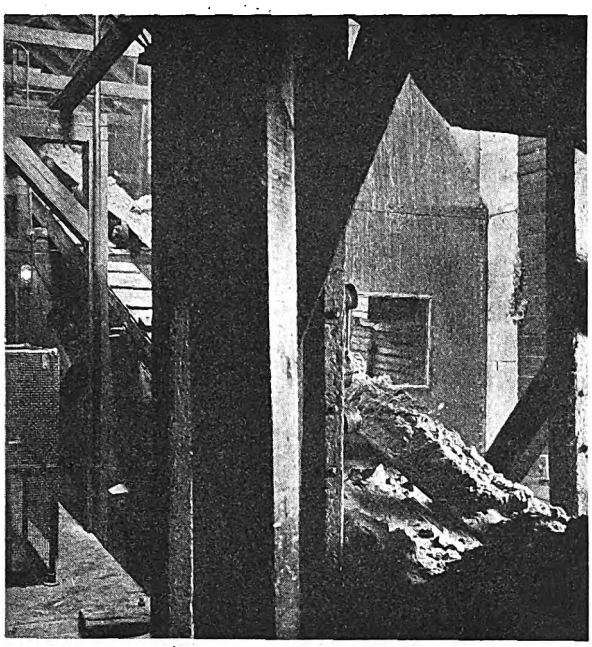
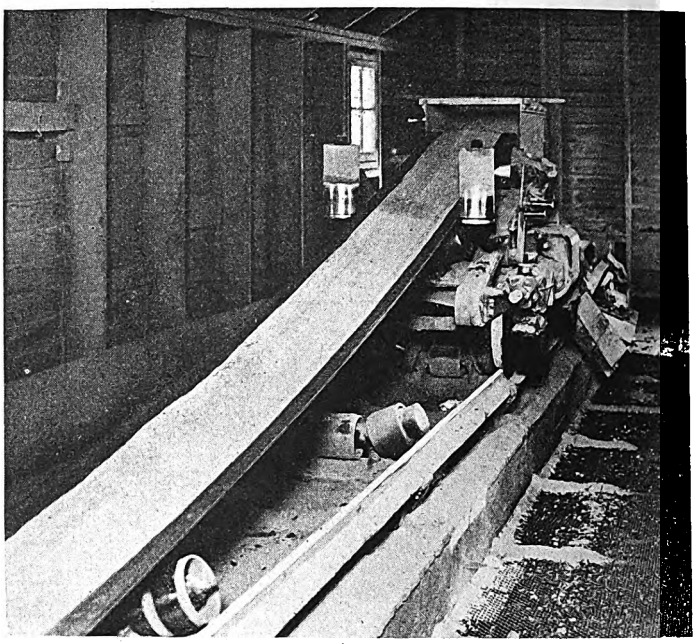


The wet sand is conveyed to the rotating drum, the stack end of which is equipped with a window giving the operator a clear vision of its interior

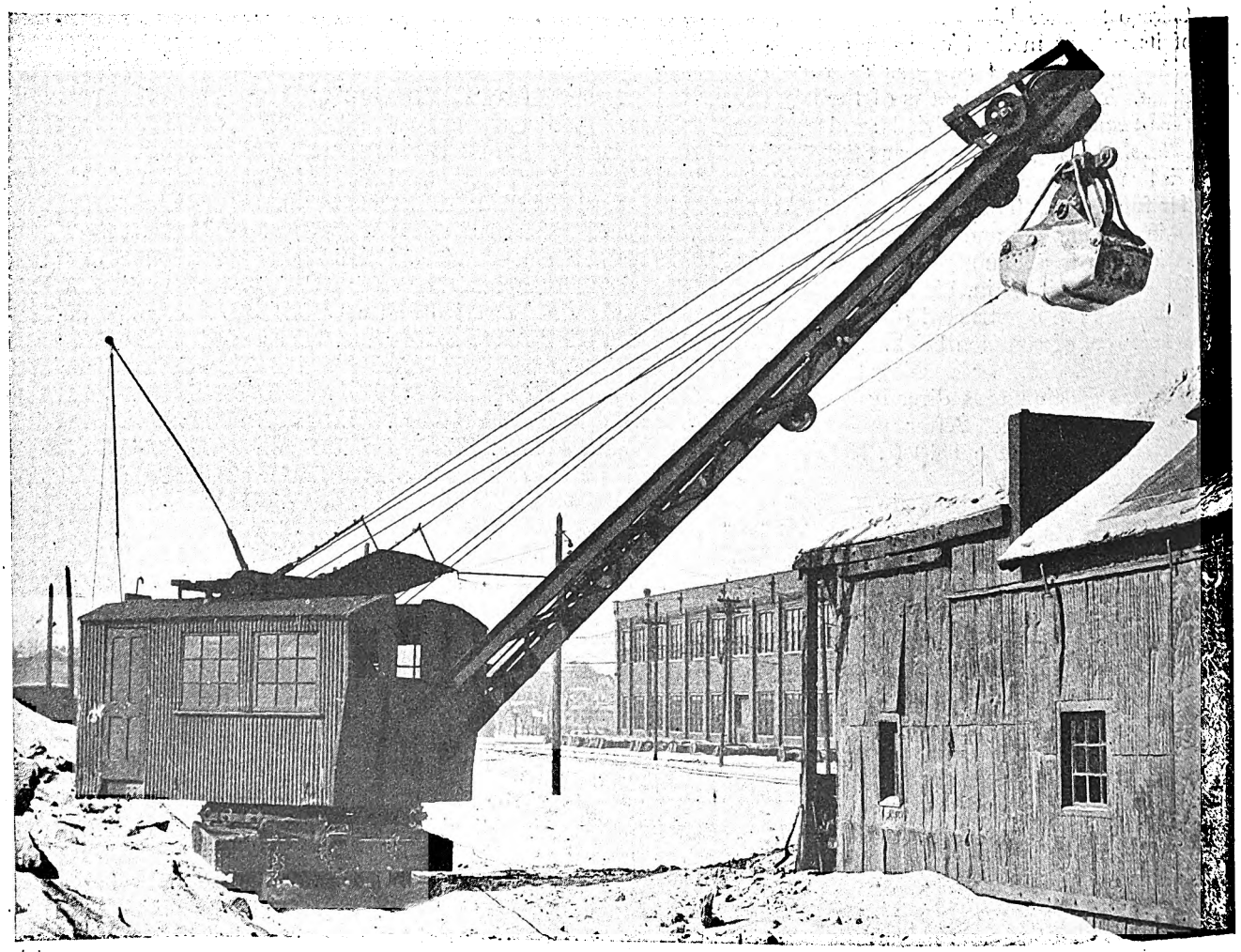


The dried sand is conveyed to the top of the sand storage bin where it is screened after leaving the belt. It then passes into the storage bins below

(234 — 32.4) × 0.19 or 4,680,000 B.t.u. The moisture remaining in the sand accounted for 470 × (234 — 32.4) or 94,700 B.t.u. The moisture evaporated consumed 4,630 × 1,150 or 5,330,000 B.t.u. The sum of these figures gives 10,104,700 B.t.u. as a total heat output.

The total heat input equals 1,939 × 12,571 or 24,400,000 B.t.u. The efficiency of the present coal-fired system, therefore, equals the total heat output divided by the total heat input or 41.4 per cent.

To compete with coal in the matter of cost of operation,



An electric crane equipped with a 1-yd. bucket loads wet sand into the 100-yd. capacity hopper

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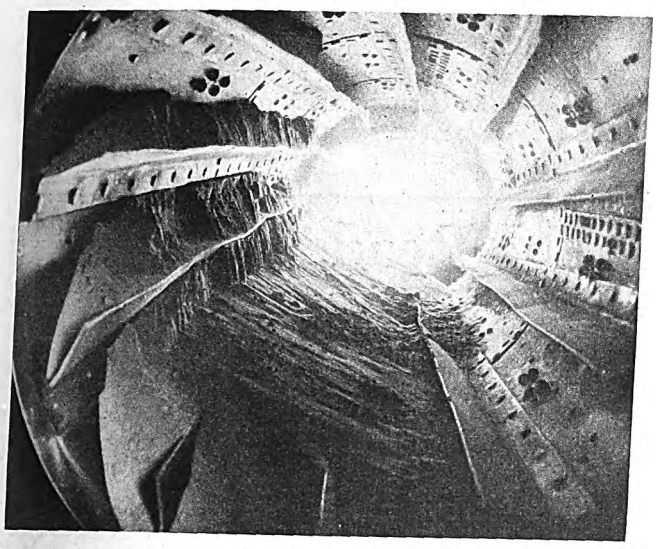

In the interior of the rotating drum the sand is carried upward by the fins and poured through the heated air which is blown through the drum by a forced draft from the firebox

it has been estimated that 30,000 cu.ft. of gas must do the work of a ton of coal. This figure allows for all of the cost incidental to coal. The foregoing figures show that by increasing the efficiency to 50 per cent, due to the elimination of the firebox and a reduction in the heating up periods, 39,000 cu.ft. of gas is required per ton of coal fired.

Under the present drying conditions it seems that gas cannot be substituted for coal at a similar cost. However, it now becomes problematical as to whether this operation cannot be carried on at lower temperatures, thus reducing the heat loss in the sand, the radiation losses from the drum, and the flue gas losses, thereby reducing the total heat requirements. By working at lower temperatures with large volumes of air, this problem becomes one of drying rather than evaporation by heat, thus presenting numerous possibilities.

TEST PROCEDURE DATA FOR FEB. 23, 1928

Time	Temperature Sand, °F. In	Out	Temperature Gases, °F. Leaving Dryer	Per Cent CO_2 in Flue Gases	Remarks
9:20	..	...	...	....	Fire started
9:50	34	...	...	....	Drying started
10:00	34	220	275	6	
10:30	32	215	325	9	
11:00	32	260	310	9.5	
11:30	32	280	340	8.4	
12:00	..	...	...	....	Shut down for lunch, cleaning fires, hauling ashes.
12:30	..	...	...	....	
1:00	32	200	265	9.4	Drying started
1:30	32	225	290	9.8	
2:00	32	220	340	12.0	
2:30	32	225	260	8.0	
3:00	32	260	290	7.0	
3:15	..	...	...	....	Finished drying
Average	32.4	234	299	8.8	

COAL ANALYSIS

	Wet Basis	Dry Basis
Moisture	5.10	....
Volatile matter	16.94	17.85
Fixed carbon	69.52	73.25
Ash	8.44	8.90
Total	100.00	100.00
B.t.u. per pound of coal	12571	13247

SUMMARY OF TEST DATA

Duration of test	5 hours 55 minutes	
Time of actual drying	4 hours 25 minutes	
Total weight wet sand through dryer	127,400	lb.
Total coal consumed	1,939	lb.
Moisture content wet sand by weight	4.01	per cent
Moisture content dried sand by weight	0.38	per cent
Weight of water in wet sand	5,100	lb.
Weight of water in dried sand	470	lb.
Total water evaporated	4,630	lb.
Average temperature sand to dryer	32.4	deg. F.
Average temperature sand leaving dryer	234	deg. F.
Average temperature gases leaving dryer	299	deg. F.
Average CO_2 in flue gases	8.8	per cent
Sand dried per production hour (wet sand)	28,900	lb.
Sand dried per ton of coal (wet sand)	131,500	lb.
Specific heat of sand	0.19	

Hydraulic Tower Trucks for Twin City Rapid Transit

TWO emergency trucks with several novel features of construction and control of tower equipment have recently been added to the fleet of the Twin City Rapid Transit Company. The chassis is a 2-ton Model T-40 G.M.C. equipped with pneumatic tires. Upon this is mounted a Wood hydraulic hoist with a 4x9-ft. platform attached directly to the top of the hoist piston. The entire support for the platform is a 5-in. piston, raised and lowered by oil pumped into a cylinder by a power take-off on the transmission. A shift lever controls the raising, and another lever operating a bypass value lowers the hoist. The platform can be raised to full height in 21 seconds and completely lowered in about the same time.

The total weight of the truck, hoist and body, without any tools, material, etc., is 8,360 lb. Loaded for service, it weighs about 9,500 lb. Advantages claimed for them over older type line trucks of the company include: (1) Absence of all but a single support for the platform. This gives additional body space sufficient to accommodate six more men. As many as thirteen men can be carried, comfortably sheltered, inside the truck body—three in the driver's cab and ten on two longitudinal seats in the truck rear. (2) More tool storage space inside the truck body. (3) Shortening of wheelbase, thereby facilitating emergency parking along the street curb adjacent to the job.

The platform of this Twin City Rapid Transit tower truck is raised and lowered hydraulically by a power take-off on the transmission

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Car Advertising Carried to an Extreme

COMMERCIAL advertising by car cards, as practised in this country, is a legitimate method of increasing railway receipts. Nearly always the advertisements are in good taste. Generally they are confined to a row of cards above the windows, with the occasional use of bulkhead advertising.

In Europe car and bus advertising is carried to an extreme, the announcements often being on both the inside and outside of the cars and buses. The accompanying illustrations show the interiors of a standard bus and a standard surface car in Paris. In the former it will be seen that there are two lines of car cards above the windows. The ceiling is also made to serve as display space by the advertisement of an automobile tire, painted around each electric lighting fixture. Then there are two rows of advertisements on the side panels of the bus between the seats, as well as a double row on the backs of the seats. On the seats at the extreme front of the bus which have no backs, an advertisement is carried on the woodwork just above the upholstery, as well as on the woodwork above the front windows. Finally, there are advertisements on the windows themselves. Sometimes these are of paper pasted on to the glass. Sometimes they are actually etched in the glass. Only the bulkhead space is reserved for company announcements.

The interior of the car, illustrated in the second view, shows a very similar condition except that there are no advertisements surrounding the ceiling lights. However, like the bus, there are two rows of advertising racks over the windows, though in this case one row does not seem to be filled with cards. The seats are arranged back to back, so that a whole back seat is not available for advertising purposes, but one appears on the frame of the seat back. There are also the announcements on the windows.

In some parts of Europe it is a practice to paint advertisements on the outside panels of a car, on the trucks, on the step risers and wherever else there seems to be vacant space.

The Readers' Forum

Asphaltum Not Advantageous for Car Floors

THE TRUNDLE ENGINEERING COMPANY

CLEVELAND, OHIO, March 11, 1929.

To the Editor:

We were much interested in the article on page 687 of the Oct. 13, 1928, issue of ELECTRIC RAILWAY JOURNAL, telling of the use of asphaltum for car floors. We have, during the past several years, done considerable research work and conducted many tests and experiments on various types of car flooring materials.

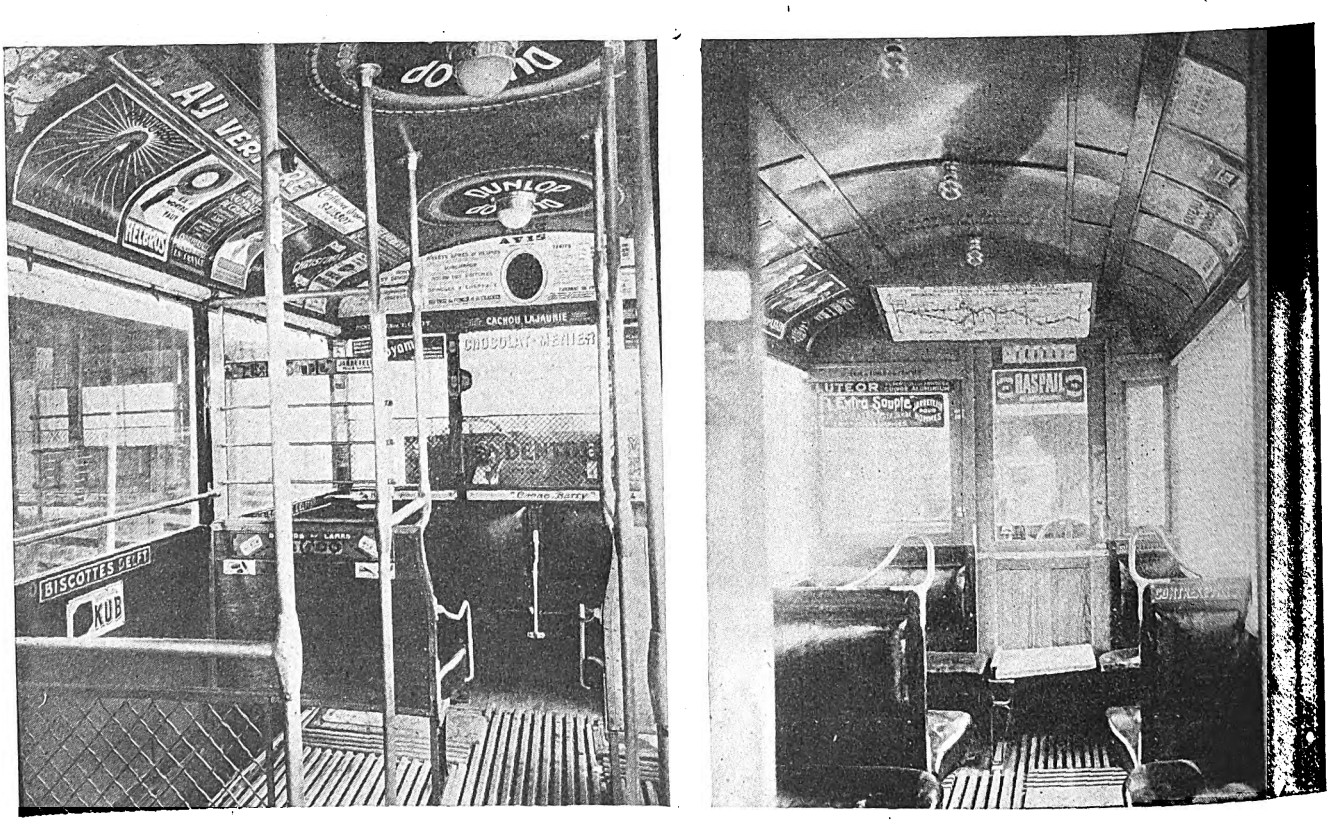
Our conclusions are as follows:

1. Asphaltum, even when mixed with light-weight filler ingredients, such as coke breeze, is still 20 per cent to 30 per cent heavier per given thickness than the type of flooring now commonly used by the railroads.

2. We find that the type of composition flooring, now generally in use, has been laid $\frac{3}{8}$ in. thick on several thousand vehicles during the past twelve years, which are still in service.

3. Our investigations indicate that it is extremely desirable to use a car flooring material that is fireproof and one that will not melt or give off noxious fumes in case of fire.

R. C. BRETT,
Research Engineer.



Cars and buses in Europe, as a rule, carry advertising to an excess. It seems to be placed everywhere that the eyes of the passengers are apt to rest

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PRACTICAL IDEAS for the Maintenance Man

Spray Paint Room of Utah Light & Traction Company

AN EXTREMELY simple and satisfactory solution of the problem of ventilating the spray painting room has been worked out for the Utah Light & Traction Company by P. W. Belcher, Salt Lake City ventilation engineer. Since July, 1925, when the railway adopted spray painting, there has been need for a method of getting rid of the fumes. This was finally accomplished by installing apparatus similar to that used in underground mines.

The new ventilation system is based upon the principle of blowing, rather than exhausting. A sweeping action of positive air currents, the railway found, was the only thoroughly adequate manner of removing the dense fog of paint fumes which settled close to the floor. By this method, including provisions for heating the air currents in the winter time, a definite air change can be made in the paint room every three to five minutes.

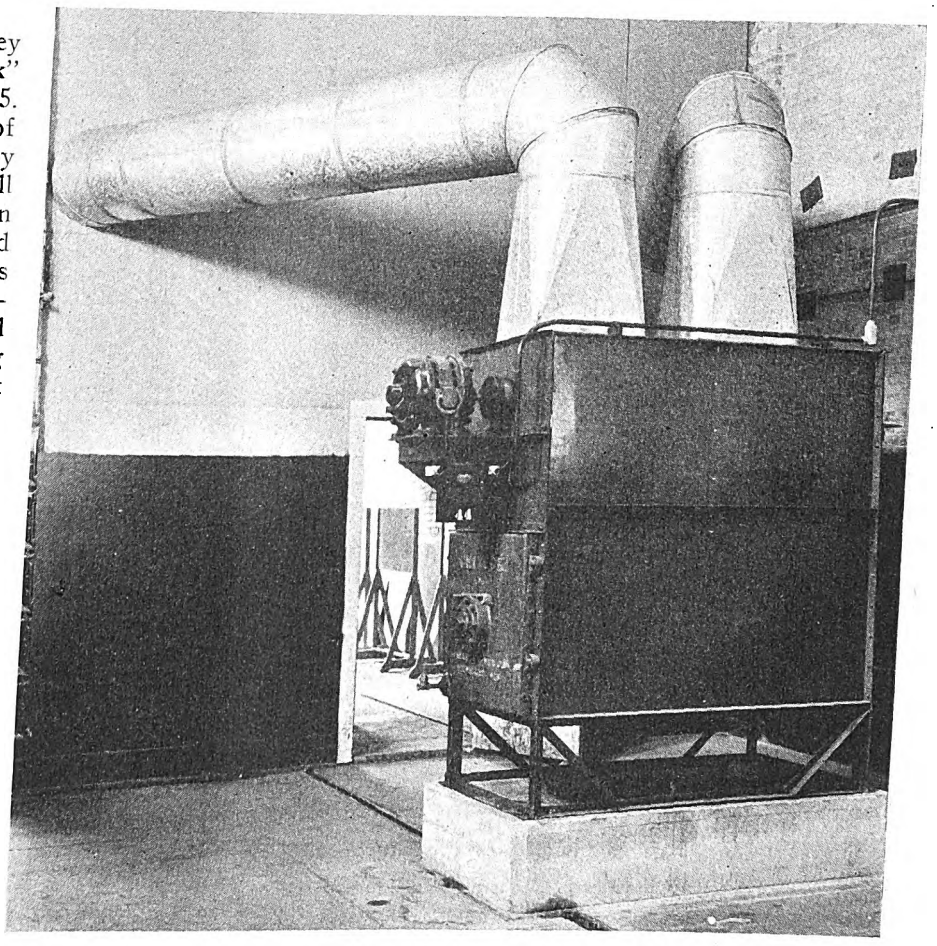
The equipment used is the Bayley Blower Company's new "Chinook" unit heater-ventilator set No. 305. This unit is furnished in the shape of a vertical cabinet, 5 ft. 6 in. long by 2 ft. 10 in. wide, having an over-all height of 6 ft. 4 in. Air is taken in at the bottom of the casing, and ascending through the casing passes through the "Chinook" heating elements, and thence to two centrifugal fans situated in the top of the casing which discharge the air to the paint room. The driving motor is situated at one end of the casing on a bracket and is direct-connected to the fans, through a flexible coupling. The fans are driven at a speed of 1,750 r.p.m. by a 5-hp., 220-volt, three-phase, 60-cycle standard constant-speed induction motor. The capacity, based on standard air at 70 deg. F. and 29.92 in. barometer, is 9,000 cu.ft. per minute.

Each fan serves a short length of 20-in. diameter galvanized iron duct leading to the inner corners of the paint room. The unit itself, for convenience and to give greater space inside, is set up just outside one end of the paint room but inside the adjacent shop space, where clean air, partially heated, is available. The heating element in this unit is rated to heat the above capacity from an initial temperature of 60 deg. F. to approximately 100 deg. F., with hot water entering the heating coils at a temperature of 170 deg. F.

The spray room is a long, narrow compartment having a railway track in the center. A roll-type door forms the entry. Over-all length along the track is 58 ft., the width being 15 ft. 6 in. The height varies from 20 to 35 ft. The cubical content is estimated at 35,000 cu.ft. On the basis of a blower capacity of 9,000 cu.ft. per minute, theoretically there is a change of air every $2\frac{3}{4}$ minutes. Making allowance for diffusion and leakage through window frame cracks and partitions, there is an actual air change about every $3\frac{1}{2}$ minutes. Paint fumes are removed almost immediately.

To get the sweeping action necessary and to control air velocity, the fresh air is introduced in two streams at one end of the long and narrow shop. Each inlet is a 20-in. diameter galvanized iron vent pipe brought in at the height of 10 ft. from the floor line at each corner of the shop. A positive air current is thus forced along each side wall and diffuses itself through the spray room, having maximum velocity at the center where the car is painted. Formation of pockets for the accumulation of fumes is also prevented.

Paint fumes and bad air find an outlet through the entry door by rolling it upward from 2 to 5 ft. The amount of door opening controls the



Blower used to force air through the paint room

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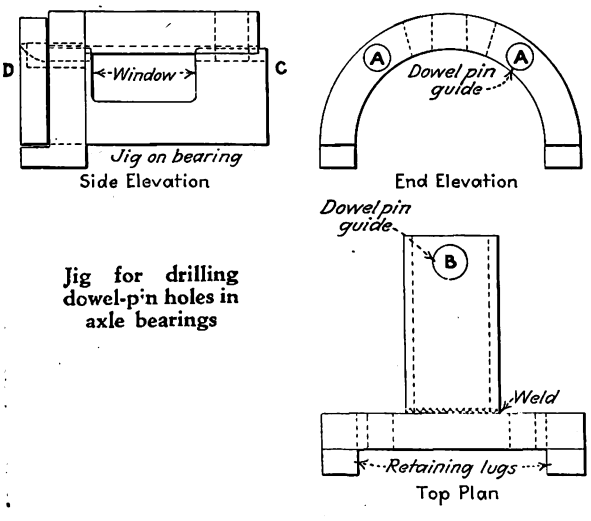
air velocities across the shop and the sweeping action across the floor. The venting of fumes from the floor line insures a complete removal of the heavy Duco paint spray fumes, since there is no other egress from the spray room for the 9,000 cu.ft. of air per minute being forced through the shop by the fans. In cold weather, the door can be regulated to suit weather conditions.

Jig Assures Accurate Drilling of Dowel Pin Holes*

By Charles Herms
General Foreman
San Diego Electric Railway,
San Diego, Cal.

HOLES for dowel pins in axle bearings must be drilled accurately and with small clearance over the size of the dowel pin. Where holes are located by center punching, or with a template, it has been found that considerable variation resulted, due to the drills crawling or to small inaccuracies in location. As a result, when the dowel pins were installed in a bearing the workmen usually cut away part of the dowel pin to fit the bearing. Wear was then rapid, and in some instances, the bearing flange was broken.



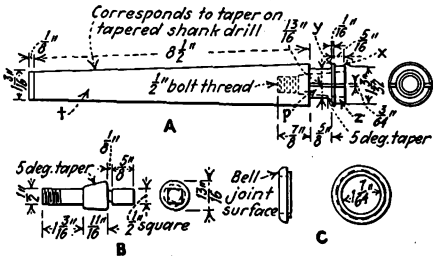
Jig for drilling dowel-pin holes in axle bearings

This difficulty has been overcome in the shops of the San Diego Electric Railway by using a jig of the form shown in the accompanying sketch. The time for drilling is decreased as the workman merely drills through the guide holes in the jig shown at A and B. The jig will slide from C to D in installation and the retaining lugs engage the bottom of the bearing flanges and hold securely to the bearing, which can be mounted on a drill press table in the usual manner.

Submitted in Electric Railway Journal Prize Contest.

Expanding Chuck Reclaims Key Washers

EXCESSIVE wear of key washers in the ME-30 rotary valves and the impossibility of obtaining immediate shipment of this material from the manufacturers compelled the Staten Island Rapid Transit Railway, Staten Island, N. Y., to reclaim them in the shop. Before this could be done a suitable chuck had to be designed and developed.



Chuck used to reclaim key washers of rotary valves

The chuck shown in the accompanying illustration was designed and constructed by Machinist James A. Collins. It consists of two hardened steel parts, *A* and *B*. Part *A* is made from stock with a diameter of 1¼ in. The right end is turned to a diameter of $1\frac{3}{32}$ in. for a length of $\frac{5}{16}$ in. A collar $\frac{1}{16}$ in. wide with a diameter of $1\frac{3}{16}$ in. is turned adjacent. The next ⅝ in. of the rod is turned to $\frac{13}{16}$ in. diameter. For the next 8⅛ in. the rod is given a taper corresponding to the taper on a drill shank. This taper starts from a diameter of $1\frac{3}{16}$ in. A ⅛-in. projection completes the turning process. The entire *P* and *Z* sections, and part of section *T*, are machined internally for a distance of 1⅜ in. on a 5-deg. taper. The diameter of the hole at the start of the taper is ⅝ in. This taper continues into a hole tapped for a ½-in. bolt thread. Four slots $\frac{3}{64}$ in. wide are cut through sections *P* and *Z*, 90 deg. apart.

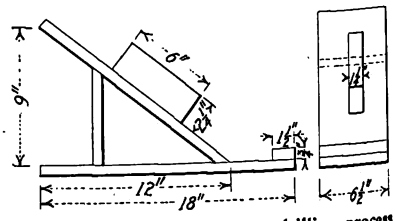
Part *B* is made from a piece of 1-in. stock. A length of $\frac{13}{16}$ in. of this rod is turned and threaded with a ½-in. thread. The other end is provided with a ½-in. square head, ⅝ in. long, and a fillet ⅝ in. wide. Between the fillet and the ½-in. end the rod is given a 5-deg. taper for a distance of $\frac{11}{16}$ in. This taper starts from a diameter of $\frac{13}{16}$ in.

The chuck is used in the following manner: Part *A* is placed in the lathe spindle and the key washer *C* installed on the surface *X* tight against the collar *Y*. Plug *B* is then placed in the tapered portion of *P* and *Z* and screwed up until the slotted sections of *Z* expand and grip the key seat firmly in position. The seat is then ready for machining.

The chuck is self-centering and very positive in its action.

Jig For Drilling Field Terminals

DRILLING out by hand the broken and burned off field terminal screws was found to require considerable time in the shop of the New York & Queens County Railway, Woodside, N. Y. In order to shorten this time a jig was designed and constructed so that the drilling could be performed in a drill press. This is used in connection with the drilling of GE-210 field coil terminals. It is made of oak. The base is 1⅛ in. thick, 6½ in. wide and 18 in. long. The angle of the incline is such as will place the terminal to be drilled in the right position under the drill press spindle. In this case the incline starts at 6 in. from the end of the base and extends upwards until the perpendicular is 9 in. from the end of the base. A 1⅛-in. vertical reinforcing strip is inserted between the base and the incline. A block 6 in. long by 1¼ in. thick by 2¼ in. high is fastened to the center of the incline. The size of this block corresponds to the pole-piece hole in the center of the field coil. A block ¾ in. high and 1½ in. wide is fastened across the end of the base 6 in. from the end of the incline to support the end of the field coil. The field with the terminals to be drilled is placed on the incline over the block with the bottom surface resting against the ¾-in. block.



This jig has simplified the drilling process and has decreased the time for drilling, thereby increasing the daily output

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Helpful Equipment *from the* Manufacturers

Protective Panel for 600-Volt Motors

By E. A. Beardmore
Industrial Engineering Department, General Electric Company, Schenectady, N. Y.

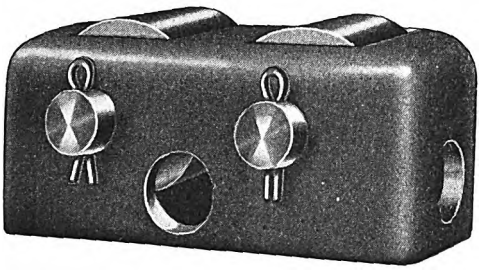
PEAK-LOAD conditions of electric railway systems often result in a considerable decrease to the normal operating voltage. On 600-volt lines this sometimes is reduced as low as 450 volts. Then if a line breaker on a car or train blows out the inductive kick causes a sudden increase in voltage. In some instances oscillograph tests on third rails have shown inductive kicks of twice normal voltage.

Motors operating from trolley voltage, such as are used for pumps and fan motors, are subjected to inductive kicks and so require some protection in order to prevent flashovers. A special protective panel has been designed for use with standard starting devices in this service by the General Electric Company. On this panel are mounted a voltage relay, a time delay relay, a protective resistor, and the necessary contactors to cut out the protective resistor in one or more steps as the individual application may require.

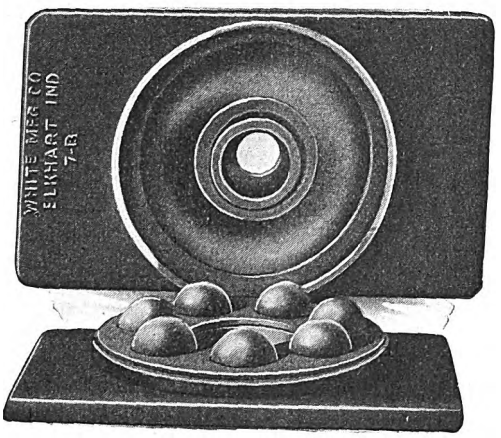
When the voltage is reduced to a predetermined value the voltage relay drops out and opens the contactors, which normally short circuit the protective resistor, thus inserting it in series with the motor to be protected. When the inductive kick occurs the voltage relay tends to close, but the time delay relay prevents it from closing before expiration of a predetermined time. When time delay relay operates, it allows contactors to close, cutting out the protective resistor and restoring normal conditions.

Improvements in Side and Center Bearings

SEVERAL improvements in roller side bearings and ball-bearing center plates have been announced by the White Manufacturing Company, Elkhart, Ind. These include the use of chromium plating to prevent rust and corrosion in side bearings, use of heavy felt washers in both center and side bearings to exclude dirt and water and to retain grease, and an increase in the thickness of castings and the size of rollers. The hardness of the chromium-plated surface eliminates much wear. The internal rollers are held in place by pressed, fitted, and turned steel side plates. All parts are pack-hardened and heat-treated, after which they are chromium-plated. Around each side of the rollers is a heavy felt washer held in grooves which are cast in the malleable-iron housing. These washers are large and heavy enough to give long life and prevent entrance of dirt.



In this side bearing the rollers are large and the parts are chromium plated



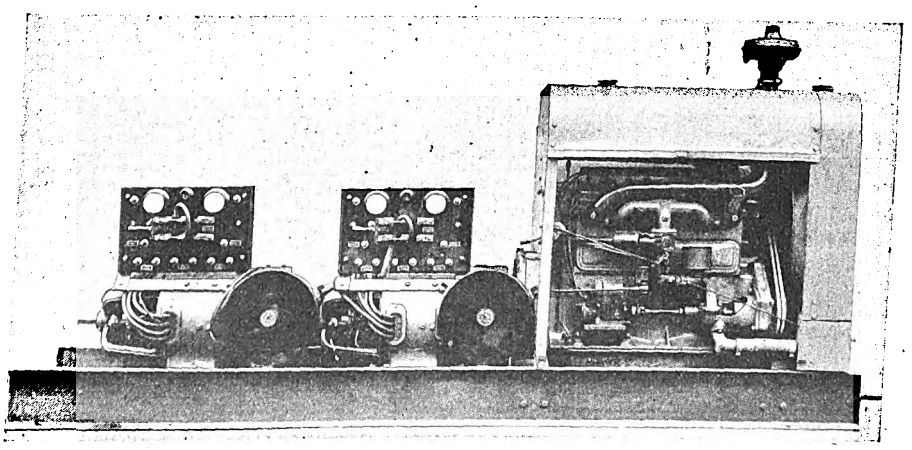
Improved type of ball bearing center plate

The new center plate castings have increased thickness to withstand bending strains and the thickness under the ball races is increased to withstand ball pressure. The upper plate casting is extended to form a collar down over the lower plate. Under this collar and fastened to the lower plate is a heavy felt washer.

The balls for the center-plate bearings are 2⅛ in. diameter, made of drop-forged, heat-treated high-carbon chrome-molybdenum alloy steel. Each ball is extremely hard and can carry the full load of the car without showing deflection or possibility of fracture. The bearing has lower friction coefficient than a bronze plate bearing, and is superior to plain friction center plates.

Two-Man Welding Outfit

A TWO-MAN welding machine motored by a single Continental 40-hp. engine is announced by the Electric Arc Cutting & Welding Company, Newark, N. J. Each of the two generators is capable of supplying 300 amp. for metallic arc-welding, and the two machines can be connected in multiple to produce full capacity for carbon arc welding. The improvement from existing equipment lies primarily in the use of separate generators, which thus can be run simply to save gas.



Two generator welding outfits driven by a single engine

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News *of the* Industry

More Moves in Chicago "L" Fare Case

A new valuation of approximately $139,000,000 on the properties of the Chicago Rapid Transit Company will be ready about April 1 for submission as evidence in support of the company's suit to make its 10-cent fare permanent.

The elevated lines are seeking a permanent injunction to restrain the Illinois Commerce Commission from enforcing its order of June 28, 1928, which denied the application of the company to replace its three-for-a-quarter ticket rate with a flat 10-cent fare. The higher rate was put in effect on July 17, however, under a temporary injunction issued by the federal court.

The new valuation to be presented by Rapid Transit engineers will represent an increase of about $47,000,000 over the valuation of $92,000,000 presented by the company in the original hearings before the commerce commission in February, 1928.

Although deciding in favor of the city, which had opposed the fare increase, the commission held in its order that the company's return under the old rate was "manifestly inadequate."

Simultaneously with the announcement of a new valuation by the company's attorney, Congressman Frank R. Reid, special assistant corporation counsel, who represents the city in the present hearings, which began Sept. 18, stated that he would ask the City Council immediately for an appropriation to hire engineers and accountants to make an independent valuation of the elevated lines. The City Council has twice failed to vote an appropriation for this purpose.

In the hearings before the commission the city contended that the valuation of the Chicago Rapid Transit Lines should be only about $60,000,000.

Arbitrators to Interpret New Orleans Contract

Dismissal of the injunction suit paves the way for peaceful arbitration of the dispute between members of the union and the New Orleans Public Service, Inc., over labor contracts. Union officials have announced they have selected Francis Williams, chairman Public Service Commission, as their member of the board of three arbiters. The Public Service previously announced Gustave Lemle as its selection. Messrs. Lemle and Williams are to select the third member, and if they can not agree, the chief justice of the Louisiana Supreme Court is to make the selection.

In terminating the injunction suit intended to restrain the men from putting into effect their threat to strike, Edward Rightor, attorney for the railway union officials, explained to the court that the act complained of—issuance of the suspension of work order—had been recalled and nullified, and that both sides had agreed to arbitrate their differences.

Judge Cage issued the temporary restraining order when the union officials seemed on the eve of calling a strike. He cited the union leaders to show cause why the injunction prayed for should not be issued.

The New Orleans *States* said:

Both the corporation and its employees have shown consideration for the public in agreeing to arbitrate their differences rather than let a suspension of transportation come about. The trouble between them is not a question of hours or wages. It is only one of interpretation of the contract as regards the rights of the two sides and there is no reason why this cannot be determined, if not to the entire satisfaction of both, at least with less damage to the corporation and its varied forces than a strike would entail.

Mr. Storrs Accepts Baltimore Appointment

Managing director of the American Electric Railway Association to start at once intensive study of problems of United Railways & Electric Company—asks forbearance

LUCIUS S. STORRS, managing director American Electric Railway Association, will become executive chairman of the board of directors of the United Railways & Electric Company, Baltimore, a position which was tendered him several weeks ago by the directors of the company. He will assume his new duties on April 1, in the meantime dividing his time between Baltimore and New York. Mr. Storrs will move his family to Baltimore and will withdraw from all other activities.

The new executive head of the Baltimore company plans to spend the next few months in an intensive study of the situation as it exists in the city. In the meantime he has requested that he be relieved from answering any questions which, although natural, should be answered only after he has had an opportunity fully to study them.

Early this year the directors of the United decided to invite Mr. Storrs to become the executive chairman of the board. He had the offer under consideration until March 19, when he made known his decision.

Mr. Storrs' statement, in full, is as follows:

Several weeks ago, the directors of the United Railways & Electric Company asked me to become associated with the property as executive chairman of the board.

It was not an easy matter for me to decide, for I have found an intense interest in my present duties which involve studies of all of the electric railway systems of the country, their policies, management, efforts to improve service, the determination through experience of what was practical and what was theoretical.

The directors and officers of the railway at Baltimore and a number of Baltimore public officials have impressed upon me the recent growth, development and increase of population in this territory, and the desirability of working out for Baltimore a future transportation system that will keep pace not only with development, but will look years ahead and help to promote that development.

I have decided, therefore, to accept the office and will take hold on April 1. At that time I expect to move my family to Baltimore and withdraw from all other activities, so as to be able to give my undivided time and attention to the transportation problems of that city.

I was greatly impressed also by the favorable condition offered by Baltimore as a city in which to live and work. My friends connected with railroads and the new industries, who have come to Baltimore to live, have all expressed their great satisfaction and contentment with the living conditions here, the high character and friendly attitude of the people.

The city, with its climatic and economic advantages, presents the greatest possibilities for continued industrial expansion. My own experience in other cities has

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shown that healthy industrial progress needs a sound and progressive transportation system. We must not only meet present conditions, but project our minds into the future.

The transportation problem is equally that of the railways and the city. Under regulated ownership, the problem becomes one of even greater import to the city and public. The company must present its problem fairly and on the basis of its knowledge and experience. The decision as to what is wise rests with public officials and the public. We must try to prevent them from making mistakes, try our hardest—for, after all, the people generally cannot study every problem. They look for honest guidance and advice from those whose duty it is to study the problem and who have made this their life work.

I shall faithfully endeavor to aid in the solution of these problems and in the development and expansion of the transportation system, and I believe that all those equally interested in the growth of the city will be willing to lend their aid and guidance free of the bias and prejudice that too often creep in among people who really have a common interest and the same purpose in view.

With this spirit of co-operation we can develop a creditable system of transportation that will be an effective agency in healthy living conditions, which are dependent upon quick and efficient transportation, and an efficient agency in the future expansion of Baltimore.

Finally, I am going to ask my new friends to give me a few months in which to study intensively the situation as a whole and in detail, and not to ask me just now questions which may seem natural, but should be answered only after full study and thought.

In the meantime my door is wide open, especially to those who are critical of the company, as I want their advice as well as that of the fine staff of men now connected with the company.

Piedmont & Northern Resumes Fight on Extension

The Piedmont & Northern Railway has taken the first step toward carrying its fight to the United States Supreme Court for the right to connect its North Carolina and South Carolina divisions. Notice has been filed in the United States District Court at Greenville, S. C., of appeal from a decision of Judge Morris A. Soper, upholding refusal of the Interstate Commerce Commission to grant the road permission to build a line connecting the two divisions between Spartanburg, S. C., and Gastonia, N. C. The Piedmont & Northern, an electric line, also sought permission to extend its lines to Winston-Salem, N. C. Besides the United States of America, the notice of appeal lists the Seaboard Air Line, Atlantic Coast Line, Louisville & Nashville, Carolina, Clinchfield & Ohio of Southern Carolina, and Clinchfield & Northern of Kentucky, as opposing the link.

The Piedmont & Northern, a Duke enterprise, has been seeking permission for some time to build the Spartanburg to Gastonia link. The Interstate Commerce Commission refused permission on the ground that the proposed route would parallel the Southern Railway between Charlotte and Spartansburg.

Need for Steam Railroads to Plan Ahead

Pennsylvania Railroad to save millions in capital investment by buying energy for train operation in Eastern zones. General Atterbury declares power industry a specialized business

GENERAL W. W. ATTERBURY, president Pennsylvania Railroad, at a luncheon of the Boston Chamber of Commerce, on March 14, discussed at length the present status and the outlook of the railroads. After referring to his own company's $100,000,000 electrification program east of Harrisburg, General Atterbury said, in part:

I believe this electrification, looking a generation or so into the future development of the Eastern part of the country, is more than an ordinary expansion of railroad facilities. It is typical of the projects which business men of this country should be encouraging the railroads to undertake.

My conception of the railroad industry is fundamentally a simple one; namely, that the railroads must plan at least a decade ahead of general industrial progress to provide adequate facilities. You cannot shut down on a railroad and then tool it up for new production overnight. Business and population growth, economic changes that may affect whole industries, improvements in railroading itself, must all be anticipated; then sufficient net earnings must be available to provide the required expansion of facilities.

It must not be thought that extension of electrified railroad lines implies that the days of steam transportation are ended. On the contrary, steam power is basic to railroad operation. Special conditions of a densely populated, rapidly growing district, however, make electrical operation desirable in some instances. In other words, the new era in railroading will not supplant the old, but will supplement it.

Because of the greater volume of traffic and the greater economy of electrification as compared with steam operation in dense traffic, this electrification ultimately will pay for the very high cost of its installation.

Advantages of Electrifying Dense Traffic

This electrification will cost about $100,000,000, which is an enormous sum of money for a corporation to spend on improving its ability to serve. It is obvious that it cannot be spent at once, but must be spread over a period of seven or eight years. It is equally obvious that it should not be spent at all unless it is necessary. The directors of the Pennsylvania Railroad did not start this work until exhaustive studies had been made of the whole industrial and transportation situation in the East, including the terminal developments of Philadelphia and Newark. It was foreseen that by 1950 the metropolitan area around New York would probably extend to New Brunswick on the west and well out on Long Island on the east, and contain 30,000,000 people, besides development in other cities.

In this special traffic situation electrification became an essential development. First of all, it will result in the ability to handle much greater traffic in a shorter period of time. By the method of operation proposed we expect eventually to reduce the number of freight trains 50 per cent for a given car movement and increase the speed. This of itself provides 100 per cent increase in capacity in so far as freight movement is concerned. For passenger trains we expect to eliminate all double-heading and most of the second sections, and also to avoid the possibility of rough handling due to limited starting capacity.

Economies of Purchased Power

An interesting and significant comment upon purchased power and its value was then made by General Atterbury in response to a previous inquiry as to why the Pennslyvania had decided to take so important a step as contracting for the electrical supply for its train service in this vital area. Putting aside his prepared notes for a moment, he said:

I have been asked why we are to buy our electricity for this development. One of the best assets a railroad can have is cheap electricity available along its lines. The day of the individual industry's manufacturing its own power has passed. We worked out a jointly-owned power plant scheme with the United Gas Improvement Company and the Philadelphia Electric Company, but decided not to go into it. Why should we enter the power business? We have no warrant to go into that business, which is an industry in itself. By the time we are ready to use it we shall be buying power cheaper than we can make it ourselves, thereby saving a capital investment of from $20,000,000 to $30,000,000 over a great number of years.

It is a serious matter for me to recommend to our directors the issuance of say $100,000,000 in new capital stock. When we get that money we become trustees for it and have a solemn duty to earn and pay a reasonable return on it. We take a real risk in estimating the volume of traffic that will be available with which to earn that return, and it is vital for use to feel sure that the public, through its legislative and regulatory authorities, will permit us to earn enough to pay a fair return to our stockholders.

The next decade will see measures taken with the view of insuring every industry a fair share in the country's prosperity. It is highly important to everyone that the railroads, which have contributed so much to make prosperity possible, shall be permitted to share in it so as to continue in the vanguard of business and industrial progress.

Suggestions to Picnickers on South Shore Route

The Chicago, South Shore & South Bend Railroad recently issued an attractive new folder giving hints on desirable picnic spots along its lines. It is well illustrated with halftones and reproductons of pen and ink drawings of such popular resorts as Hudson Lake, Washington Park, Michigan City, and Grand Beach, Mich. The principal appeal is made to chairmen of company picnic committees, with a view to interesting large special parties. The convenience of the South Shore Line's fast direct service and six express stops in Chicago is emphasized.

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Transportation Sold from Door to Door in Roanoke

The Roanoke Railway Electric Company, Roanoke, Va., has started a system under which six employees have begun a canvass of the entire city to sell the public the idea of riding street cars and buses and also dispose of weekly passes and tokens.

Four young women and two young men were assigned certain districts in which to make a house-to-house canvass. All sections of the city will be covered by the young women, save the north east, which along with the business district, will be serviced by the young men.

Through the plan, it is hoped to bring to the housewives' attention the saving to be realized by riding the street cars and buses and furnish them tokens and weekly passes at their door, thus eliminating any confusion in making change on the buses and cars and the subsequent delays.

The canvassers will also find out how many in each home use street cars and buses, and if there is none using these services, they will seek to learn the reason.

Starting on March 20, the canvassers handled passes for the current week, the sale to continue each week through the following Tuesday night. Tokens will be sold at any time.

New Fares in Vancouver

After negotiations between W. G. Murrin, president, and other officials of the British Columbia Electric Railway, and the Vancouver City Council, in connection with the renewal of franchise, the following street car fares have been agreed upon: 7 cents cash; four tickets for 25 cents; 17 tickets for $1 between the hours of 9 a.m. and 4:30 p.m. week days and all day Sundays. The city's percentage will be cut to $120,000 a year.

These conditions will be in effect for the next three years. Under the previous agreement the fares had been: 6 cents cash; six tickets for 35 cents in city area; ten tickets for 70 cents in suburban area; childrens' tickets ten for 25 cents.

Some interesting figures covering the electric railway situation in Canada were presented by the company in stating its case. In the year ended June 20, 1928, the net profits of the Vancouver city and suburban system were $233,217 on a total investment of $10,118,835, or a return of only 2.31 per cent.

In addition the company claimed that the expense of operation is increasing, and advances the following reasons: The increasing use of automobiles; increasing peak-hour traffic and decreasing non-peak-hour traffic; increasing average length of ride, owing to the spreading out of the city; higher wages to employees and traffic congestion.

The British Columbia Electric also explained that, while the population of Vancouver has increased 31 per cent since 1921, street car riding has increased only 16 per cent. The company finds it necessary to operate 46 more cars in the peak hours than it did in the corresponding hours of 1922. It has to employ 114 additional conductors and motormen, and has to pay $260,000 additional each year to cover increased wages. The traffic on long distance lines has increased but traffic on short distance lines has decreased.

The company concluded its case by stating that the problem is not only to allow an adequate fare, but to decide how to co-operate with the company so that it may continue to supply adequate transportation to the people of Vancouver. Transportation cannot be provided indefinitely by the company at a loss.

Slight Damage to Alabama Railways

Recent Alabama floods damaged electric railways but little, as the heaviest floods were in southeastern Alabama where there are no electric railways. In the eastern and western sections of Birmingham a number of streets was inundated, stopping street car service for several hours. Some slight damage was done to tracks and fills. In Montgomery street cars were tied up on some streets for several hours due to high waters, and a slight financial loss was suffered. In the flood district of southeastern Alabama many state highways were flooded for several days and were badly damaged by racing waters. This has greatly retarded the bus service in the vicinity of Troy, Andalusia, Elba, Brewton and other places.

Tightening Traffic Restrictions in Nashville

Several important changes in the laws governing the movement of traffic in Nashville, Tenn., affecting the central part of the city were recommended at a recent meeting of the traffic committee of the City Council. Probably the most important change proposed by the committee is that during what is known as the rush hour between 5 and 6 p.m., no automobile will be allowed to turn into Church Street from Fourth to Seventh Avenues, inclusive. According to members of the committee, this is supposed to eliminate the parade of cars that congest traffic on Church Street at that time in the afternoon, and will allow street cars to move freely.

Other revisions of the Nashville traffic code suggested by the committee were that parking be allowed on the south side of Union Street for one hour; no parking on either side of First Avenue from public square to Mulloy Street; no parking on the east side of Third Avenue from the public square south to the railroad. It also was recommended that the present speed law of the city be increased to 30 m.p.h., to conform with the state law.

Former Commissioner Suggests New Deal in Philadelphia

J. Henry Scattergood, former member of the Public Service Commission of Pennsylvania, believes reasons exist for a review of fares on the line of the Philadelphia Rapid Transit Company's expenditures, its large reserves for "maintenance and depreciation" and its policy of paying losses of some years ago out of present fares. He feels that a movement of this kind should be carried on by the municipality. It would be too big for any private individual or group to undertake. He said:

With that in mind I told the utilities committee of the Philadelphia Chamber of Commerce that Philadelphia needs a city administration with backbone to stand up for the public interest against the traction interest, and I will add now that the people, with that thought definitely in mind, should strive to get such an administration.

I believe it is desirable that justice shall be done to the Philadelphia Rapid Transit Company, as well as to the city. In this underliers-purchase plan I believe also that justice should be accorded both the city and the underliers. That is a reason I strongly favor passage of the Woodward bill and of the new measures designed to place in the hands of the Public Service Commission the power to review and, if necessary, to revise the rentals and leases between the P.R.T. and the underlying companies.

Token Purchase in Sioux City to Benefit Regular Patrons

An agreement has been made between the Sioux City Service Company, Sioux City, Ia., and the City Council whereby the regular railway patron may obtain rides for 7.6 cents through purchase of $1 worth of tokens at a time. The cash fare has been raised to 10 cents, under the franchise provisions, but three tokens are sold for 25 cents and the steady patron has opportunity to ride for practically the same tariff as has prevailed in recent months. E. L. Kirk, vice-president and general manager, said that continuance of the sliding tariff depended upon customer response to the offer, but that the plan would be tested thoroughly.

Vacancies on the District Utility Commission

One of the important local questions confronting President Hoover is the filling of vacancies existing and soon to exist on the Public Utilities Commission for the District of Columbia. Colonel Brand's appointment lapsed by reason of the Senate's failure to take up his confirmation. The term of Mr. Childress expires on June 30. As the Washington *Evening Star* sees it the District needs a full commission, sitting full time, to devote thought and study to the various utility questions, having in mind, it would appear, the agitation for the consolidation of the local street railways and also the imminence of the plea for changes in fares.

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New Deal in Tacoma

Plan outlined under which company in Pacific Coast city will be returned to local control

ACCORDING to information received by M. G. Tennant, Mayor of Tacoma, Wash., an agreement has been reached between bondholders of both the Tacoma Railway & Power Company and the Puget Sound Electric Company with Stone & Webster, Inc., by which the Tacoma Railway & Power Company will be rehabilitated and placed under the virtually complete management of Richard T. Sullivan, present local manager.

Mayor Tennant received this information in a letter from Attorney Scott Z. Henderson, receiver for the Puget Sound Electric Company, which is the holding company for the Tacoma Railway & Power Company. Mr. Sullivan declares there will be no request for new franchises at this time, there will be no revaluations for rate-making purposes, and there is no intention either to ask a change in fares.

It will be about April 1, Mr. Sullivan states, before all the legal steps in the change of control and management can be consummated. Mr. Sullivan admits that the announcement of the change of management has been hastened over first intentions by the fact that the City Council has up for consideration the proposed agreement between the Tacoma Railway & Power Company and the city for the settlement of paving, bridge construction, track changes and other matters involved in pending public improvements and in franchise requirements.

Last December the Mayor addressed a caustic letter to Mr. Henderson calling attention to the fact that the Tacoma Railway & Power Company had not been put into a receivership as had been promised at a meeting in New York last spring between bondholders and him and threatening action to bring the matter to a head.

It was during a visit by Mr. Sullivan to the East in January that bondholders agreed to invest further substantial sums for rehabilitation of the Tacoma system. Because the plans for the reorganizations still depend, in a measure, upon the receivership of the Puget Sound Electric, details of rehabilitation, changes of personnel, revision of the system and other phases could not be made public at this time. Mr. Sullivan will move towards the substitution of bus service on the Pacific Traction line to the Lake district, on the Midland and Spanaway lines and perhaps others.

Stone & Webster, as holder through its subsidiary, the Puget Sound Power & Light Company, of $4,895,000 second-mortgage bonds of the Puget Sound Electric, might be said still to have some interest in the local properties, under the reorganization plan, but Manager Sullivan asserts that since the second-mortgage bonds are practically worthless, the concern of Stone & Webster in the matter is nominal. The Puget Sound Power & Light Company owns all the stock of the Puget Sound Electric, just as the latter owns all the stock of the Tacoma Railway & Power Company and the Pacific Traction Company.

The Puget Sound Electric under receivership has discontinued the Tacoma-Seattle interurban line, but certain properties of the Puget Sound Electric used by the Tacoma system have been reserved. These include all the yards, the Portland Avenue, the one-man and some larger cars, now under rental by the Tacoma Railway & Power Company from the Puget Sound Electric Company.

In the meantime, the City Council and Mayor Tennant, who have been discussing the problem of how leniently to deal with the railway in the matter of paving between tracks, relaying tracks, and conforming to new grades, all subjects in which the company is involved, are divided in their opinions. One group is inclined to take an uncompromising attitude, while the other appears to be disposed to allow the company several years time in which to do all the work demanded of it.

Hertz Interest in St. Louis Bus Sold

The International Utilities Company, operating public utility properties in this country and Canada, has purchased from John Hertz, Chicago, Ill., for approximately $1,750,000 an interest in the People's Motorbus Company, included in the system of the St. Louis Motor Coach Company, part of whose stock in turn is held by The Omnibus Corporation, controlling lines in New York and Chicago.

Richard W. Meade, president People's Motorbus Company, declined to comment, as his company was not a direct party to the transaction.

In 1924 interests behind the reorganization of the United Railways, St. Louis, endeavored to purchase the People's Motorbus Company, but satisfactory terms of sale could not be arranged.

Lancaster Objects

PATRONS of trolley cars operated by the Conestoga Traction Company will no longer be entertained or annoyed by the merry humming or tuneful warbling of motormen.

The whole happy world for carmen collapsed on March 10, when company officials posted notices warning employees to cease further attempts at grand opera and jazz.

Railway officials said that tired office workers had complained that the whistling and humming motormen annoy them when they are homeward bound. — Philadelphia *Ledger*.

Virtual Agreement Reached on Chicago Traction Settlement

Representatives of the Chicago Surface Lines, the Chicago Rapid Transit Company and the City Council subcommittee on local transit matters have tentatively agreed on enabling legislation for consolidation of all local transportation systems in the Chicago metropolitan area.

Five legislative bills drawn by the citizens' traction settlement committee, after more than two years of futile discussions between the city and the companies, were approved in general form at a joint meeting on March 19. Facts disclosed on March 21 that company lawyers have dropped the demand that home rule be made contingent on granting of a terminable permit to which the city had objected. This was the last obstacle to the agreement on enabling bills and City Council will be asked to approve them.

The major provisions of the enabling measures are as follows:

1. Authorizing the city to grant a terminable permit and name conditions upon which it is issued, such as how it may be terminated, the rate of return to be allowed the grantee, and the number of miles of extensions and amount of new equipment to be added each year.

2. Amending the cities and villages act, restricting the term of traction franchises to twenty years, by allowing the city to grant franchises for a fixed term of years, the number to be decided by the City Council.

3. Amending the general corporation act to allow the organization of a corporation to acquire street and elevated railways, buses and other forms of local transit facilities in Chicago within a 30-mile radius of the city limits.

4. Authorizing the city to build subways and to finance them by levying special assessments against owners of property especially benefited, through use of the $50,000,000 traction fund now in the city treasury, and by means of special bonds payable out of subway earnings, or by all three methods.

5. Restoration of home rule to the city through a commission of three members who would be appointed by the Mayor, subject to approval by the City Council. The commission, having jurisdiction over all local transportation lines in the 30-mile metropolitan district, would exercise all the powers now vested in the Illinois Commerce Commission.

Upon obtaining the approval of Judge Wilkerson, under whose supervision the Chicago Railways is now being operated, the bills will be submitted to the City Council for indorsement and then presented to the General Assembly for enactment. This step would be followed by the drafting of an ordinance creating the franchise, which would be submitted to a referendum of the voters.

The settlement plan has been approved, in general, by Samuel Insull, chairman Chicago Rapid Transit Company; Henry A. Blair, receiver for the Chicago Railways; Leonard A. Busby, president Chicago City Railway; and John Hertz, chairman Chicago Motor Coach Company.

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No-Accident Vacations for Gary Men

Eighty trainmen of the Gary Railways, Gary, Ind., or approximately 73 per cent of the total number employed, have operated their cars through the year 1928 without being charged with a single accident. Each honor man will receive as a reward a five-day no-accident vacation in addition to his regular annual service vacation.

Although street traffic in 1928 was probably heavier than in previous years, the number of public accidents in which Gary Railways cars and motor coaches were involved showed an actual decrease of 33.4 per cent over 1927. Each month in 1928 showed a decrease in the number of accidents over the corresponding month in 1927. Collisions between cars were reduced 53 per cent in 1928. The number of miles operated by a car without accident was 1,700 miles greater than in 1927.

Monthly safety meetings held by the company are well attended by the trainmen. At them officials talk on the subject of safety, and the operators make suggestions for the correction of unsafe practices and conditions.

Trainmen on the Gary-Hobart interurban division were the stars of the Gary Railways system last year. They had a perfect record.

All Twin City Lines Included in Fare Decision

With a new rate of fare in effect in Stillwater and Bayport on the Minneapolis & St. Paul Suburban Railway, all lines of the Twin City Rapid Transit Company are affected by the recent decision of the Minnesota Railroad and Warehouse Commission giving the advanced rate of 10 cents or six tokens for 45 cents in the Twin Cities. The neutral zone between Stillwater and Bayport is out of existence and the uniform new fare is in operation. Formerly a 6-cent fare was charged in Stillwater to a neutral point, then 4 cents in Bayport.

The Suburban company petitioned the commission on Nov. 15, 1928, for an increase, but it was not effective until after the new Twin City rates had been made. The change in the Minneapolis rate affects the Lake Minnetonka line at the Minneapolis end within the city limits.

Extension of Time for Electrification

The New York Senate has passed the Thayer bill, amending section 53-A of the public service commission law, stating that the time within which a railroad is to comply with the commission's order to electrify within certain city limits shall not be extended beyond seven years after Jan. 1, 1926. Previously the extension of time had been limited to five years.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 5 — **Metropolitan Section, American Electric Railway Association, 33 W. 39th Street, New York, N. Y.**

April 12—**Maryland Utilities Association, Annual Meeting, Hotel Emerson, Baltimore, Md.**

May 1-3—**Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

May 13-15 — **National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

May 15—**Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.**

June 3-6—**National Association of Purchasing Agents, Annual Convention, Hotel Statler, Buffalo, N. Y.**

June 5-7—**Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

June 21-22 — **New York Electric Railway Association, Bluff Point, N. Y.**

June 27-28—**Central Electric Railway Association, Michigan City, Ind.**

July 24-26—**Electric Railway Association of Equipment Men, Southern Properties, Lexington, Ky.**

Aug. 15-16 — **Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.**

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Controversy Over Counsel Fees in New York

Charles Evans Hughes was paid a fee of $75,000 for his appearance before the Supreme Court in reargument of the 5-cent fare case of the Interborough Rapid Transit Company. A statement of expense, together with others, totaling $817,000, has been filed with the New York Transit Commission by the Interborough as "operating expenses." The Interborough contends that expense of its litigation should be charged to operation. The Transit Commission, however, has served notice that fare litigation costs will not be allowed as operating charges. Other legal fees contained in the Interborough's statement of litigation expenses are: William L. Ransom, special counsel, $120,000; G. W. Wickersham, special pleader at the original Supreme Court hearing, $25,000; Harry L. Butler, counsel for the Manhattan Railway, owner of elevated lines, $55,000.

Maintenance Problems Occupy C.E.R.M.M.A.

The Central Electric Railway Master Mechanics' Association, meeting in Youngstown, Ohio, on Feb. 14, busied itself with proposed alterations in its recently published standards on uniform charges and interchange equipment maintenance, a consideration of carbon brush performance and a discussion of a prepared list of questions relating to specific maintenance practices.

"The ideal carbon brush," said J. V. Dobson, chief engineer Stackpole Carbon Company, in his paper on the proper application of carbon brushes, "must have strength, be able to withstand severe vibrations incident to road shocks, be hard, capable of resisting abrasion and dusting away. Contact drop between brush and commutator should be high, electrical resistance low and brush friction low."

In discussing the question of brushes sticking in their holders, Mr. Dobson scouted the idea that carbon actually swelled under service conditions. "It is difficult," he said, "to conceive how a carbon brush that has been subjected during manufacture to a graphitizing temperature of 3,000 deg. C., a temperature above the melting point of practically all metals, can contain anything but carbon, graphite, and a very small percentage of ash residue from iron, copper or silica. At this graphitizing temperature the brush material takes its final shape as has been verified from many tests."

"This refers, of course," continued Mr. Dobson, "only to brushes usually used in railway work, which are electrographitic and therefore baked at a very high temperature. It does not consider the so-called "doped" brushes filled with a lubricating material such as paraffin that is not baked out afterward."

Mr. Dobson pointed out that the railway motor has the advantage over strictly industrial types of doing a considerable amount of running under no-load conditions as in coasting and braking periods. This, when no power is being applied to the commutator, is very effective in cleaning and polishing it, correcting to a large extent the damage of the heavy accelerating current which may have immediately preceded. He concluded by saying that this, in a measure, was the reason why the railway motor can safely withstand greater duty both under current density and at high commutator speeds.

Following luncheon at the Poland Country Club as guests of the Pennsylvania-Ohio Power & Light Company, the association elected officers for the ensuing year. A. J. Challeen, superintendent of shops and equipment Detroit United Railway, was elected president; E. J. Jonas, superintendent of equipment Cincinnati Street Railway, was elected vice-president; L. E. Earlywine was re-elected secretary; Charles Sigler, T. H. Nicholl, J. W. Osborn, and J. B. Corderman were elected to the executive committee. The spring meeting will be held in Lima.

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Recent Bus Developments

Equitable Grant Still Being Discussed in New York

Comptroller Berry, of New York City, reported to the Board of Estimate on March 18 that Edmund L. Mooney, counsel for the Equitable Coach Company, holder of the bus franchise for Manhattan, Brooklyn and Queens, had informed him on March 16 that it would be unable to proceed with the inquiry "at the present time" because all of its energies were engaged in getting a certificate of necessity and convenience. The application to the Transit Commission to reopen the hearings was made several hours after the Board of Estimate session ended. Mayor Walker suggested "that the comptroller be requested to communicate again with Mr. Mooney and find out what he means by that language—whether he means they will be ready to appear before the comptroller in a day, a week or a year."

The bus company is still a suppliant before the Transit Commission in its endeavor to perfect its rights and was notified to appear before that body on March 21 when hearings on granting a certificate of necessity and convenience were resumed. The session continued during the day and was then adjourned until March 27. The company must obtain this certificate by April 1 before it can have the right to operate buses.

Illinois Senate Passes 3-Cent Gas Tax

The 3-cent gasoline tax, sponsored by Governor Louis L. Emerson in the Illinois General Assembly, passed the State Senate recently by a vote of 35 to 14. In the upper house the chief objection to the measure came from Chicago and Cook County delegations, who claimed that the state's most populous city and country would be deprived of their proper share of the revenue to be derived from the bill. As passed by the Senate, the bill contained Governor Emerson's recommendations that 2 cents of the tax should go to the state and 1 cent be returned to the county from which it was derived. The Chicagoans asked for an equal split. Amendments urged by Cook County members are expected to be discussed in the House of Representatives shortly.

Amsterdam Certificate Reasonable

The Public Service Commission affirmed on March 19 its action of Oct. 18 last in granting a certificate for the operation of a bus line by Charles Vollmer over certain streets in Amsterdam, N. Y., following a rehearing had on the petition of the Fonda, Johnstown & Gloversville Railroad. This railway alleged that Mr. Vollmer was violating conditions in his certificate prohibiting carrying local passengers in Main Street and that his bus operations were affecting the income of the trolley line.

In its ruling the commission held that from the evidence at the rehearing, it was not demonstrated that the action of the commission in granting a certificate to Vollmer was in any respect unjust or unwarranted. The commission further held that the railroad, on the rehearing, was unable to show that there had been any considerable violation of the restriction against carrying local passengers and from the evidence of witnesses called by the bus operator, it appeared that Mr. Vollmer had been making every reasonable and proper effort to enforce the provisions of his certificate.

City Versus State in Chicago

A rehearing of the case involving the right of the city of Chicago to require a license and otherwise regulate buses operating over its streets was asked recently in a petition filed by the Chicago Motor Coach Company in the Illinois Supreme Court at Springfield. In a decision handed down on Feb. 18, the court ruled that cities have full jurisdiction over the use of their streets by buses even though the company first obtained permission to operate from the Illinois Commerce Commission. The decision established the validity of ordinances of the city of Chicago which require such a franchise.

The coach company operates in Chicago under authority of the Illinois Commerce Commission and by permission of the local park boards. It asserts in its brief that "no prior decisions require the conclusion which this court has reached."

Preliminary Steps Toward St. Joseph Installation

The St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., is awaiting permission of the Missouri Public Service Commission and the City Council to institute motor coach service on the Messanie Street line for a trial. If service by bus proves successful it is intended to substitute buses for the railway cars. The change would mean an expenditure of approximately $150,000 for new equipment, according to C. A. Semrad, general manager. The motor coach service on the Grand Avenue line has proved satisfactory and it is believed that the change on the Messanie Street line will prove popular. Because of the larger number of passengers and the greater length of the Messanie line it is planned to use larger coaches than those used on Grand Avenue.

Service Routes in Jamestown Combined

In an effort to secure more economical operation the Jamestown Motor Bus Transportation Company, subsidiary of the Jamestown Street Railway, Jamestown, N. Y., has combined its North and South Side bus routes. Another important change has been the elimination of the p.a.y.l. system in favor of the p.a.y.e. system on all lines with the exception of the one operating between Jamestown and Greenhurst, conforming to the practice of the Jamestown Street Railway.

Mitten Tours Expand

Further to supplement its through motor coach service from Washington to New York via Baltimore, Wilmington and Philadelphia, Mitten Tours, intercity motor coach lines, owned by the Pennsylvania Railroad and the Philadelphia Rapid Transit Company, began hourly operation of motor coaches between Baltimore and Washington on March 15. Service from Baltimore will be every hour on the hour from 8 a.m. to 8 p.m., then 10 p.m. and 12 midnight from the Union Bus Terminal, Liberty and Redwood Streets. Service from the International Tours terminal, Washington, will be hourly from 8 a.m. to 8 p.m., then 9:30 p.m. and 12 midnight. The noon coach, however, from Washington will leave at 12:15 p.m. Running time between Baltimore and Washington is one hour and 35 minutes. Between Baltimore and Washington the one-way fare is $1.25 and round trip $2.25.

Three coaches from Washington, the 9 a.m., the 12:15 p.m. and the 9:30 p.m., will carry through passengers to New York, via Philadelphia. The schedule in Washington has been co-ordinated with the leaving and arrival times of the Richmond, Fredericksburg & Potomac Transportation Company, rendering motor coach service to Richmond and Fredericksburg, Va., and with the Greyhound-Florida lines for Jacksonville and Miami, Fla.

On Jan. 31 the Pennsylvania, following its plan of rail and motor coach co-ordination, purchased a substantial interest in the People's Rapid Transit Company, Inc., (known as Mitten Tours) and operated by the Philadelphia Rapid Transit Company. The Philadelphia transit organization still maintains an interest and it will continue to operate the service under the supervision of Mitten Management, Inc.

Substitution on Eighth Avenue, New York, Urged

Eighteen civic associations asked the committees of the whole of the Board of Estimate of New York on March 18 to scrap the cars and tracks of the Eighth and Ninth Avenues Railway and to substitute a system of buses. The petition asking that such action be taken was signed by representatives of the

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civic associations at a luncheon on Feb. 27. The removal of the surface car lines is asked on the ground that they obstruct traffic and hinder the development of the districts through which they pass. According to the civic groups, the railway has expressed willingness to exchange its 99-year franchise for a short-term bus franchise.

Extension of Service by Pacific Electric

A certificate of public convenience and necessity has been granted by the Railroad Commission to the Pacific Electric Railway to operate motor coach service for the transportation of passengers between Wingfoot in Los Angeles, and the Ford Plant in Long Beach. This is subject to the provision that no local service be performed between Orange Avenue and Olive Street in the city of Compton, and between the intersection of Anaheim Street and Badger Avenue in the city of Long Beach, and the Ford Plant.

Meter System in Worcester by May

Possibility that the competition with which the Worcester Consolidated Street Railway, Worcester, Mass., has had to contend both on its bus and trolley lines because of a 35-cent flat fare for taxicabs may be eliminated, is seen in the recent move in Worcester, Mass., to have the taxis return to the meter system by May 1.

The license board of the city is not satisfied that the flat rate has worked out well and has given its unofficial approval to the 15 and 5-cent basis of charge rather than the old 30 and 10-cent plan in effect before meters were abolished.

The plan is opposed by taxi patrons who, by clubbing together, have been taking advantage of the flat rate much to the disadvantage of the railway.

The number of taxis has increased about 50 per cent since Oct. 1, while the number of drivers has tripled since that time. Mayor O'Hara has informed the license board that he is opposed to any further increase in numbers. On Oct. 1, the date of the introduction of the 35-cent flat-rate fare by the entry of the Ring Cab, Inc., into the field, 224 taxicabs and 423 drivers were licensed in the city. At present there are 1,146 licensed drivers and 355 licensed cabs.

Toledo High School Students Swell Bus Receipts

Special bus service operated by the Community Traction Company, Toledo, Ohio, for high school students in February carried 18,000 passengers and brought in a net profit from operation of $520. Total revenue was $1,339 and expenses $818. The revenue of 40.074 cents per mile was highest in the entire bus operations of the company.

Financial *and* Corporate

First Common Dividend by Eastern Massachusetts

On April 1 the Eastern Massachusetts Street Railway, Boston, Mass., will pay its first common dividend of the public trusteeship, which began early in 1919. The 37½-cent payment ordered by the trustees was not labeled a quarterly dividend, but the opinion of the Boston News Bureau is that in the road's strong financial condition is found basis for the belief that the stock is now on a 37½-cent quarterly basis.

After all charges and dividends on senior stock issues the Eastern Massachusetts in 1928 earned $1.55 a share on the 82,664 shares of common outstanding. This is a shade larger than common dividend requirements at a 37½-cent quarterly rate. Signs are not wanting that the new managerial régime in the Eastern Massachusetts is committed to the policy of its predecessors of going vigorously after business and low-operating ratio. If the result is to increase the net earnings the common dividend would then naturally appear to be so much more secure. The News Bureau says:

After the maturity of $3,352,000 Lynn & Boston bonds on Dec. 1 next is out of the way, which amount incidentally will be met from treasury cash and investments the Eastern Massachusetts will have no obligations coming due until Jan. 1, 1948. This freedom from nearby maturities, combined with a strong showing as to current assets, constitutes an unusual condition of affairs for an electric railway in these times.

Circuit Court Affirms St. Louis Fare and Valuation Finding

City Counselor Muench, of St. Louis, Mo., is preparing to carry to the Supreme Court the city's fight against the straight 8-cent fare and $66,000,000 rate-base valuation, awarded the St. Louis Public Service Company by the Missouri Public Service Commission. On March 12 the Circuit Court for Cole County affirmed the commission's order in the fare case. The commission's ruling was handed down on June 21, 1928, and the 8-cent fare went into effect on July 1, 1928.

Of the $66,000,000 value placed on the property the commission decided $63,500,000 represented tangibles used or useable for service. The values are as of Jan. 1, 1927. This valuation is an increase of $14,000,000 over a tentative value of $52,000,000 fixed by the commission in June, 1927, when the company was granted a temporary fare increase from 7 cents to 8 cents, with two tokens for 15 cents, pending a final order.

In its appeal to the Supreme Court the city will contend that the commission did not give proper consideration to investment cost but based its ruling on the theory of reproduction new less depreciation.

The company sought confirmation of a valuation of $75,000,000 with an allowed return of 8 per cent on that value and a depreciation allowance of $1,500,000 a year. The commission fixed the return of 7.14 per cent and cut the depreciation allowance to $800,000 a year.

In sustaining the commission, Circuit Judge Westhues merely announced his ruling with an entry of affirmation on the court docket.

Foreclosure Sale at Binghamton May 15

The properties of the Binghamton Railway, Binghamton, N. Y., will be offered for sale on May 15 in mortgage foreclosure proceedings, with initial bids to be at a set-up price of $2,300,000, as ordered by the federal court. The sale will include the lighting plant and franchise in Endicott, N. Y., a tract of more than 50 acres in the center of Binghamton and other holdings.

W. S. Appleyard Buys Railway at Burlington, Vt.

William S. Appleyard, who for the past three years has been operating the Burlington Rapid Transit Company running bus lines at Burlington, Vt., has bought from the People's Light & Power Corporation, New York, all the stock of the Burlington Traction Company, which in 1926 was valued by a Stone & Webster appraisal engineer at $1,231,500. The Burlington Traction Company includes the Military Post Street Railway, operating between Burlington and Essex Junction, 8 miles, including a stop at Fort Ethan Allen. Other than the electric railway operating between the villages of Stowe and Waterbury the Burlington Traction is the last city system of its kind in the state.

Extension of Time for Deposit of Brooklyn City Stock

The committee for stockholders of the Brooklyn City Railroad, Brooklyn, N.Y., under plan and agreement of Feb. 13, 1929, has announced extension of the time, up to and including April 1, 1929, at 3 p.m., within which deposit of stock may be made. The Brooklyn Trust Company is the depositary of the stock. The stock is being deposited under the plan for the consolidation of the property with the street surface lines of the Brooklyn-Manhattan Transit Corporation. The terms under which the roads will be brought together were outlined in the ELECTRIC RAILWAY JOURNAL for Feb. 16, page 301.

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Massachusetts Route Discontinued

The Massachusetts Northeastern Street Railway ceased operations at midnight on March 17 on its line between Lawrence, Mass., and Salem, N. H. Service by railway in the town was at one time supplied by the line from Haverhill, Mass., which operated to Canobie Lake Park, connecting Salem with Salem Depot. Another line operated via Salem Depot to Hampshire Roads, Lawrence and Methuen, Mass. A month back no cars were operated beyond the Massachusetts line but the Massachusetts Northeastern took over the route between Lawrence and Salem and had cars connect with the Hampshire road.

Hudson Valley Properties Sold

Sale of all the properties of the defunct Hudson Valley Railway, extending from Warrensburg to Troy, N. Y., was announced on March 16 by the Delaware & Hudson Railroad, owners of the company. Included in the transactions were tracks, wires, rights-of-way, substations, the waiting room in Saratoga Springs and other real estate in Saratoga and Ballston Spa. The property was disposed of to eighteen persons and companies. Figures for the deal could not be learned.

The announcement set at rest rumors that the Delaware & Hudson was planning to build a new line between Mechanicsville and Fort Edward, since the rights-of-way of that area were included in the disposal.

Large purchasers of the various properties were the New York Power & Light Corporation, the Eaton Wrecking Company, Albany, the Schenectady Railway, the Boston & Maine Railroad, the Hudson Transportation Company, the United Paper Board Company, of Thompson, and B. M. Frank, New York.

Short Brooklyn Three-Cent Line Succumbs

Final action has been taken by the Board of Estimate in acceptance of the $206,000 selling proposition of the Manhattan Bridge Three-cent Line. This marks the end of an adventure in transportation begun in 1912 by a combination of Brooklyn business men to connect the junction of Fulton Street and Flatbush Avenue with the east side of Manhattan by a short line, using the Flatbush Avenue extension and the Manhattan Bridge. The price the city is to pay includes the whole plant and equipment. It also includes a franchise running to 1937.

For years the road did a fairly good business, with sixteen cars and 5 miles of track. Power was purchased, but there came accidents on which heavy damages were assessed against the line.

The city plans to convert the space on the bridge now occupied by the trolley tracks into two additional lanes for automobiles and to arrange for a bus service to supplant the former service by trolley.

Disputes Nashville Valuation

The Nashville Railway & Light Company, Nashville, Tenn., has entered exception to the order of the Tennessee Railroad and Public Utilities Commission of Dec. 22, 1928, in which the commission fixed the valuation of the properties of the company. The formal protest and exception was filed by Attorneys W. E. Norvell and J. M. Anderson, and says that the value as determined by the commission "is grossly inadequate and insufficient and is substantially less than the valuation to which the company is entitled under a correct and proper application of well-settled principles of law to the facts as they appear in the record."

As mentioned in the ELECTRIC RAILWAY JOURNAL, issue of Jan. 26, a $17,500,000 value was placed on the Nashville property.

Service to Be Restored on Rockaway Road

Plans are in the making by H. E. Salzberg Company, Inc., New York, for the early restoration of service by the Ocean Electric Railway, purchased recently. It is intended to operate service by electric railway from Hammels to Neponsit over the streets of these and intervening towns. To this end a new company is being organized. A survey of the traffic possibilities has already been made and the intention of the purchasers is to put on new cars. The road runs the length of the Rockaway Peninsula, a territory very heavily populated particularly during the summer months, and the feeling of the new owners is that under rehabilitation the road can be made profitable. An indiscriminate service by bus is now being given in the territory, but this has been so unsatisfactory that the new owners have received the pledge of support of the business interests. The physical changes in the property are to be carried out so that the road will be in condition properly to handle the expected seasonal patronage.

Auburn & Syracuse to Abandon

Operation of the Auburn & Syracuse Railroad will be abandoned within the next two months. The bondholders protective committee has decided that it would not be advisable to bid in the property at a sale to be ordered by the court. An asset of real value is Owasco Lake Park, near Auburn, N. Y., leased to others during the last few years. Operation of the trolley line has brought successive losses.

T. C. Cherry was appointed receiver for the railway two years ago when the road defaulted in payment of interest on its first mortgage bonds. Last August Rolland B. Marvin was appointed referee to compute the amount due on the mortgage.

Alexander H. Cowie, the receiver, and attorney for the bondholder protective committee, will apply soon for

Conspectus of Indexes for March, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	March 1929 7.75	Feb. 1929 7.75	March 1928 7.61	Feb. 1929 7.75	Jan. 1924 6.91
Electric Railway Materials* 1913 = 100	March 1929 144.8	Feb. 1929 145.0	March 1928 140.1	March 1924 163.9	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	March 1929 230.1	Feb. 1929 229.9	March 1928 228.8	March 1929 230.1	Jan. 1924 217.4
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	March 1929 203.4	Feb. 1929 205.2	March 1928 200.5	March 1924 206.8	Sept. 1927 199.4
Eng. News-Record Construction Cost (General) 1913 = 100	March 1929 207.8	Feb. 1929 210.4	March 1928 204.6	March 1924 224.7	Nov. 1927 202.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	Feb. 1929 96.7	Jan. 1929 97.2	Feb. 1928 96.4	Nov. 1925 104.5	April 1927 93.7
Bradstreet Wholesale Commodities 1913 = 9.21	March 1929 13.00	Feb. 1929 12.98	March 1928 13.34	Dec. 1925 14.41	July 1924 12.23
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	Feb. 1929 154.4	Jan. 1929 154.6	Feb. 1928 151.6	Nov. 1925 167.1	May 1924 141.0
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	Feb. 1929 161.0	Jan. 1929 160.9	Feb. 1928 161.5	Nov. 1925 171.8	April 1928 160.8
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	Feb. 1929 140.4	Jan. 1929 132.5	Feb. 1928 127.7	Feb. 1929 140.4	July 1924 73.4
Bank Clearings Outside N. Y. City 1926 = 100	Feb. 1929 110.1	Jan. 1929 108.7	Feb. 1928 99.0	Feb. 1929 110.1	May 1924 84.4
Business Failures Number	Feb. 1929 1720	Jan. 1929 2184	Feb. 1928 1882	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	62.26	56.19	51.30	122.95	23.13

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

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the sale of the property to the highest bidder.

The decision of the committee in this case is expected to result in the property going to some bidder who will operate the park at Owasco Lake and junk the tracks and equipment. Auburn city lines owned by the company were junked sometime ago and a bus corporation is operating in that city.

Interests identified with the railway also organized the Mid-State Coach Lines, which is operating buses between Syracuse and Ithaca by way of Auburn.

The railway extends from Syracuse through Taunton, Spit Rock, Marcellus and Skaneateles to Auburn. There is no bus service now from Syracuse to Marcellus or Skaneateles, but it is understood the Mid-State company is planning to move soon for permission to extend its network to include these places.

Boston January Receipts $74,244 in Excess of Cost

Trustees of the Boston Elevated Railway, Boston, Mass., report for January a revenue of $74,244 in excess of cost of service compared with similar excess in January, 1928, of $191,382.

For the seven months of the trustees' fiscal year ending Jan. 31, 1929, cost of service exceeded revenue by $629,520 compared with a similar excess of $323,417 in the preceding year.

The road carried 32,038,239 revenue passengers in January of this year compared with 33,164,520 in the corresponding month a year ago. Average fare per revenue passenger decreased from 9.262 cents to 9.255 cents.

A greater amount of service was provided, however, for the smaller number of passengers. Trips operated increased from 633,881 to 654,205 and total miles operated increased from 5,013,084 to 5,107,130.

Hears Argument on Illinois Abandonment

Hearings on an application of the Chicago & Illinois Valley Railroad for authority to discontinue service and remove the tracks over that portion of its line between DePue and Princeton, Ill., were begun in Chicago recently before the Illinois Commerce Commission. In seeking permission to abandon this 14-mile section of its interurban system, the railroad presented evidence showing that operations were being carried on at a steadily increasing loss.

$11,556 Balance on Utah Commission Report

The annual report of the Public Utilities Commission of Utah, for the year 1928, shows appropriations, allowances and receipts for the year of $35,819, which included a balance from the report for the year ended on Jan. 1, 1928, of $10,617. Expenditures were $24,263, leaving a balance on hand of $11,556.

Real Progress Noted in Toledo in 1928

Surplus earnings of $125,150 credited to the stabilizing reserve after all operating expenses, taxes, and charges, compared with a deficit of $361,825 for the previous year, tells the story of 1928 or the "year of greatest progress and achievement so far as public transportation in Toledo is concerned." This was revealed in the annual report of Commissioner E. L. Graumlich submitted to the City Council. Operations of the Community Traction Company show the marked benefits of a co-ordinated railway-bus operation, improvement in railway equipment, new bus equipment, economical and centralized storage of buses, elimination of competition, and the general benefits of good industrial conditions in the city.

During the year the transportation ordinance passed by the City Council with approval of Mayor W. T. Jackson, the Street Railway Board of Control, and company representatives of Henry L. Doherty & Company provided a lower power rate, a refund of $150,000 on power charges, a definite paving and repaving program for the next five years, payment of old paving obligations to the city, establishment of crosstown bus service, reduction in bus fares, restoration of control of service to the city and elimination of bus competition.

Passenger revenue for 1928 was $3,479,628 compared with $3,251,198 for the previous year. There were 48,230,315 revenue passengers compared with 45,503,270 in 1927. Increase in patronage came largely from extensions of service to parts of the city not served before. Increases in revenue were also obtained from special services, subsidies and the rent of tracks and terminals for interurban use. Total revenue from all sources was $3,691,071, an increase of $259,288 over the previous year.

In the face of an increase of 10 per cent in service, operating costs were reduced from $2,044,191 in 1927 to $2,018,119 in 1928. While wage costs went up due to increased service, cost of power was cut about $30,000 and settlement of injury and damage claims reduced about $50,000 through continuous safety campaign and careful handling of claim cases. Taxes were $230,356, a considerable increase. This sum was almost equivalent to half the amount paid in bond interest and preferred stock dividends.

Bus operation provided total revenue of $495,633 which is 118 per cent gain over the previous year. Revenue passengers on coaches increased from 2,795,052 in 1927 to 6,150,851 in 1928. Net income from the coach operation was $50,065 against a deficit of $15,457 the previous year.

INCOME STATEMENT OF THE COMMUNITY TRACTION COMPANY FOR YEAR ENDED DEC. 31

	1928	1927
Passenger revenue. The fares collected from street car and coach passengers.	$3,479,628	$3,251,198
Special revenue. The revenue derived from cars and coaches used for special services and from subsidies.	42,526	36,176
Express revenue. Collected for carrying newspapers on the cars and coaches.	274	491
Station and car privileges. Paid to the company for advertising cards on the cars and coaches.	33,417	32,305
Rent of equipment. Received from other companies for the use of company cars (Point Place).	3,455	6,220
Rent of tracks and terminals. Paid to the company by interurban lines for use of city tracks.	110,748	81,512
Rent of buildings and property. Received for the use of land or buildings—bill board space.	287	481
Non-operating income. All revenues which are not the result from operation—interest earned on the several funds, cash discounts.	20,734	23,396
Total revenue from all sources	$3,691,071	$3,431,783

OPERATING EXPENSE AND DEDUCTIONS FROM INCOME OF COMMUNITY TRACTION COMPANY

	1928	1927
The Miller ordinance directs that the revenues of the company shall be used as follows:		
Operating expense. This is the cost of operating the cars and coaches—conductor and motormen wages, cost of power, injury and damages, and gasoline.	$2,018,119	$2,044,191
Maintenance. The amount provided for repair of tracks, cars and coaches.	547,044	570,992
Taxes. Real and personal tax, state excise tax, public utilities, automobile license, gasoline tax	230,356	209,524
	0	0
Total operating expense and taxes	$2,795,521	$2,824,708
Income from operation	$895,549	$607,074
DEDUCTIONS FROM INCOME		
Depreciation. The amount set aside for renewals and reconstruction.	199,323	139,888
Sinking fund—(city's purchase fund) 2½ per cent of capital value must be set aside out of operating revenues for the purchase and retirement of bonds and preferred stock for which common stock is issued to the city.	72,603	317,323
Interest—unfunded debt	50,002	31,306
Interest on money borrowed for current needs, coach contracts	0	0
Total deductions from income	$321,929	$488,518
Balance is available for:		
Stabilizing reserve	$573,620	$118,555
Ordinance requires that from this fund shall be paid:		
Interest on bonds	375,515	392,665
Dividends on preferred stock	87,955	87,715
Total interest and dividends	$463,470	$480,380
Net increase deficit	$110,150	$361,825
Add—refund on power—ordinance No. 6480	15,000	.....
	$125,150	

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Personal Items

C. H. Jones Heads Illinois Association

C. H. Jones, general manager Chicago, South Shore & South Bend Railroad, South Bend, Ind., was elected president of the railways group at the recent joint sessions of the three organizations, namely, the Illinois Gas Association, the Illinois State Electric Association and the Illinois Electric Railways Association. In this capacity he succeeds R. F. Palmblade.

Mr. Jones' name has long been identified with accomplishment in the electrical field. Since his affiliation with the Chicago Rapid Transit Company in 1909 he has given unstintingly of his time and effort to electrical development. He was made electrical engineer of the Chicago Rapid Transit Lines and the North Shore Line in 1917. Prior to this he had made a reputation for himself in the rebuilding of the power distribution system of the Rapid Transit Lines and he was to add to his record later in the work on the new Skokie Valley Route of the North Shore Line. The expeditious handling of the thousands who visited Chicago during the Eucharistic Congress in 1926 was attributable in great measure to his leadership.

C. H. Jones

Of his latter-day accomplishments is the high standard of service maintained on the South Shore Line and mentioned in these pages under date of Aug. 21, 1926, at the time of his assuming the duties of general manager of the company. In this capacity he succeeded Charles W. Chase. At that time the company's operating headquarters were removed from Gary to Michigan City, Ind. Since the purchase of the insolvent Shore system by the Insull interests in 1925, the company has been domiciled in Gary.

Mr. Jones was born in Chicago. He was graduated from Armour Institute of Technology in 1909 with the degree of electrical engineer. Mr. Jones has always been interested in association activity, particularly the work of the body of which he has now been made the head.

F. W. Hoover in Industrial Survey Work

Fred W. Hoover, former vice-president Consumers Power Company and later associated with Hodenpyl, Hardy & Company, Inc., has established department headquarters at Jackson, Mich., in charge of the Allied Power & Light Corporation's newly formed industrial development department to co-operate with and supplement activities of commercial organizations operating in the various local communities served by companies with which Allied Power & Light is identified. Work of this character has been carried on for several years by various operating companies, but the new department not only will consolidate the activities of such companies but will provide a clearing house and will make available engineering and economic advice and data to each community expert for directing industrial promotion efforts.

Within the territory served by the operating companies, Mr. Hoover believes the organization can do a lot of effective preliminary work, and supply the local chambers with a mass of valuable data and information which will be helpful in guiding and confining their activities and enthusiasm to channels which promise the greatest degree of permanent, constructive benefit to their communities. Primarily the work will be of an advisory nature, but, in the last analysis, it will have to be the Chamber of Commerce or some other local industrial development agency which brings the new industry into the community and gets the credit for the accomplishment.

Changes in St. Louis

G. Z. Ledford is now temporary superintendent of car operation for the St. Louis Public Service Company, St. Louis, Mo. He formerly was division superintendent of the North Broadway station.

F. A. Wilson, who was division superintendent of the DeBaliviere car station, has been made temporary division superintendent of the North Broadway car station while John H. Rippen, former superintendent of methods, is temporarily filling Mr. Wilson's old post at the DeBaliviere sheds.

James Stewart has been promoted to the superintendency of the Virginia and Walsh station, which houses the Grand and Belleville cars. He had been day dispatcher at this station for the past eight years.

M. L. Cummings Directs Salt Lake Advertising and Publicity

M. L. Cummings, Jr., associated with the advertising and public relations activities of the Utah Power & Light Company for several years, has recently been placed in charge of advertising and publicity for the Utah Light & Traction Company, Salt Lake City, Utah. Mr. Cummings is also editor of the Utah Power & Light Company's house organ, "The Synchronizer." He will retain his present connection with the power company, and assumes the additional duties with the company operating the railway and bus lines.

Mr. Cummings became associated with public utility work in March, 1915, at which time he entered the employ of the Utah Power & Light Company as secretary to S. R. Inch, who at that time was general superintendent of that company. About three years later he became identified with the commercial department, was appointed editor of the company's house organ, and in that capacity gained his first experience in public relations work. In 1922 he began to devote the major part of his time to the company's advertising and publicity activities, and in the latter part of 1924, when the Utah Power & Light Company organized its own advertising department, he was made assistant manager of that department.

M. L. Cummings

Mr. Cummings has been closely associated with the activities of the Electrical League of Utah ever since it was organized about nine years ago. He has served as chairman of its publicity committee; and as chairman of its Christmas home lighting committee for the past four years. He was recently elected secretary and treasurer of that organization for the year 1929.

L. F. YETMAN, newly appointed chief clerk for the El Paso Electric Company, El Paso, Tex., has reached that city. He was formerly with the Blackstone Valley Gas & Electric Company, where he had long experience. More recently he had been active head of the accounting department of the company at Woonsocket, R. I.

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R. J. S. Pigott Rejoins Stevens & Wood

R. J. S. Pigott, for three years mechanical engineer with Stevens & Wood, Inc., and later consulting engineer with the Public Service Production Company and Smoot Engineering Corporation, has returned to the Stevens & Wood organization as consulting mechanical engineer.

J. H. Shearer Elected Head of Pennsylvania Utility

J. H. Shearer, vice-president and general manager Penn Central Light & Power Company, Altoona, Pa., was elected president of that company, at a meeting of the board of directors held March 20, and of its subsidiary and associated companies, including the Keystone Public Service Corporation and subsidiaries, the Altoona & Logan Valley Electric Railway and subsidiaries, the York Railways and subsidiaries and the Chester Valley Electric Company.

Mr. Shearer entered the public utility field with the Thomson-Houston Company in 1890. He became identified with the public utility industry in the East as general superintendent of the Eastern Shore Gas & Electric Company at Salisbury, Md., and later Day & Zimmermann, managers of the Eastern Shore utility, selected him for the position of general superintendent of the Penn Central Light & Power Company. In 1923 he was elected vice-president in charge of operation and three years ago, when the National Electric Power Company acquired the Penn Central properties, he was appointed vice-president and general manager and a member of the board of directors.

Samuel A. Lockhart Promoted at Fall River

Samuel A. Lockhart, formerly operating foreman, was appointed superintendent of transportation of the Fall River, Mass., division of the Eastern Massachusetts Street Railway on Feb. 18. Mr. Lockhart has served in several capacities for the company through a period of 26 years. His first employment with the company in 1903 was as a motorman, operating from the old North carhouse in Fall River. Later he was promoted to foreman of the North carhouse, the headquarters for all the cars of the division. His next step was to the transportation department, in which he became chief operating foreman. Mr. Lockhart served in this position for sixteen years before receiving his recent appointment.

When Mr. Lockhart started his career as a motorman, the Old Colony Street Railway was furnishing transportation in Fall River. While serving in his various positions he saw the company change to the Bay State and then to the Eastern Massachusetts Street Railway.

Mr. Lockhart was born, reared and educated in Fall River. He has participated in several local activities in the city, and at the present time is president of the Maplewood Baseball League, composed of the leading amateur teams of Fall River. He also has been successful in developing the athletic activities of his division.

EDWIN D. CROWLEY, Lynn, has been appointed treasurer of the Eastern Massachusetts Street Railway, Boston, Mass., by the public trustees of the company. Mr. Crowley is a graduate of Dartmouth College, 1923, and the Amos Tuck School of Administration, 1924, with the degree of Master of Commercial Science. He was admitted to the bar in 1927 and authorized to practice as a certified public accountant in 1928.

W. D. SCHUYLER, for 21 years traffic superintendent of the railway lines in Muscatine, Iowa, has joined the new Muscatine Coach Lines. This service supplanted the electric railway on March 1 He will be traffic superintendent of the new transportation system.

OBITUARY

John L. Heins

John L. Heins, who was president of the Coney Island & Brooklyn Railroad, Brooklyn, N. Y., before its absorption some years ago by the Brooklyn Rapid Transit Company, the predecessor of the Brooklyn - Manhattan Transit Company, is dead, in his eighty-fifth year.

Moving to Brooklyn when still in his twenties, Mr. Heins became superintendent of the Franklin Avenue line there, but ill health subsequently caused his resignation. He returned to one of the roads that later was included in the merger that formed the Coney Island & Brooklyn Railroad, and remained in that field during the remainder of his active career, assuming the presidency and chairmanship of the board of the Coney Island & Brooklyn Railroad on its formation 30 years ago.

As president of the Coney Island & Brooklyn Railroad he succeeded Col. John L. Partridge. He was in turn succeeded as president of the company by Slaughter W. Huff, who later became a vice-president of the Brooklyn Rapid Transit Company when control of the Coney Island property passed to the Brooklyn Rapid Transit. The Equitable Life had been a large holder of stock of the Coney Island & Brooklyn Railroad, one of the most prosperous companies of its kind in the country in its day, but competition and other circumstances militated against the company and the Equitable holdings eventually found their way to the ownership of the Brooklyn Rapid Transit at prices considerably under par, whereas at one time the stock had sold at a magnificent premium. To Mr. Huff, as the successor of Mr. Heins, fell the task of rehabilitating the road.

George B. Cornell

George Birdsall Cornell, for nearly 50 years actively identified with the construction of electric railways in the United States, and in the evaluation of public utility properties throughout the world, died on March 14. Mr. Cornell's earliest notable work was as chief engineer of construction of the Brooklyn Elevated Railway, in 1884-'86. He retired in 1927, after completing an evaluation of the property of the Philadelphia Company.

From 1895 to 1898 Mr. Cornell, as chief engineer New York & Brooklyn Bridge Railway, installed the first elevated trains to cross Brooklyn Bridge. He also installed the first electrical equipment in the Brooklyn elevated system. Before that he had been chief engineer of the construction of the South Side Elevated Railroad in Chicago, and of the Union Elevated Railway in Brooklyn.

He was associated as resident engineer of Ford, Bacon & Davis, Inc., and was engaged in the construction of the railway power plant and overhead lines of the Memphis Street Railway, Memphis, Tenn., in 1906 and 1907. For the next six years he was chief engineer for Meiklehan & Dinsmore, engineers and bankers. Mr. Cornell returned to Ford, Bacon & Davis as resident engineer in Richmond, Va., from 1918 to 1921. He designed utility plants and evaluated properties in and around New York and gave expert testimony in various public utility investigations.

He was graduated from the Columbia College School of Mines in 1877 and held the degrees of Civil Engineer and Engineer of Mines. He was a life member of the American Society of Civil Engineers.

HORACE J. COCHRAN, former president Maysville Public Utilities Company, operators of utilities prior to the sale of the power, light and street car divisions to the Kentucky Power & Light Company, about three years ago, died recently. Mr. Cochran, a native of Maysville, was 52 years old.

CHARLES BRUCE WHITE, Chicago representative of the Cochrane Corporation and vice-president and general manager of the Cochrane Engineering Company, Chicago, died in Chicago recently. He had charge of building the electric railroad at Lynchburg, one of the first of its kind in the South. At the age of 34 he went to Chicago and was chief electrician for the Calumet Street Railway; he later entered the service of the Western Electric Company as a salesman, and in 1900 became manager of the Sprague Electric Company's office in St. Louis. In 1901 he became associated with A. Sorge Jr. & Company, then representing the Harrison Safety Boiler Works, (now the Cochrane Corporation), with which he was associated until the death of Mr. Sorge seven years ago. He was then made vice-president and general manager of the Cochrane Engineering Company, which succeeded A. Sorge Jr. & Company.

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Equipment Orders Continued

Grand Forks Street Railway to purchase car and bus equipment. Louisville Railway tests trucks. Track and shop construction planned

EXPANSION and renovation of railway systems and equipment have played an important part in the market activity of the electric railway industry during the past winter. With the coming of spring there appears to be no abatement in the announcement of projected improvements for this year. The delivery of 100 cars to the city of Detroit has just been started and now that city is making a special survey to ascertain if an additional 100 cars will be needed. Chicago has placed orders for 100 cars and other cities have either ordered or are contemplating the order of car equipment. Several large construction projects have been commenced and additional rehabilitation is being proposed or planned in a number of cities.

Cars for Grand Forks

Grand Forks Street Railway, Grand Forks, N. D., is considering the purchase of two or three new street cars of the Birney safety type. If these cars are to be ordered equipment similar to the present cars will be preferred. These cars are built for extremely cold weather operation, being equipped with double flooring, head lining and storm windows. The trucks are the St. Louis No. 7 type and the cars are equipped with G. E. No. 264 motors, No. 25 C P air compressors and are heated with Peter Smith hot-air heaters.

The Grand Forks Street Railway is also considering the purchase of buses to be used as feeders or possibly to replace one or two branches of its system where track conditions are such that it may be found prohibitive to rebuild them. Although a definite decision has not been made, the matter is being thoroughly investigated and some plan will be adopted in the very near future.

The Street Railway Department of the city of Detroit, Mich., has returned five mechanical-drive buses to the manufacturer for the installation of General Electric gas-electric drives. These five buses have been in service for some time and it is believed that this is the first case of conversion of buses already in service to gas-electric drives. The Street Railway Department now has in service 100 gas-electric buses.

Work on the three-year program of relocating elevated columns at the downtown street intersections in Chicago has been completed. A total of 35 columns were relocated from the center to the side of the street at an approximate cost of $470,000.

Louisville Railway, Louisville, Ky., has placed orders with the Timken Detroit Axle Company for two trucks. These trucks are each to be equipped with two 50-hp. motors of the Westinghouse high-speed type. These two trucks are to be installed for experimental purposes on car No. 1050, operating on the Fourth Avenue line. This car, which is one of the company's better steel cars, has been completely rebuilt and equipped with treadle-exit doors, safety devices and leather upholstered seats. The seating capacity is 43 passengers. The car with the old trucks weighs approximately 43,000 lb., while it is estimated with the new trucks the weight will be reduced to 33,000 lb.

It is figured that the car will have an acceleration of 3 to 3½ m.p.h.p.s. as compared to 2 m.p.h.p.s. with the old equipment. The drive is of the worm-gear type and the brakes are on the end of the armature shaft. Delivery of these trucks is expected about May 15, and if tests prove satisfactory, similar trucks will probably be installed on a number of the railway cars where a quicker acceleration and less current consumption is desired.

Equipment Ordered

The Pacific Gas & Electric Company has ordered two carloads of weatherproof wire and four carloads of bare copper wire. Among track material ordered by the Connecticut Company, New Haven, Conn., is one double-track three-part Y; one double-track branch-off; one double-track electric over single-track steam crossing and two crossovers. This company has also ordered four 29-passenger Mack coaches. The Portland Electric Power Company, Portland, Ore., has ordered three A. C. F., 40-passenger, metropolitan type coaches. One Mack six-cylinder, 33-passenger, city type bus has been ordered by the Houston Electric Company, Houston, Tex. The Portland Electric Power Company, Portland, Ore., plans two equipment storage and distributing plants, one costing approximately $200,000 and another about $50,000. The Puget Sound Power & Light Company, Seattle, Wash., will make improvements in its power plant costing approximately $200,000.

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has placed orders for ten cars of poles, two cars of wire and cable and one car of crossarms. This company has also let contracts for the construction of a new substation. The Dallas Railway & Terminal Company, Dallas, Tex. has placed orders for one carload of creosoted pine poles, and 150 21-in. rolled-steel wheels.

The Public Service Co-ordinated Transport, Newark, N. J., has received approval of the Board of Public Utility Commissioners of New Jersey on a contract between this company and the city of Newark on the construction of a rapid transit railway to be built in the bed of the abandoned Morris Canal.

It is understood that until about March 27 the Pennsylvania Railroad, Philadelphia, Pa., will receive bids for the construction of a modern twenty-story office building to be built between Sixteenth and Seventeenth Streets, in Philadelphia. Graham, Anderson, Probst and White, Chicago, Ill., are the architects.

Montreal Tramways, Montreal, Ont., is contemplating the erection of a car-house and two substations. One of the substations to be located in the west end of the city will have a capacity of about 4,000 kw. and the other in the east end of the city will have a capacity of about 3,000 kw.

Laying of a second track on the Hamilton Road line for a distance of about 1½ miles is being considered by the London Street Railway, London, Ont. The estimated cost of this work is $36,000 a mile exclusive of the cost of removing the present single track.

The Ford City Council has passed a resolution requesting the management of the Ontario Hydro-Electric Railway to extend its car line on Seminole Street from George Avenue to Norman Road. This work, which is estimated to cost approximately $8,000, is to start at the opening of this year's construction season, if the request is approved.

Tacoma Track Construction

Extension of the Municipal Belt Line around the head of Hylebos Water Way and along the east side thereof as far north as Lincoln Avenue has been approved by the Tacoma Chamber of Commerce, Tacoma, Wash., in its ten-year program for the development of that city, particularly the east side of the Hylebos Water Way, for industrial purposes. This improvement also includes the extension of the line as far north as East Eleventh Street. At present there is no bridge across the water way which can carry the belt line tracks and there is no roadway serving the east side south of Lincoln Avenue.

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has received a decision giving it the right to move a park statue in Caledonia, thus permitting the construction of straight tracks on the railway's new right-of-way.

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Ohmer Company to Expand

The Ohmer Fare Register Company, Dayton, Ohio, said to be the largest manufacturer of taximeters in the world and an important manufacturer of truck auditors, hubometers and other fare registers, as well as cash registers, plans a large expansion program. The company has authorized the sale of a large block of its class A stock to F. J. Lisman & Company, New York, and will use the proceeds of such sale to provide for the retirement of its short term notes, the payment of existing bank loans, the retirement of all or substantially all of its preferred stock and for expansion purposes, particularly in the field of recording and registering machines. The company has also authorized the issue of 20,000 shares of the class B stock in exchange for certain valuable patents.

At a special meeting of its stockholders and a special meeting of its board of directors, action necessary to carry out a plan of recapitalization of the company was taken. The plan of recapitalization provides, among other things, for an increase in the authorized capital stock of the company from 15,000 shares (par $100) to 504,922 shares, of which 4,922 shares, known as preferred stock, will have a par value of $100 per share, 100,000 shares, known as class A stock, will have no par value, and 400,000 shares known as class B stock will have no par value. It is contemplated that the 4,922 shares of preferred stock, which are temporarily carried over from the old capitalization, will be retired out of the proceeds of the sale of class A stock by the company, and that there will presently be outstanding 100,000 shares of the class A stock and 270,000 shares of the class B stock. Holders of present common stock will receive in exchange for each share held 2 7/9 shares of the new class A stock and 25 shares of the new class B stock.

The board of directors has been increased from six members to nine, and F. J. Lisman and A. M. Chambers of the banking firm of F. J. Lisman & Company have been elected to the board.

It is expected that F. J. Lisman & Company will, in the near future, make a public offering of a block of the class A stock.

John F. Ohmer, president Ohmer Company, has made it plain that no business change is being considered which might bring about a merger of his company with others engaged in similar lines of industry. Expansion is contemplated, but whatever is done will not in any way affect the present directorate of the concern. He is quoted as follows:

The increase which we have enjoyed in our business during the past year and the prospects for the future in cash register and accounting machine business, a field we entered some time ago, has made it necessary that we be prepared to have a financial structure that will take care of the expansion.

The Ohmer Company will soon place in production its new models of cash registers and accounting machines, while continuing with the manufacture of fare-recording machines which has been the nucleus of the business since its inception.

METAL, COAL AND MATERIAL PRICES F. O. B. REFINERY

	March 20, 1929
Metals—New York	
Copper electrolytic, cents per lb	22.45
Copper wire, cents per lb	24.875
Lead, cents per lb	8.
Zinc, cents per lb	6.825
Tin, Straits, cents per lb	49.
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.425
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago, net tons	1.50
Central, Ill., screenings, Chicago, net tons	1.125
Kansas screenings, Kansas City, net tons	1.70
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	$6.95
Weatherproof wire base, N.Y., cents per lb.	25.875
Cement, Chicago net prices, without bags	2.05
Linseed oil (5-bbl. lots) N. Y., cents per lb.	10.6
White lead in oil (100-lb. keg), N. Y., cents per lb	13.5
Turpentine (bbl. lots), N. Y., per gal	64.5

Westinghouse Annual Report

Business of the Westinghouse Electric & Manufacturing Company during the year 1928 was the best for any twelve months in its history, according to the company's annual report, which was made public recently. Sales billed for the year were $189,050,302, and net income was $20,814,940, which figures exceed previous records by $3,500,000 and $2,700,000, respectively. The net income per share of stock (preferred and common) was $8.78, or 17.5 per cent on the par value, which compares with $6.59, or 13.2 per cent for the period covered by the last annual report. Both classes of stock are now receiving annual dividends of $4 per share of $50 par value.

Owing to a change in the fiscal year, which now ends Dec. 31, instead of March 31 as heretofore, the present report covers officially only the nine-months period extending from April 1 to Dec. 31, 1928, but the figures above given are for the entire year of 1928 to provide a basis for comparison with previous full fiscal years.

The company's total current assets are given as $135,679,223 (a gain of over $13,000,000 in nine months), and its total current liabilities are only $17,000,000. The surplus is now $67,000,000, a gain of $10,000,000 in nine months.

The value of unfilled orders on Dec. 31, 1928, was approximately $47,000,000. During the nine-months period the value of orders received exceeded by almost $20,000,000 that of the same period in 1927, due largely to the increase in demand for radio products and industrial motor apparatus.

Weekly Business Conditions

The volume of money turnover during the week ended March 16, as indicated by check payments, was smaller than in the preceding week but considerably greater than a year ago, according to the weekly statement of the Department of Commerce. Industrial activity, as reflected by steel-plant operations, was greater than in either the preceding week or the similar period a year ago. The production of bituminous coal during the latest reported week was smaller than in either the previous week or the similar week of 1928. The output of lumber showed a decline from the previous week and no change from a year ago. Petroleum output showed a sizeable recession from the previous week but was considerably greater than at this time last year. Freight-car loadings, covering the latest reported week, showed a gain over both the previous week and the similar period of last year.

The general level of wholesale prices showed no change from the preceding week, but was fractionally higher than a year ago. The price of copper continued to mount, while prices for iron and steel, showing no change from the previous week, averaged higher than a year ago. Loans and discounts of federal reserve member banks showed further expansion, as compared with both the preceding week and the similar period a year ago. Interest rates on call loans averaged lower than in the previous week but were higher than a year ago. Bond prices averaged lower than in either period. Prices for stocks were higher than in either the previous week or the similar period of 1928. Business failures were fewer than in either period.

Weekly Business Indicators

(Weeks ended Saturday. Average 1923-25 = 100)

	1929				1928			
	March 16	March 9	March 2	Feb. 23	March 17	March 10	March 3	Feb. 25
Steel operations	123.7	122.4	118.4	117.1	109.0	108.0	109.0	111.0
Bituminous-coal production	.....	105.4	114.5	120.6	102.0	106.6	103.0	104.4
Lumber production	.....	99.1	101.4	96.4	102.3	99.1	101.4	108.6
Petroleum production (daily average)	.....	128.0	129.8	129.3	114.7	113.1	113.2	112.8
Freight-car loadings	.....	.....	101.9	94.6	98.3	99.2	100.1	90.7
Building contracts 37 states (daily average)	.....	93.2	124.5	93.1	139.4	110.0	111.0	122.2
Price iron and steel, composite	87.9	87.9	87.9	87.6	86.7	87.6	86.5	86.0
Copper, electrolytic, price	.....	139.9	139.1	129.0	100.7	100.7	100.0	100.0
Check payments	130.6	157.8	124.8	145.5	114.4	126.6	123.7	105.3
Bank loans and discounts	131.5	131.4	130.9	129.5	122.6	121.2	121.2	120.4
Interest rates, call money	178.8	218.2	187.9	169.7	109.1	103.0	109.1	103.0
Business failures	113·0	120.4	131.9	101.0	117.0	125.3	126.8	118.7
Fnterest rates, time money	180.0	177.1	177.1	177.1	105.7	105.7	105.7	105.7
Iederal reserve ratio	91.2	89.9	90.2	91.4	95.9	96.0	95.6	96.4

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL,
Publishing Director

Volume 73 New York, April, 1929 *Number 13*

Leadership Requires Perspective

UNDER the pressure of daily activities, there is always danger that attention may become so focused upon routine details as to lose sight of major objectives; that the distinction between the means and the end may become obscured. An enterprise which loses sight of its primary objectives is like a ship without a pilot. So also is an industry which fails to establish a chart of sound principles by which to judge whether it is moving ahead on a definite course or merely drifting with currents of opinion and the tide of circumstances. Of course, even without policies established or principles determined, circumstances and exterior forces may combine to bring about considerable success when results are measured only in immediate profits. But without adequate soundings to guide them through dangerous channels, and without the vision of capable leadership, many businesses have all too soon found themselves upon the shoals of economic desperation.

THERE is more group thinking in business today than ever before, and never has there been keener appreciation of the importance of leadership. In the local transportation industry, growing realization of this need has been manifested during recent months by a persistent demand for a better understanding of fundamentals. There is less inclination today to drift with the tide of events than at any time in the past decade. There is less readiness to be guided by opinion or to be satisfied with expedients which promise only temporary relief. There is a growing demand for a clearer understanding of transportation economics. An effort is being made to develop a clearer understanding of the economic interrelation between transportation and the community itself.

Experience has indicated that the huge costs of rapid transit facilities cannot be carried by operating revenues at any reasonable rate of fare, if service is to be maintained at modern standards of comfort and convenience. Furthermore, transportation men are beginning to understand that it is not alone sufficient that rapid transit construction costs be borne by the community. The method of financing is equally important. Most of those who have given the matter intensive study have become convinced that property values created by transit construction should supply the funds for the structure and right-of-way, for after all a new transit line is merely a special form of street or highway. If this principle applies to rapid transit why should it not likewise apply to rail lines laid in the street itself for public transportation? When some of these fundamentals are considered, there are presented new fields of research and study that indicate how little, after all, is known of the fundamentals of this business which plays so important a part in the life of the modern community.

BUT the need for more fundamental thinking in the industry is not limited alone to broad questions of management and economics. It is important likewise that each principal department maintain its own perspective and sense of proportion. Whether the direct responsibility be operation or maintenance; and whether the latter be the maintenance of equipment or track or buses or electrical system, the distinction between problems of daily routine and broad problems of departmental policy is important. The department head who, though he be ever so capable a technician, loses sight of the broader objectives of the industry, and of the relation between his own work and that of associated departments, is headed toward ultimate difficulty.

This issue of ELECTRIC RAILWAY JOURNAL indicates in a striking way the fact that electric railway maintenance executives are alert to the needs of the times and are themselves engaged in critical analysis of methods and previously accepted precedents. In all four departments of electric railway maintenance—track, equipment, distribution system and buses—current practices and methods are being examined with a critical eye. There is a demand for performance and efficiency transcending former accepted standards. There is a frankness in discussion, a freedom in the interchange of information between properties and an open-minded attitude toward the other man's methods, that promises accelerated improvement and progress.

A GREATER tendency exists today than for many years in the past to emphasize the objectives as well as the methods of maintenance. This has resulted in a radically changed concept of the maintenance departments' work. The old idea of repair after failure is being superseded by the modern policy of preventive maintenance. This has been proved to be good business not only from the standpoint of avoiding service interruptions, but from the standpoint of economy as well. The rapid progress that has been made on many properties toward this modern concept indicates that the alert maintenance executive is maintaining his perspective, thereby proving his right to leadership.

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Maintenance Achievement Worthy of Emulation

HAD anyone said ten years ago that it would be possible to keep street cars in service for more than 20,000 miles without a pull-in he would have been considered a dreamer. And had he asserted that this could be done not once, but kept up for six years as the average on four leading properties, it would have been considered preposterous. Then add that while making such a record the railways participating would save $2,000,000 in the maintenance of equipment, and he would have been branded a fool.

Yet this is the record achieved by member companies of the Electric Railway Association of Equipment Men, Southern Properties. The association, formed more than six years ago, has had as its object the improvement of performance and the reduction of costs. That it has been successful in this is proved by the figures quoted. It is the more remarkable that the record was made in a period when costs of labor were rising and prices of materials remaining at or near the post-war maximum.

There are other properties that have made comparable improvements in keeping equipment in service and in reducing maintenance costs. But the work of this association is remarkable in that these results have been achieved not by one company alone, but by a group of properties in a widely scattered territory. The accomplishment is worthy of the highest praise. And what is more, it is worthy of emulation the country over.

Chromium Plating Has Many Uses

NEW uses of chromium plating merit careful investigation by electric railways. The most extensive present application is its use instead of nickel for the finish of radiators, headlights, and other exterior fittings of automobiles. In this field it is proving of advantage particularly for its freedom from tarnish. Following along this line it should prove of advantage for the finish of car fittings such as grab handles, stanchions, window catches, window guards, etc.

But in addition to its use as a decorative finish, the great hardness and wear-resistant properties of chromium are leading to its use for finishing surfaces that are subject to wear. Its principal mechanical application so far has been on measuring devices, such as plug gages; snap gages; drawing, stamping and forming dies; jig bushings, etc. For such uses it is applied in thicknesses of 0.002 in. to 0.004 in.

Chromium should prove valuable as a bearing surface because of its low coefficient of friction and its resistance to abrasion and chemical action. This last characteristic permits the use of certain oils that are efficient lubricants but which have been limited in use during the past because of their acid content that attacks most metals. For bearing surfaces, chromium can be applied satisfactorily in thicknesses up to 0.015 in. In repair work it may prove useful for building up worn surfaces where the wear is very slight, such as the outside surfaces of armature and axle bearings, housing fits, etc. Its use in this field up to the present has been entirely experimental.

Another application which promises to be of interest to electric railways is in providing a wearing surface for such parts as gears, brake cylinders, pistons, coupler faces, door operators, etc. Chromium is applied by plating. To get good adherence to the base metal the part being plated must be cleaned perfectly. The extreme brittleness of chromium accounts largely for the tendency of relatively thick deposits to chip when subjected to impact. The relative coefficients of thermal expansion of chromium and the base metal upon which it is applied determine largely its adherence when subjected to any great change in temperature. The expansion of chromium under temperature change is similar to that of glass and platinum but is much less than that of iron, copper, nickel and zinc. Results obtained from the experimental uses of chromium plating vary greatly, but its possible applications by electric railways certainly merit careful consideration and investigation.

Properly Designed Records Guide Future Practice

TO GAIN a true insight into any branch of maintenance work by an electric railway it is necessary to have properly detailed records. All companies keep records of their various activities—in fact, most of them actually keep too many—but in every department numerous records may be found that merely require valuable space for filing and which serve no useful purpose. The big problem, therefore, is not necessarily to create new classifications and forms to increase the number, but to choose those which will be of the most benefit in analyzing costs, in determining which products are giving the best service, and in apportioning material and labor to obtain the highest efficiency and least wastage in repair work. It is a real problem and one that requires careful thought and study over a long period of time.

A few railways have departed from the easy and usual methods of recording maintenance details and the results attained on these properties are convincing proof that it is worth while. An excellent example of what can be accomplished is afforded in the experience of the New Orleans Public Service, Inc., whose methods of recording track maintenance costs are described elsewhere in this issue. The company classifies all of its trackage according to the type and age of construction, and keeps accurate records of all expenditures for each section. These figures are so compiled that an intelligent analysis of the various track designs and maintenance methods can be made. The company also has adopted a system of inspection reports which is used in assigning repair work. They are particularly helpful in apportioning the proper amount of materials and the proper number of men to each repair job.

Track maintenance, however, is only one of four major maintenance activities. Cars, buses and overhead all require heavy and continuous expenditures for materials and labor. To determine which tires give the best service on buses it is necessary to have records that tell the full story of the conditions to which each tire was subjected and its service history. Likewise, records of cars and buses, railway motors, armatures, trucks, compressor equipments, controllers and other parts, should all be designed for the ready comparison of performance and cost, and to serve as a guide in determining future purchases and maintenance policies.

Although fewer records are being kept today than were maintained in the past, there is no need for increasing the number. As a matter of fact, when fewer records are kept, closer attention can be paid to each, with resulting greater usefulness. The important thing in setting up records is to make them more than a history

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of what has occurred. Each record should have as its ultimate purpose the improvement of future practice on the basis of past experience.

Adequate Bus Maintenance Facilities Are a Good Investment

OPERATION of buses by electric railways has expanded rapidly in recent years, but in many instances this expansion has occurred without any definite forethought. Consequently it is not surprising to find that adequate maintenance facilities have not always been provided. Many garages are simply converted carhouses. Such buildings usually are far from ideal places for doing bus maintenance and repair work. Because of the use of internal combustion engines for buses the problem of ventilation in a garage is entirely different from that in a carhouse. So also are the pit requirements, as most of the heavy parts can be lowered from the underside of a car while they must be removed by lifting from the chassis of a bus. In other ways also, an old carhouse is not entirely satisfactory for bus maintenance work.

In the matter of machine tools the present status of electric railway garages shows signs of unplanned development. Many are poorly provided with equipment, considering the number of buses operated. Apparently this is the result of a recent increase in the number of vehicles without a corresponding increase in maintenance facilities. Need for economy undoubtedly is the reason for these conditions. But despite the compelling force of this necessity, the fact must not be lost to sight that in the long run the provision of adequate maintenance facilities always proves to be the most economical policy.

That the truth of this is recognized by many progressive managements is clearly shown by the information gathered in a survey including 41 of the largest electric railway bus operating companies in the United States and Canada, a summary of which appears elsewhere in this issue. While some companies have been compelled to follow the policy of using old carhouses for garage purposes, the majority opinion is strongly in favor of buildings especially designed for the purpose and provided with ample maintenance equipment and tools to insure expert workmanship and real efficiency.

A Distinction Between Information and Propaganda Is Accuracy

ELEGANCE of expression is always to be desired, but no phrase other than "How do they get that way?" appears to fit the case of the Florida Public Utility Information Bureau in its discussion in its bulletin of Feb. 25 of the subject "Street Cars or Buses in Jacksonville." That city is in the throes of growing pains. It needs more transportation. The disposition of the Jacksonville Traction Company appears to be to give the citizens what they most desire, more service by bus or street car. It favors bus service to the outlying districts. This is the progressive attitude where density of traffic and prospective business do not warrant the building of street railway lines, but the information bureau appears to be taking upon itself a great responsibility when it proclaims through its bulletin that "the company does not want to lay double tracks on Main Street to clutter up the landscape, interfere with auto service and parking." So street cars interfere with parking. Since when? The general impression among railway men and many others was that parking interfered with the street cars. But that isn't all. According to the Florida sage, "double-tracking on a busy street is out of date, handicaps modern transportation and demonstrates lack of knowledge of modern ideas." The JOURNAL stands second to none in its enthusiasm for the bus. It is not disposed to enter again here into a discussion of the economics of various forms of transportation or of the economics of the use of the streets. It would be easy to correct charitably authors not properly informed who make statements of this kind about such matters, but the Florida Bureau should be in a position to know better. Regardless of the objective it may have in mind for Jacksonville, this statement is both a misrepresentation and an exaggeration.

The Association's Loss Is Baltimore's Gain

FOUR years ago Lucius S. Storrs was chosen managing director of the American Electric Railway Association. It was a new office, but Mr. Storrs' contact with association affairs had extended over the years and he was in thorough sympathy with the objectives for which the Advisory Council was formed. The industry needed leadership. Most of its problems were generally to many properties and there was need for group thinking and organized attack on common difficulties.

There have been no heroics in the conduct of the affairs of the association under Mr. Storrs, but there has been steady progress in the creation of greater group consciousness among electric railways and in the stimulation of the interchange of ideas, methods and information between properties through the medium of the association. In Mr. Storrs, the industry has had a national spokesman on questions of taxation, legislation and relations with other industries—activities the value of which are not readily apparent unless the results are viewed collectively. As for the individual properties, there have been available to them, in addition, the personal services of the association staff.

In his new post as executive chairman of the board of the United Railways & Electric Company of Baltimore, Mr. Storrs takes the leadership of an individual property. His advice will still be available in the councils of the association. In addition, he may be expected to apply in Baltimore the policies which he has advocated for the industry, and through demonstration of their efficacy he will continue to help in guiding the industry. Mr. Storrs assumes his duties in Baltimore with an enviable record of achievement in management. It was largely his accomplishments as president of the Connecticut Company that led to his selection as managing director of the association. From that post he takes with him a still broader outlook and understanding of transportation fundamentals.

If the citizens of Baltimore are expecting the spectacular from Mr. Storrs they are doomed to disappointment. But if they are prepared for that gradual upbuilding which is the result of the most careful study and deliberation and is the sign of permanence, they may expect their patience to be rewarded. The present management of the United Railways & Electric Company welcomes Mr. Storrs' leadership. If the JOURNAL is correct in its conceptions of Baltimore and its transportation problem, he may be expected to initiate a program that will redound to the mutual and permanent advantage of the community and the security holders of its transportation system.

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Four Southern Properties

Save $2,000,000 in Equip

By

G. C. HECKER

Special Engineer American Electric Railway Association

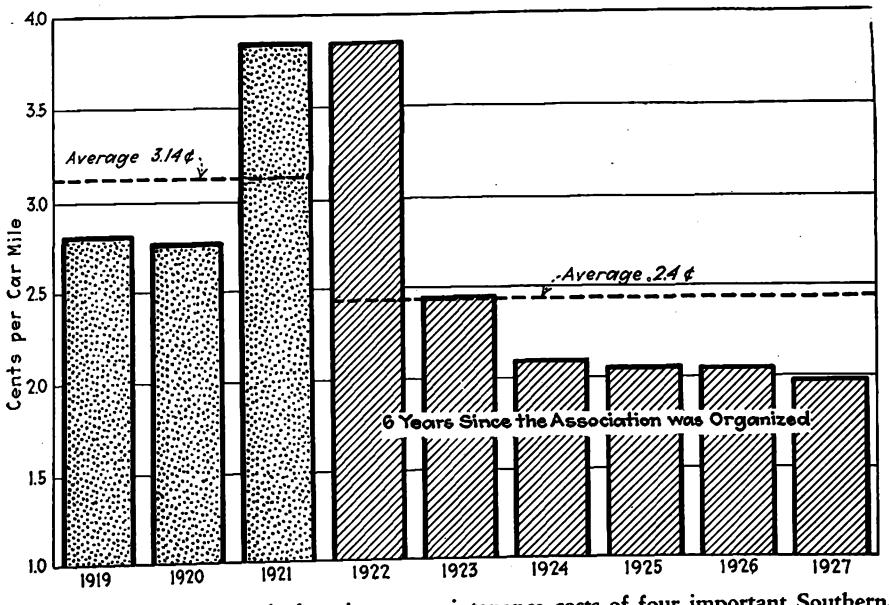

Fig. 1—A striking record of equipment maintenance costs of four important Southern companies, showing how interchange of experience and records through the Association of Equipment Men, Southern Properties, has resulted in major reductions

IN APRIL, 1922, a small group of superintendents of equipment of Southern electric railways met in Memphis, Tenn., to exchange operating experiences and to discuss maintenance methods, costs and other common problems. Uppermost in the minds of these men was the question of how the efficiency of their mechanical departments could be increased. During the meeting a comparison of operating costs and car failure records paved the way for an animated discussion of inspection and maintenance methods, which brought to light many divergent opinions and many interesting practices.

As the discussion continued the conviction grew among those present that this frank interchange of information and ideas had been extremely helpful and that each man had benefited greatly by it. It was agreed unanimously that regular interchange of maintenance data and costs and the periodical discussion of this information would provide a means of creating a spirit of friendly competition among the mechanical departments which would inevitably result in each one striving to improve its performance and its relative standing in the group. Before adjourning this group organized the Electric Railway Association of Equipment Men, Southern Properties, the charter members representing the mechanical departments of the properties in Birmingham, Nashville, Knoxville, Little Rock, Dallas, New Orleans, Mobile, Atlanta and Memphis.

Each member furnishes the secretary his monthly maintenance of equipment costs and his record of car failures, or pull-ins. In order to secure uniformity in the pull-in records, the association established the following definition for the guidance of the members:

> A car which has to be removed from service prior to completion of its regular prescribed run for any mechanical, electrical or man failures or accident, is termed a "pull-in."

These figures are compiled each month by the secretary and are printed and distributed to all members of the association. Not only are these data available to the department heads and supervisory forces for study, but they are posted in the shops and carhouses so that the rank and file of the employees on each property can see the standing of their own company in the group. The association meets semi-annually to discuss questions of interest to members and for the presentation of papers and discussions on timely shop and equipment subjects. A feature of these gatherings is the inspection trip through the shops and carhouses of the property in the city where the meeting is being held.

It is now seven years since the association was organized. Has it justified its existence? Did it result in any real accomplishment? The answers to these questions should be found in the maintenance records of these properties. With that thought in mind the writer has compiled and studied data furnished by four large companies represented in the charter membership of the association, viz., Memphis, Atlanta, Birmingham and New Orleans. A larger group would have been included in the study had it been possible to obtain continuous records, both prior to and since the organization of the association. As such figures were not available for all of the nine companies represented in the charter membership, the study has been confined to the above-mentioned companies.

The accompanying table shows the combined figures of these four properties. For the three years prior to the formation of the association, the combined main-

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n Eqent Maintenance

During Six Years

FREE INTERCHANGE of cost records, comparison of methods and critical self-analysis resulting from the activities of the Association of Equipment Men, Southern Properties, have brought about improved maintenance performance which has attracted widespread attention. A consolidated study of the records of four companies — at Memphis, Atlanta, Birmingham and New Orleans — gives a striking summary of the results accomplished.

tenance of equipment costs averaged 3.14 cents per car-mile. For the first six years of the existence of the association, these costs averaged 2.4 cents per car-mile, a decrease of 23½ per cent. Fig. 1 shows that since 1922 there has been a consistent, steady downward trend in maintenance costs. Comparing the 1927 cost with the year just before the association was formed, we find a maximum reduction of 49 per cent.

In order to translate the accomplishments of the mechanical departments into dollars and cents, the average reduction in maintenance cost per car-mile during the six years from 1922 to 1927 has been multiplied by the average car-miles operated during the same period. This shows an annual saving of roughly $350,000 per year, or for the six-year period approximately $2,100,000. Comparing the average cost for the three years prior to the formation of the association with the 1927 cost, we find that the maximum annual saving has been roughly $556,000.

COMBINED STATISTICS OF MECHANICAL DEPARTMENTS AT MEMPHIS, ATLANTA, BIRMINGHAM AND NEW ORLEANS

Year	Maintenance of Equipment Cents per Car-Mile*	Pull-ins Due to Equipment Failures	Car-Miles per Pull-in	Car-Miles Operated	Cars Operated	Carhouse and Shop Employees	Motor Cars Purchased
1919.....	2.8	15,000	3,300	49,396,000	†	841	35
1920.....	2.759	15,700	3,200	50,421,000	†	971	30
1921.....	3.864	12,632	3,900	49,385,000	1,259	1,019	45
Average of above three years....	3.141	14,477	3,457	49,725,000	....	943	37
1922.....	3.825	6,028	7,720	46,554,000	1,234	911	100
1923.....	2.399	3,425	14,100	48,479,000	1,244	944	40
1924.....	2.118	2,388	20,100	48,401,000	1,251	872	103
1925.....	2.048	1,955	24,100	47,185,000	1,266	764	100
1926.....	2.050	1,579	30,300	47,838,000	1,286	745	118
1927.....	1.976	1,566	30,500	47,778,000	1,291	737	40
Average of above six years.....	2.403	2,824	21,133	47,706,000	1,263	829	83

*Depreciation not included. Maintenance costs include standard accounts 29—41 inclusive.
†Complete figures were not available.

Fig. 2 shows the record of car failures. These are the pull-ins due only to equipment failures and do not include those due to man failures nor accidents. During the first six years of the existence of the association the average number of pull-ins for the four properties was approximately 2,800 as compared with an average of 14,500 for the three previous years, or an average reduction of 77½ per cent. Car failures, like maintenance costs, have been reduced steadily until in 1927 the pull-ins were only 1,566. Compared with the year 1921, this is a maximum reduction of 87½ per cent in car failures due to mechanical or electrical defects.

In order to permit comparisons with other properties, this car failure record has been converted in Fig. 3 to "car-miles operated per pull-in." It will be observed that the car-miles per pull-in have been increased steadily from approximately 3,500 to 30,500. The average miles prior to 1922 were 3,457. The average for the six years following the organization of the association was 21,133.

The average daily cars operated on the four properties during the years 1922 to 1927 inclusive totaled 1,263. Thus it will be seen that the car failures have been steadily reduced until during the year 1927 there were about 1¼ failures per car operated. Here is a record of splendid achievement. How are we going to account for the reduced maintenance costs and the improved performance of equipment, which began almost simultaneously with the organization of this association?

Obviously, not all of this splendid improvement in performance can be attributed to the activities of the association, as there are many other factors which may influence the maintenance costs and the car failures. Among these might be mentioned the new cars purchased

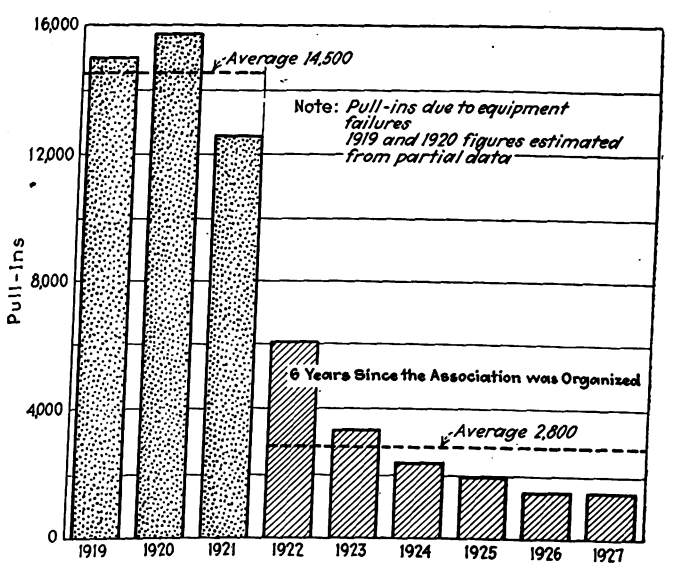

Fig. 2—Steady reductions in pull-ins for mechanical failures indicate that the standards of maintenance were being raised while costs were being reduced. This chart is compiled from the combined figures for Memphis, Atlanta, Birmingham and New Orleans

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COMPARATIVE STATEMENT

OF CAR PULL-INS ON THE STREET CAR SYSTEMS OF THE CITIES NAMED FOR MONTH OF DECEMBER, 1928, AND FOR YEAR TO DATE

NOTE: A car which has to be removed from service prior to completion of its regular prescribed run for any mechanical, electrical, man failure, or accident, will be termed a pull-in.

Covington		Mobile		Baltimore		Charlotte		Pittsburgh		Miami		Richmond		
December	Yr. to Date	December	Yr. to Date	December	Yr. to Date	December	Yr. to Date	December	Yr. to Date	December	Yr. to Date	December	Yr. to Date	Decem
2	40	2	23	14	261		32	30	261	1	12	12	126	
			1	2	11		1						27	
					1							2	17	
	1		2		5						1		10	
							1					2	11	
					1						1			
				4	12	1	7				3		18	
1	9		3		29	1	5	11	59		6	4	29	
1	11		1	2	61	1	18	4	115		6	3	55	
				3	52									

Comparative statements of maintenance costs and detailed pull-in records are compiled monthly by the secretary of the E.R.A.E.M., Sou. Prop., and sent to each member company

COMPARATIVE STATEMENT.

F MAINTENANCE COST PER 1,000 CAR MILES

R CARS AND EQUIPR MONTH OF DECEMBER, 1928, AND FOR YEAR TO DATE COMPARED WITH THE SAME PERIOD FOR PREVIOUS YEAR

ELECT. EQUIPT. OF CARS				SHOP TOOLS and EQUIPT.				SHOP EXPENSES				MISC. EQUIPT.				TOTAL MAINTENANCE				CAR CLEANING and INSP.				R. and R.				
Dec. 1928	Yr. to Date	Dec. 1927	Yr. to Date	Dec. 1928	Yr. to Date	Dec. 1927	Yr. to Date	Dec. 1928	Yr. to Date	Dec. 1927	Yr. to Date	Dec. 1928	Yr. to Date	Dec. 1927	Yr. to Date	Dec. 1928	Yr. to Date	Dec. 1927	Yr. to Date	Dec. 1928	Yr. to Date	Dec. 1927	Yr. to Date	Dec. 1928	Yr. to Date	Dec. 1927	Yr. to Date	
1.73	1.77	.99	1.44	.42	.29	1.57	.35	1.65	1.27	1.48	1.28					13.56	14.02	17.62	15.85	5.99	5.97	6.12	6.11					1
3.71	3.88	2.99	3.55	.17	.28	.29	.20	.73	1.00	1.23	.96					15.89	16.75	15.00	13.51	8.39	7.65	7.61	6.87					2
2.71	3.75	2.91	4.07	.09	.09	.04	.11	.83	.85	.93	.89					15.94	17.85	16.06	16.11	8.78	8.87	8.55	8.86					3
3.56	4.70	3.88	5.40	.09	.05	.15	.04	1.83	1.71	2.80	2.15		.003		.01	13.66	17.90	16.97	18.45	9.09	10.29	9.14	8.45	780.43	76,895.97			4
4.94	4.96	4.21	6.00	1.24	.40	.03	.09	1.76	1.38	1.72	1.40					20.79	18.31	19.41	20.55									5
4.25	4.92	4.29		.08	.20	.08			1.05	1.22	1.09					18.35	18.86	15.88	17.48	5.97	5.89	5.61	5.71					6

entirely convincing. Poorly maintained rolling stock could not have made the performance shown in Figs. 2 and 3.

Furthermore, the reduction in maintenance cost has been achieved in spite of the fact that wages have increased 38 per cent since 1919 and material prices have gone up slightly. It is interesting to note that the present high standard of maintenance is accomplished with fewer employees than were required ten years ago. From 1919 to 1921, inclusive, the average number of shop and carhouse employees was 943. The average for the next six years was 829, an average reduction of 12 per cent. The number of employees in these departments has been steadily reduced until in 1927 only 737 men were required. From incomplete figures available for 1928 still further substantial reductions are indicated.

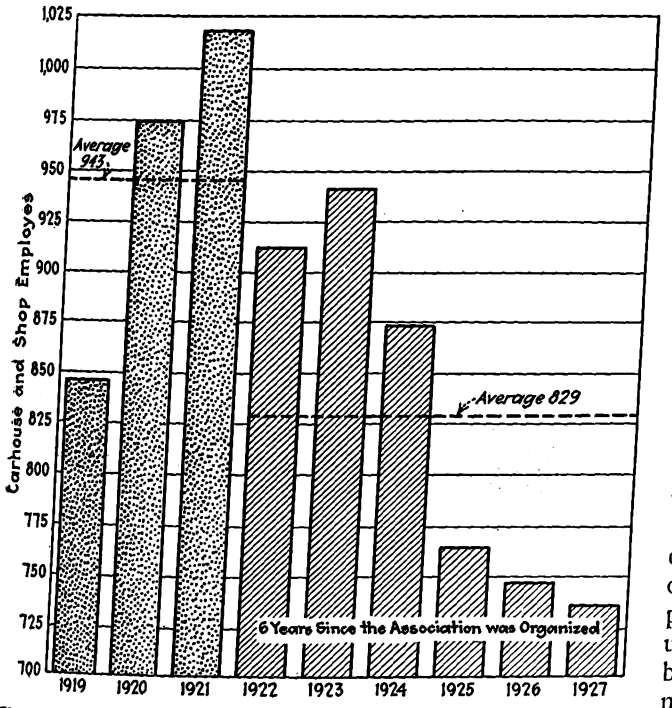

Fig. 4—Although wages for maintenance employees have increased approximately 38 per cent since 1919 on the four Southern properties included in this study, there has been a considerable reduction in the number of men on carhouse and shop work. Better organization, closer supervision and more thorough inspection have made possible this steady decrease in man power

Just what has happened on these properties to account for these very favorable mechanical department records? The writer firmly believes that the most influential factor is the free and frank interchange of operating data and maintenance experience and the discussion of common problems among the mechanical men comprising this group of properties. Their association is the vehicle through which they interchange their information and ideas. The publication of the cost data and the service records of equipment undoubtedly has stimulated the interest of every man in the mechanical departments. There has been created through this medium a desire on each property to improve past performance and to raise the standard of each company in the group.

Naturally, this spirit had to be fostered by those in charge of the work. Back of the performance on each of these properties lies a story of careful organization, painstaking study and critical analysis of methods, with unceasing effort to improve conditions. Inspection has been put on a very thorough and systematic basis which makes it possible to locate and remedy incipient defects before they become sufficiently serious to cause car failures. Overhauling of equipment is done periodically and most thoroughly. The intervals between overhauls are such that the cars may reasonably be expected to operate without serious trouble.

EDITOR'S NOTE—This study of the records of these four Southern properties will be followed in a later issue by a discussion of the methods through which maintenance costs and equipment failures were reduced.

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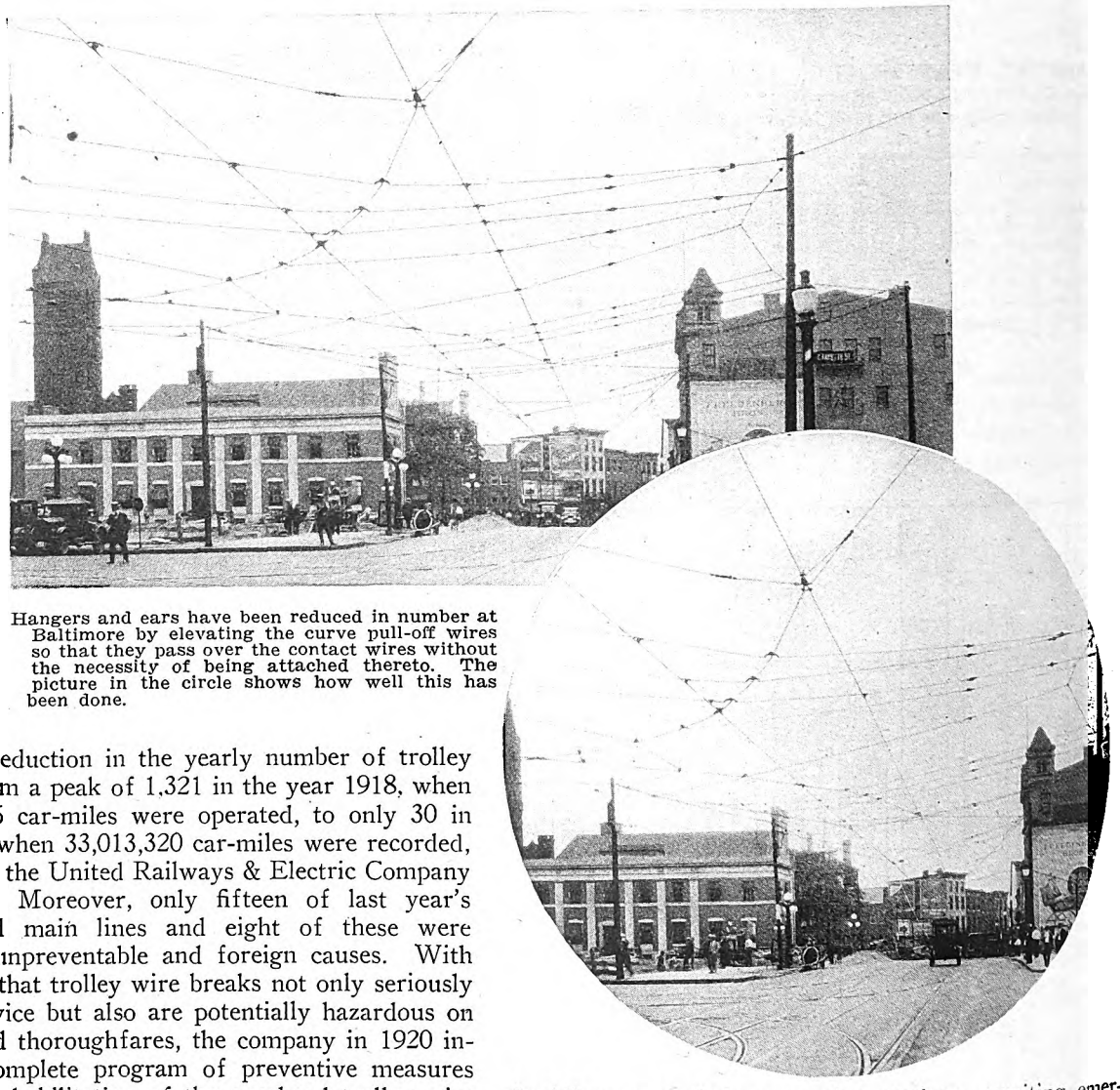
Trolley Wire Breaks PREVENTED by Alert Maintenance

By
W. T. TRAUTMAN
Superintendent of Emergency Division
United Railways & Electric Company
of Baltimore



Hangers and ears have been reduced in number at Baltimore by elevating the curve pull-off wires so that they pass over the contact wires without the necessity of being attached thereto. The picture in the circle shows how well this has been done.

STEADY reduction in the yearly number of trolley breaks from a peak of 1,321 in the year 1918, when 32,569,906 car-miles were operated, to only 30 in the year 1928, when 33,013,320 car-miles were recorded, is the record of the United Railways & Electric Company of Baltimore. Moreover, only fifteen of last year's breaks affected main lines and eight of these were chargeable to unpreventable and foreign causes. With the knowledge that trolley wire breaks not only seriously impair the service but also are potentially hazardous on heavily-traveled thoroughfares, the company in 1920 inaugurated a complete program of preventive measures including the rehabilitation of the overhead trolley wire system together with a plan for inspection and maintenance to insure the detection and elimination of incipient faults before failures developed. The success that has attended these efforts is attested by the physical results achieved as well as by the consequent decrease in maintenance costs to the extent of $30,000 annually.

Whereas under former practice all trouble crews were held in idleness at their respective stations, awaiting emergency calls, the plan now in effect employs the majority of these forces actively and usefully in inspection and maintenance work. The results thereby obtained reaffirm the truth of the old adage about "an ounce of prevention being worth a pound of cure." As now organized, the emergency division of the power department functions not only in all emergency cases of whatever nature, but it is also

During past decade the United Railways & Electric Company of Baltimore has effected a steady reduction from 1321 to 30 breaks per year. Annual maintenance costs have been cut by $30,000. Taut contact wire, slack spans, shorter ears and U-groove wheels have been instrumental in this improvement

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responsible for the general condition of the entire overhead trolley structure. Five crews comprise the day shift and four are used on the night shift, each crew consisting of a lineman, a helper and a chauffeur, together with a tower truck especially designed and equipped for the purpose. Line cars also are available at convenient locations and are used instead of the motor trucks when more suitable for work on suburban sections having open track construction.

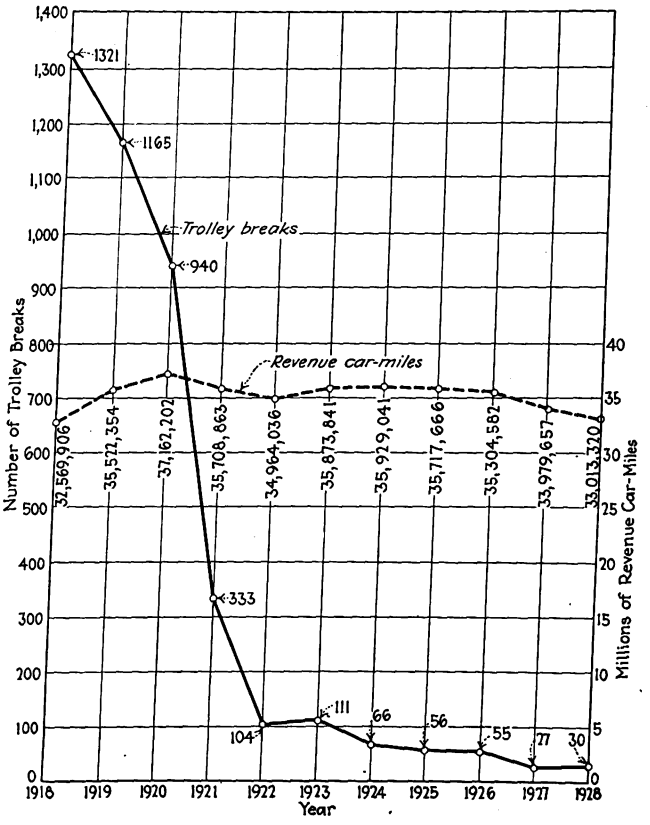
One crew is normally held at division headquarters at all times in readiness to respond to emergency calls such as fires, accidents, blockades, etc., and for the duration of the morning and afternoon peak hours all crews stand by at their respective stations so as to be immediately available if needed. During the remainder of the time, however, all except the single crew held for emergency service inspect and maintain the overhead structures. They keep in frequent communication with the emergency dispatcher so they can be readily located whenever required to augment the reserve crew. Each crew is assigned a certain portion of the system, approximately 60 miles of single track, and is held accountable for the upkeep and general condition of the overhead structures. In this way the entire system is covered thoroughly not less than once a month with the result that practically all defective conditions are discovered and remedied before they have a chance to develop into hazards or service detentions.

Alert and skilled inspection and maintenance have been largely responsible for the record of diminishing trolley breaks, but certain other important factors have also contributed in no small measure to the results that have been realized.

Of primary importance is the matter of trolley wire. Bronze wire of the highest grade obtainable is now purchased under rigid specifications, as compared with the former method of buying on price, and a company engineer inspects and tests the wire at the point of manufacture, all reels not meeting the specification requirements being rejected. The amount of wire required each year for section renewals is purchased in one lot on competitive bids, and is usually erected in the spring of the year when temperatures are mild and uniform. The wire is stretched taut when erected, a dynamometer being used to determine when the definite tension required with the prevailing ambient temperature conditions has been obtained, in accordance with the tension-temperature curves shown in an accompanying chart for Nos. 00 and 000 bronze wire having an ultimate tensile strength of approximately 65,000 lb. per square inch.

In order to mitigate as much as possible the injurious effects of suspension "hard spots," the supporting span wires are kept as slack as practical, consistent with the height of the poles and the standard clearance that has to be maintained above the rails. Wear is watched carefully, especially at vulnerable locations, and any wire reported by the crews as being worn beyond the allowable limit is personally inspected by the superintendent of the division before renewal is made.

One of the most pertinent factors related to any study of how to keep overhead trolley structures in condition is, obviously, the design of the trolley wheel collector. After all, it is the functioning of this device that is responsible for the ultimate destruction of the contact conductor and its accessories. Several years ago in Baltimore it was recognized that a trolley wheel having a wider and differently shaped groove than the one then in use would be considerably less injurious to the trolley wire and fixtures, especially by minimizing arcing and reducing excessive impact on the wire at the leaving ends of ears and other attachment fittings. Accordingly, the V-groove wheel then in use was superseded by a modified U-groove type of wheel with excellent results in reducing unnecessary wear of the wire and also in greatly prolonging the life of the supporting ears, as shown by the fact that the number of ears renewed each year has since decreased from approximately 48,000 in 1925 to about 12,000 at present. Worn-out, defective and improperly lubricated wheels, if permitted to remain



The number of trolley wire breaks has been greatly reduced while the number of car-miles operated has remained practically constant

in service for any length of time, are exceptionally severe on the overhead contact structures and may cause many dollars' worth of damage. Consequently, whenever an arcing or noisy wheel is noticed it is immediately reported to the proper carhouse for attention.

Still another factor which influences to an appreciable extent the work of maintaining the overhead structure efficiently and economically is the type and character of the trolley supporting ear used at suspension points. Extensive study has been given to this troublesome problem and various service tests are in progress to determine the device best suited generally for the purpose. One of the essential features, of course, is that the ears should have proper taper-ground ends to provide a smooth approach and runoff for the trolley wheels, and all ears now purchased for use on this property satisfy this requirement. As a result of using high-grade ears of an approved design and, as previously mentioned, slack span wires, taut trolley wire and U-groove trolley wheels, the well-known and highly destructive gouging or cupping form of wear on trolley wire encountered at the ends of ears has now been virtually eliminated.

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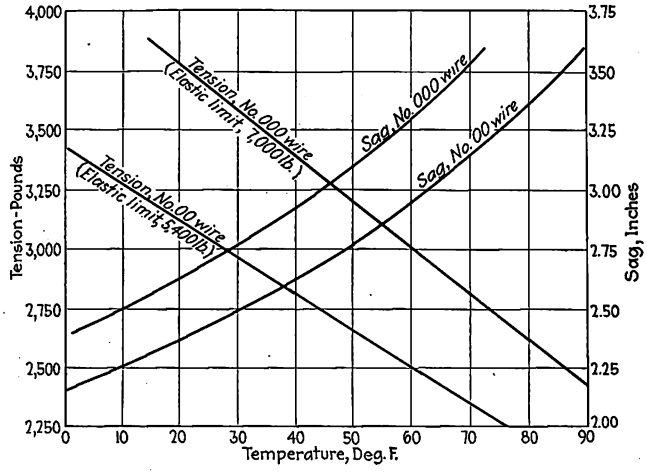
During the past several years, 9-in. ears have been used in the erection of new trolley wire, the original intention having been to replace these when worn out with ears of 12-in. length, should the wire show evidence of cupping, and later on with 15-in. ears if necessary to cover up and protect new depressions. So far, however, by reason of the almost complete disappearance of this form of wear, it has not been found necessary to resort to the longer ears, and the 9-in. ear is, consequently, now being used almost exclusively on the entire system.

At special work locations, where the most severe and troublesome conditions are encountered, wire life has been prolonged, the use of expensive fittings reduced, and better alignment is being maintained through the elimination of all fittings not actually required to support the trolley wires or hold them in place. Accompanying illustrations show how a number of hangers



Tension and sag of bronze trolley wire

Temperature range—0 to 90 deg. F., pole spacing—110 ft. Wind and sleet loads were neglected in calculating stress and sag. Modulus of elasticity = 18.14×10^6. Coefficient of linear expansion = 9.39×10^{-6}.

and ears have been removed advantageously from special work by elevating the curve pull-off wires to a point on the poles, so that they will pass over the straight line portions of the contact conductors without the necessity of being attached thereto in accordance with the customary practice.

Additional savings are also being realized as a result of protecting all splicing ears and the approaches to frogs with bronze trolley armor, which is ground to a taper finish on each end to provide a smooth approach and runoff for the trolley wheels. Trolley armor is appreciably cheaper than splicing ears and prolongs the life of the fittings indefinitely.

Further economies and fewer service interruptions have also resulted through reducing the number of accidental car pull-downs by equipping all frogs and small-degree crossings with pans specially designed to prevent trolley harps from becoming caught in the crotches of these fixtures in cases of dewirements.

Although the number of trolley breaks due to causes within the direct control of the company decreased rapidly under the co-ordinated program of inspection and maintenance, it was noted several years ago that a comparatively large number of breaks continued to occur as a result of burn-downs by cranes, steam shovels and similar equipment operated by other utilities and contractors. The problem of reducing the number of burn-downs chargeable to these foreign causes was approached by addressing letters to all the contractors in the city operating such equipment, outlining the hazards and inconvenience incident to a broken trolley wire and requesting their co-operation in preventing such occurrences by notifying the trouble dispatcher of the intention to move the equipment so that a trouble crew might be sent without charge as a convoy to assist in moving the apparatus across the company's tracks. The response to this request has been almost unanimous, and burn-downs due to contractors' equipment are now very infrequent.

As a direct result of these various measures and methods the company has succeeded, in a comparatively short time, in establishing a record in the reduction of trolley breaks and service detentions far beyond original expectations; and, as a byproduct, has been further rewarded with a material reduction in maintenance expense. The success of the undertaking, however, must be credited in great measure to the untiring efforts and initiative of the men of the emergency division, who have shown an eagerness and persistency that could scarcely have resulted otherwise.

Auxiliary Rain Troughs for Bus Engines

AS A double precaution against motor failure during severe rain storms from the leakage of water through the engine hoods onto the ignition wiring, the International Bus Company, subsidiary of the International Railway, Buffalo, N. Y., and the Philadelphia Rapid Transit bus organization, has equipped its whole fleet—90 buses in Buffalo, 610 in Philadelphia—with an auxiliary rain trough of its own design.

The rain trough is made of ordinary light-weight sheet metal, so shaped as to fit snugly over the radiator tie rod and slope sufficiently toward the rear to lead all water away from the ignition circuits

The rain trough is located directly beneath the center hinge of the engine hood and rests on the radiator tie-rod. Constructed of sheet metal, it is so designed as to drain the water to the rear of the engine and away from all electrical circuits. Simple as this addition to the bus engine seems, it has served to eliminate all complaints arising from the short-circuiting of the ignition system of the bus engine during bad storms.

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Night shovel gang at work on Euclid Avenue track reconstruction job

Careful Organization Essential for Rapid Track Reconstruction

By
HOWARD H. GEORGE
Superintendent of Way
Cleveland Railway

Greatest possible speed is desirable from standpoint of public relations. To accomplish this the working force must be thoroughly trained in their jobs, and every detail planned in advance. Recent track renewal in Cleveland furnishes an example of how this was done successfully

GENERALLY speaking, speed is desirable in any construction operation, and within certain limits results in the greatest economy. Speed in construction, however, involves two important factors: i.e., proper equipment and proper organization. The maintenance of a street railway naturally involves a certain amount of work during the entire year, but, unfortunately, it is impossible to spread the work uniformly over the entire period, particularly in our Northern climate. The organization must be skeletonized during the winter months, but at the same time lend itself readily to rapid expansion when the construction season opens. This makes the problem of organization a difficult one, especially when it is necessary that the piece of work be done speedily.

It is a generally recognized principle in all large construction work that the best equipment available is none too good for the job. This applies particularly to the work of constructing tracks. Contractors and engineers are constantly seeking for improved and more efficient machinery, but the fact must not be lost to sight that the equipment may be 100 per cent satisfactory and at the same time the entire operation fall flat because the organization of the personnel was inadequate. The two factors go hand in hand and cannot be considered alone.

No construction job of any size should be undertaken without a reasonable construction schedule being planned in advance. This constitutes a bogey and gives every part of the organization concerned something at which to aim, and a mark to beat if possible. It is equally important that every subdivision of an organization be thoroughly familiar with the part it is to play on every job. This means definite instruction in advance. The smooth working of such an organization is materially

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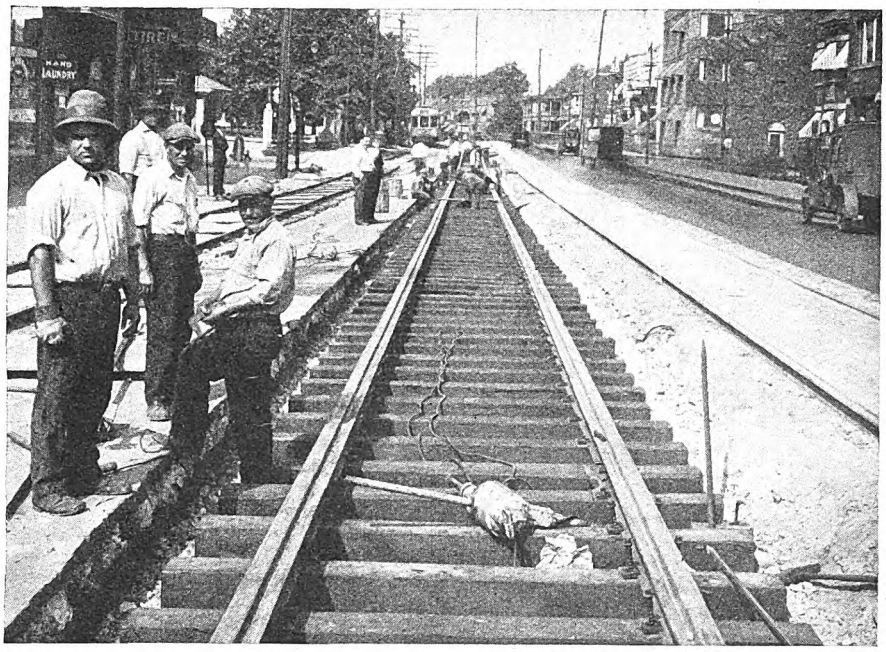


New track ready for surfacing gang

assisted by regular conferences between the department head and the various responsible sub-department heads.

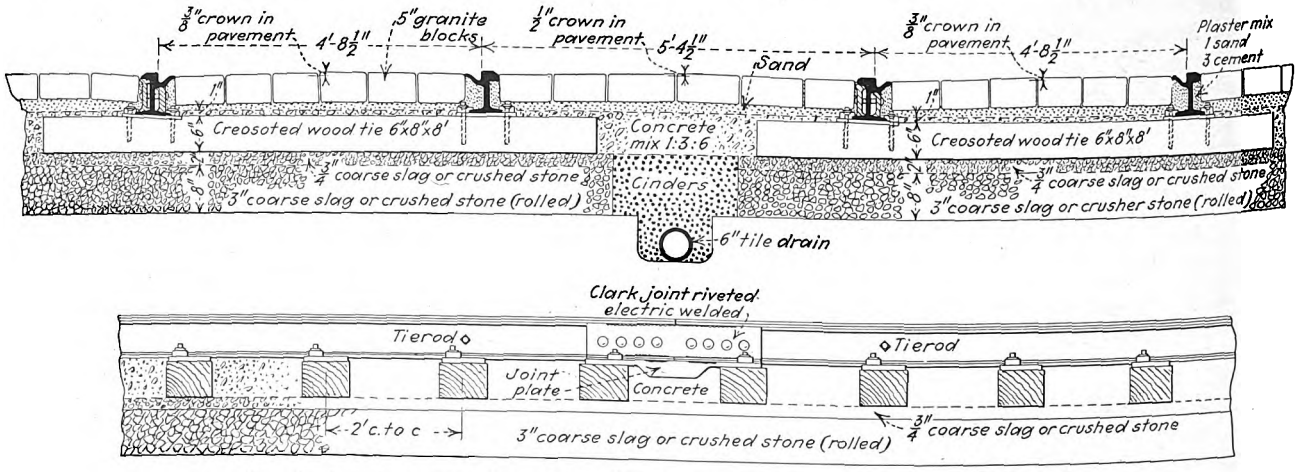
It is frequently the case that as long as an organization is called on to perform only the ordinary routine work everything goes quite smoothly, but that it fails to stand up under the strain of emergency demands. This should not be true, and in order to be prepared for the unusual demands a construction organization should be so planned as to be readily susceptible to expansion. In addition, a certain amount of extra equipment should be kept in reserve or else a definite source of supply should be assured from outside. This means that every man in the organization who acts in a supervisory or executive capacity must have at least one man whom he has trained for the job higher up, so that, when the time for expansion comes, there are already in the organization men ready to take on the work of running the necessary additional construction crews and other incidental work.

There seems to be, in many cases, a disinclination among heads of departments to train assistants to handle every phase of their jobs, or to delegate any authority to them or divide responsibility with them. This may, in some cases, be because the individual concerned has under him subordinates who are not fully qualified to take over his work but where, for reasons beyond his control, he is obliged to retain the services of such individuals. Generally, however, where a department head insists upon shouldering the entire responsibility himself, it is due to an exaggerated sense of egotism and not to any inability on the part of his subordinates to measure up to any responsibility which may be put up to him. As a matter of fact, the successful direction of any departmental organization or business enterprise depends largely upon the ability of the head to devote all of his time and attention to studying the functioning of his organization in perspective, in comparing the work it is doing with that which is being done by others, and in working out plans for simplifying and improving his own practices.

Because the organization of the Cleveland Railway Company's way department was prepared for emergencies, it was possible to meet the unusual demand imposed upon it in the reconstruction during the past year of the double track on Euclid Avenue from East 55th Street to East 105th Street, necessitating the reconstruction of 3.41 miles of single track. The street is one of the main east and west thoroughfares of Cleveland. In addition, it is one of the principal business streets, being devoted for a considerable part to the automobile sales houses. As it had been necessary to tear it up and interfere with business and traffic for extensive trackwork less than four years before, it was the decision of the management that the work should be expedited in every way possible and that the total time for the completion of the necessary replacement should be reduced to the absolute minimum.

The general design selected for the new track in Euclid Avenue is shown in the accompanying cross-section. Although T-rail was used on this job, the cross-section was subsequently modified for other jobs using the A.E.R.E.A. standard grooved-girder rail and screw spikes and clips. The old steel ties and concrete base were completely removed and a creosoted wood-tie construction laid on crushed slag ballast was substituted.

The work was started on May 11 and, with the excep-



Standard track section with 102-lb. girder rail. Tee rail was used on Euclid Avenue

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tion of a short stretch at East 79th Street which was left pending a decision by the city relative to street widening details at this point, it was practically completed by the middle of July. The exception noted could easily have been completed by the same date had there been no question at issue regarding the track location at the time the adjoining track was under reconstruction.

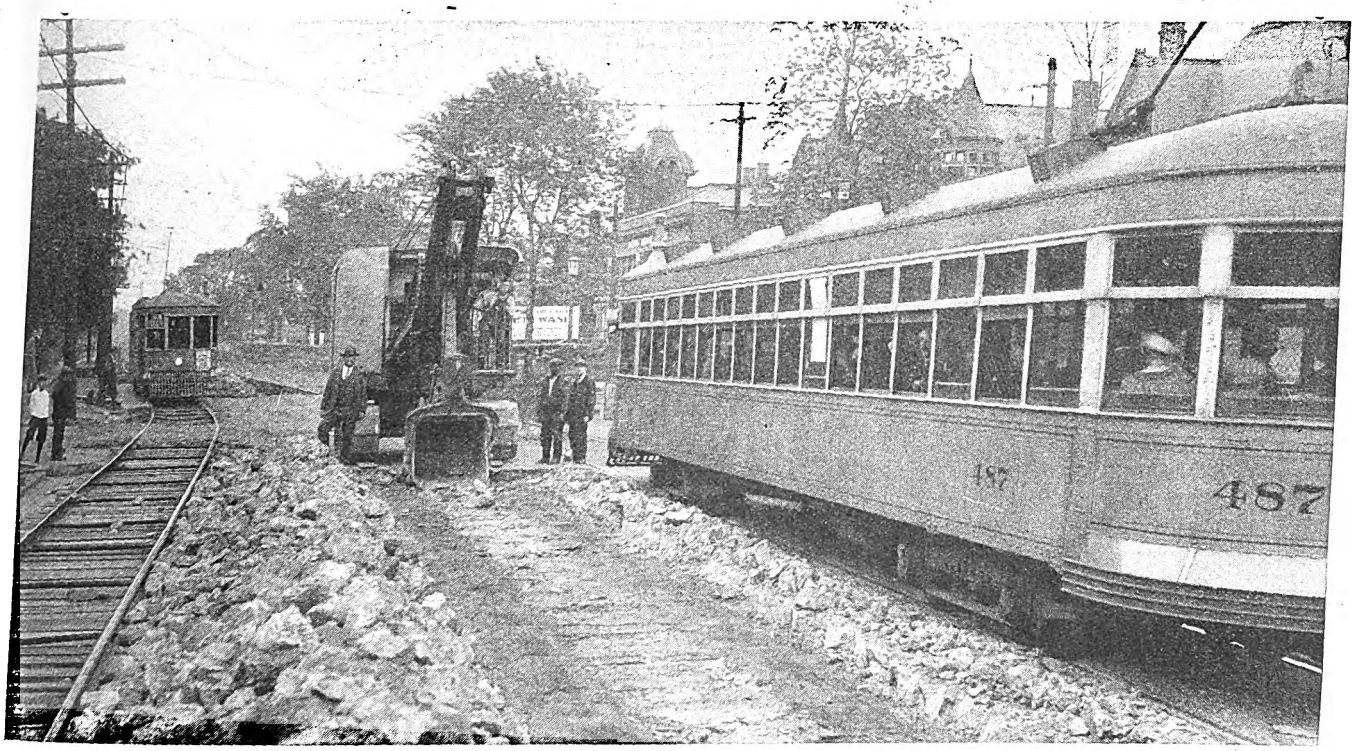
In order to make this speed possible, the work was carried on practically without interruption day and night. The first operation was the placing of the temporary track and crossovers which were used during the day for regular car operation in connection with the track not under reconstruction. During the night the second main track was turned over for work trains, and passenger car operation made a two-way affair over the temporary side track by means of block signals. This temporary side track is permanently assembled in sections brought to the job on flat cars and laid on boards set closely together on top of the street pavement as near to the curb as practical, the track being shimmed to a sufficiently accurate grade to permit safe operation. Runoffs were set at various points on this track to take care of expansion and contraction. About 7,500 ft. of temporary track was necessary, this being shifted from section to section as required. The actual work of bringing this material to the job and shifting from one section to the other and as much of the connection work as possible was done at night, the day crew completing it the next morning.

During construction, temporary crossings were provided over the side track and open trench, old ties, broken concrete, and slag screenings being used for this purpose. Loading platforms of fine slag screenings were provided at all car stops for the benefit of passengers boarding cars on the temporary track, or alighting therefrom.

As soon as operation had been diverted to the temporary track, the old Amiesite pavement surface was removed, air compressors and air-operated cutting tools being used. It was then shoveled by hand to one side and later thrown back in the trench to be loaded by the power shovels along with the rest of the excavated material.

The next operation was the breaking up of the concrete. Two Clark concrete breakers were used for this purpose, one breaking up the top layer of concrete forming the pavement base. A gang of laborers shoveled this out of the trench and the second breaker then passed over the track and broke the foundation concrete.

The rail was then burned at the joints with acetylene torches. The nuts holding the rail to the ties were also burned and knocked off by a track gang, which also overturned the loosened rail. At night, the derrick picked up the old rail and loaded it on flat cars for removal to the material yard.



Tearing up old track without interference to car service which continued uninterrupted in both directions

Shovels started working at 8:30 p.m., which was the earliest the second main track could be released. Work stopped at 4:45 a.m., so as to permit resumption of double-track operation. The only exception to this was in the case of the westbound track between East 77th Street and East 79th Street, where work of the shovels did not start until midnight and stopped at 4:45 a.m.

Most of the new track material was handled at night in order to reduce to a minimum the delays to operation of passenger cars through the day. The coarse slag for ballast was dumped directly into the track trench, the fine slag being deposited in the space between the trench and the temporary side track. Concrete aggregate was landed in the same way as the fine slag. Ties were unloaded and placed in the trench at night as far as the foundation had been rolled. Otherwise, they were piled along the sidewalk at convenient locations to be placed in the trench by the day crew. All rail was unloaded by derrick at night and laid on the ties in the track trench as far as the ties could be placed, the balance of the rail being distributed on the street pavement just outside the trench.

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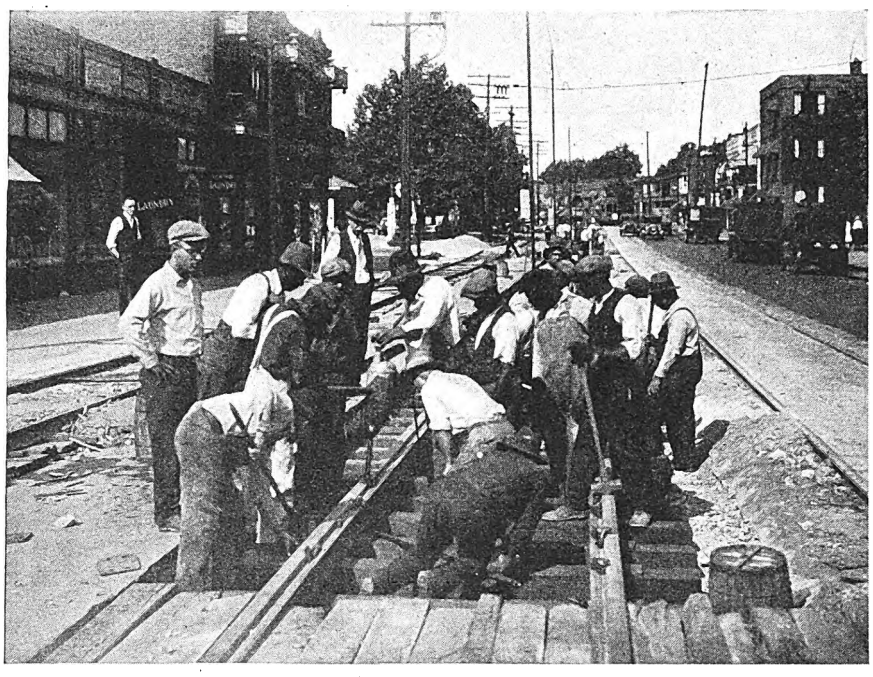

One track was completed and placed in operation, before work was begun on the other track

The foundation consists of 8 in. of coarse slag, thoroughly rolled with a 10-ton tandem type roller, this base being covered with fine slag which was washed down and rolled into the coarse slag base. On this base the track was then laid and spiked to the ties. Fine slag for tamping was thrown in the trench, 2 in. being allowed for tamping under the ties on the rolled base. The tamping was in this instance mostly done with electric tie-tamping machines. As soon as the track had been tamped to surface and lined, all surplus tamping material was removed from between the ties.

Riveting and welding crews then completed the assembly of the rail joints, followed immediately by the concreting machine. Care was taken in the joint assembly to obtain as complete a closure between rail ends as possible. The rail and splice-bar drillings were arranged so as to provide $\frac{1}{16}$-in. draw at the two center holes, a drift pin being used to pull the rail ends tightly together. Heat-treated rivets were used to secure the plates, and the seams then welded. A baseplate was used under each joint, the rail base being welded to this plate.

Concreting Was Done Carefully and Lumnite Cement Used as Needed

In concreting the track, care was taken to see that the concrete was of uniform quality and that it was carefully tamped around the ends of the ties and under the rail base between ties and under the joint baseplates. As soon as the concrete had set, the fine slag screenings were distributed over the concrete for a paving cushion. The paving-gang laborers arrived on the job at 3 a.m. to unload the granite paving block and fine slag cushion. The pavers started at 7 a.m., the entire space between rails, including the devilstrip, being paved with new granite block. The space outside the outer rails was paved with asphalt for an average width of 2.3 ft., this work being done by the Cleveland Trinidad Paving Company under contract. The grouting of the pavement consisted of two parts sand and one part Portland cement. Paving pitch was used at street intersections which had to be turned over to traffic at once. In certain short stretches where it was desired to turn traffic over the tracks in a much shorter time than would otherwise have been practical, Lumnite cement was used for the grout. After the pavers had completed their work, the track grinders went over every rail joint to remove any imperfections in the rail surface.

Clean-up Work at Night

Most of the work of cleaning up was done at night. During the day labor gangs would collect the débris in piles and it would then be loaded on the work trains by the night gangs.

During the period covered by this job it rained on sixteen days and 24 nights. It was necessary partly to suspend operations for this reason on fourteen different days. This fact makes the time record that much more interesting.

The following figures indicate the amount of work involved in this job.

Dirt and concrete excavation	10,434 cu.yd.
Slag used for track base	13,392,000 lb.
Fine slag used for tamping	1,730,000 lb.
Fine slag for paving cushion	3,420,000 lb.
Granite paving block	411,829 block
Sand for grouting pavement	358,000 lb.
Cement for concrete base and grouting	18,783 sacks
Gravel for concrete	5,190 tons
Oak ties	8,702
102-lb. rail	34,397 lin.ft.
Splice bars	583 pair
Joint baseplates	553
Standard tie plates	16,308
Track spikes	111 kegs
Rivets for joints	4,400

The job required a total of 102,030 man-hours and 8,116 equipment-hours for its completion. The various day and night gangs were organized as follows:

Average day track gang—for 56 days	
1	Foreman
5	Sub-foremen
77	Laborers
7	Watchmen
7	Temporary track maint'nce men
2	Temporary crossing men
1	Water boy
100	Total

Average night track gang—for 54 nights	
1	Foreman
3	Sub-foremen
50	Laborers
2	Watchmen
7	Temporary track maint'nce men.
63	Total

Average day paving gang—for 31 days	
2	Foremen
22	Pavers
25	Laborers
1	Watchman
2	Truck drivers
52	Total

The equipment used in the operation was as follows:

2	Portable burners
4	Schramm air compressors
1	Ingersoll-Rand air compressor
2	Clark concrete breakers
2	Electric shovels
1	Gasoline shovel
2	Steam rollers
1	Gasoline roller
1	Concrete mixer and conveyor
1	Riveter
3	Welding machines
2	Grinding machines
11	Work trains
3	Derrick cars
40	Work cars

This equipment was operated for the following periods:

	Days	Nights
Portable burners	32	8
Air compressors	38	23
Clark concrete breakers	32	8
*Electric shovels	..	38
*Gas shovel (started May 26)	..	23
Steam rollers	16	..
Gasoline roller (started June 2)	28	2
Concrete mixer and conveyor	33	3
†Riveter	23	1
‡Welding machines	25	1
Grinders	13	..

* Shovels required three men each.
† Riveted 550 joints.
‡ Welded 553 joints.

The cost of the material entering into the work was approximately $150,000 and that of the labor approximately $85,000, a total of approximately $235,000, or about $13 per lineal foot, this including every item of expense in connection with the operation.

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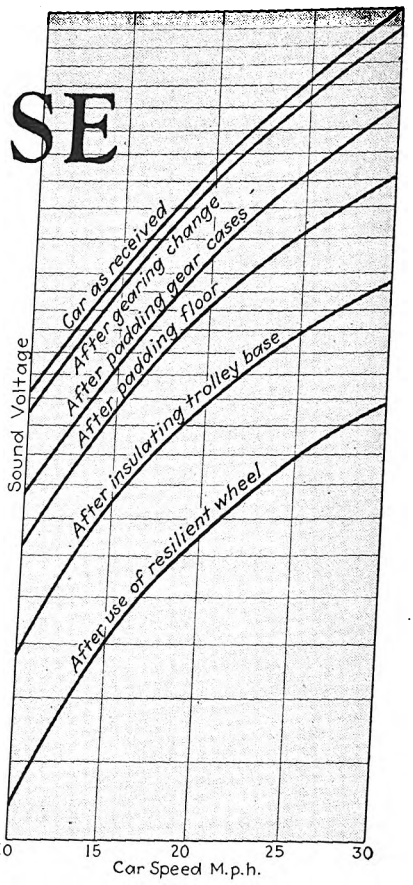
REDUCING NOISE of Car Operation

By

H. S. WILLIAMS
Assistant Superintendent of Equipment
Department of Street Railways
Detroit, Mich.

A noisy car has actually been made quiet. Tests show efficiency of various schemes for wheel silencing and results from consistent use of high standards of maintenance. Wheel noise can be reduced considerably by use of grooves filled with lead



Results in eliminating noise plotted to logarithmic scale

TO DETERMINE the efficiency of various methods of wheel silencing numerous tests have been made with the noise-measuring apparatus of the committee on noise reduction of the American Electric Railway Engineering Association. The set-up for the wheel test is shown in an accompanying sketch (Fig. 1). The essential feature of this test consists of striking a uniform blow on the tread of the wheel while it is mounted in the customary manner upon its axle. The wheel under test is blocked up to free it from contact with the rail.

Tests were made of four different wheel conditions as follows: (1) Conventional forged steel wheel without any quieting device, (2) same wheel with four 3-in. wooden blocks bolted to the web near the rim, (3) same wheel with lead ring insert as shown in accompanying sketch (Fig. 2), and (4) resilient wheel as shown in another sketch (Fig. 3).

A sufficient number of tests were made in each case to obtain reliable results. Four typical curves made by the noise evaluating apparatus are reproduced in Fig. 4. From this the silencing value of the various schemes is readily apparent, their ratio being: (1) Conventional forged steel wheel, sound value, 100 per cent; (2) conventional wheel with wood blocks added, 85.9 per cent; (3) conventional wheel with lead insert, 49.7 per cent, and (4) resilient wheel, 16.4 per cent.

Since these tests were made another scheme has been proposed for accomplishing the same purpose. It consists of the use of a ring of iron welded in four spots to the under side of the wheel tread. This plan has been used successfully on gears. Tests are under way to fix a definite value to this scheme. It is believed that its effectiveness will equal that of the lead ring and will have the added advantage of more economical installation.

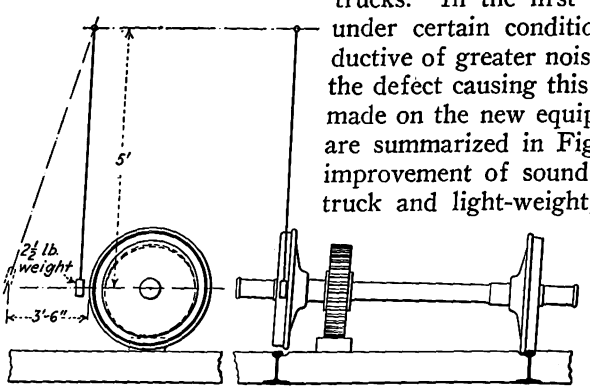


Fig. 1—Set-up for testing various sound muffling methods for car wheels

It must be remembered that the above tests refer to the damping of the ringing or high pitch sounds emanating from the wheels themselves. It must not be inferred that the total noise of the car can be reduced in the proportion shown, but only the sound from the wheels themselves. In other words, all of the car wheels may be arranged with the lead ring and yet it may be difficult to determine by ear that any improvement had been made because the noise due to this particular source is so small a part of the whole that the difference cannot be recognized without instruments.

Tests have been made also on the new worm-drive trucks. In the first of these tests it was shown that under certain conditions the new equipment was productive of greater noise than the standard apparatus, but the defect causing this has now been corrected and tests made on the new equipment. The results of these tests are summarized in Fig. 5, which shows a very definite improvement of sound with the use of the worm-drive truck and light-weight, high-speed motors. With this truck, gear noise is nearly zero and the balance of the improvement is largely due to decreased weight and closer fitting parts.

The question has been raised as to the effect of composition flooring as compared with ordinary wood flooring on noise

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within the car. To secure information on this point tests were made on a car with wood floor as shown in Fig. 6. After this test was made the car floor was changed to composition floor as shown in Fig. 7, and this

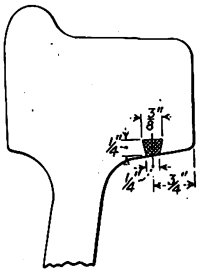

Fig. 2 — Wheel silencing by use of lead ring method

test was repeated under the same conditions. The result of the several tests is shown in the graph which is reproduced as Fig. 8, which shows that the composition flooring has a slightly beneficial effect upon noise within the car.

There is need for greater accuracy in the manufacture of gears and pinions in the interest of noise reduction. Changes in construction of gearing, such as muffling, to produce quiet operation are entirely nullified if accuracy is lacking. Gear defects consist chiefly of warpage and eccentricity due to heat-treatment.

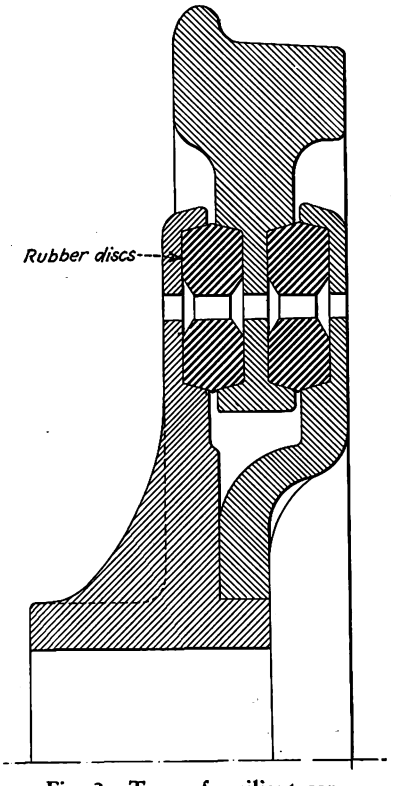

Fig. 3—Type of resilient car wheel on which tests were made

In checking over gear discard gages approved by the association in 1926 it appears that too great wear is allowed by the use of these gages. A layout to enlarged scale made of a section of a four-pitch gear and pinion

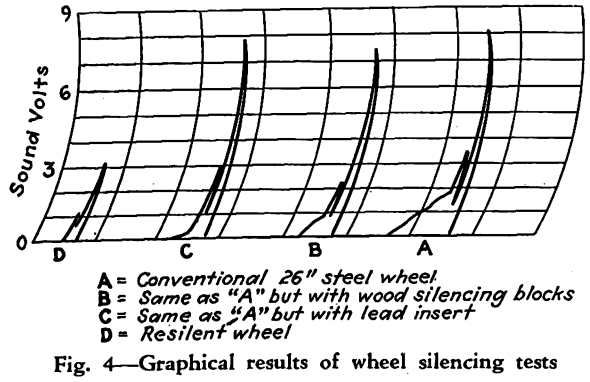

Fig. 4—Graphical results of wheel silencing tests

is presented herewith as Fig. 9. This shows new teeth and the same teeth when worn to the limit allowable by the discard gage. The amount of back lash under this condition is $\frac{1}{4}$ in., which is too great. Moreover, by the use of the present recommended design for gear discard gage, gearing which just fails of condemnation by the gage would be kept in service for a considerable period, with the result that by the time the motor is again taken down the wear of the teeth will be much greater than allowable. Noise values mount rapidly when the gear centers are spread. With a spread of gear centers amounting to $\frac{5}{32}$ in., the noise value more than doubles. A spread of this amount means a back lash of approximately $\frac{5}{64}$ in., or about one-fourth of the amount allowable by the discard gage. In view of this, it appears that the gear defect gage should be altered and limits of warpage and eccentricity established to cover the inspection of new gears.

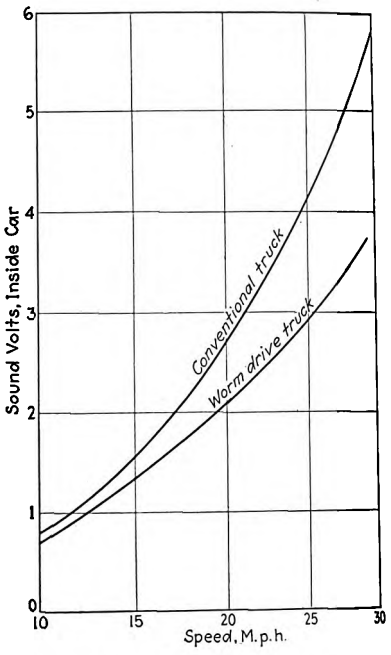

Fig. 5—Comparison of noise of standard and worm-drive trucks

Gear noise is caused by vibration in the material of the gear. The reasons for this may be summarized as follows:

1. Unequal loading of individual teeth, i.e., the load is borne by more teeth at one period than at another, and the increased compressive strains produce vibration.
2. Actual concussion caused by one tooth disengaging before another takes up the load. This allows the following tooth to strike a hammer-like blow with resultant noise and is apt to

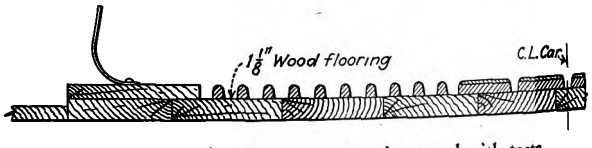

Fig. 6—Wooden floor construction used with tests

occur with gearing of low pitch or with spread gear centers. It may also occur during idling.
3. Inaccurate cutting or distortion due to heat treatment may cause the load to be borne by one tooth at a time whereas two or more should always be in engagement
4. Faulty alignment, causing the load to be carried on part of the tooth instead of being distributed over the whole width of the tooth.
5. Bottoming or actual interference of gear teeth.
6. Damaged gearing.

As a further step toward the manufacture of quieter spur gearing, it is suggested that attention be given to the use of gears of greater diametral pitch and consequently smaller teeth.

Tests were made on two stretches of track of differing construction but with identical car operation. One type of track was built with steel ties and compressed concrete, as shown in Fig. 10, while the other had granite nose block and compressed concrete pavement with rails

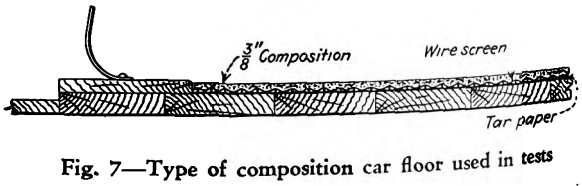

Fig. 7—Type of composition car floor used in tests

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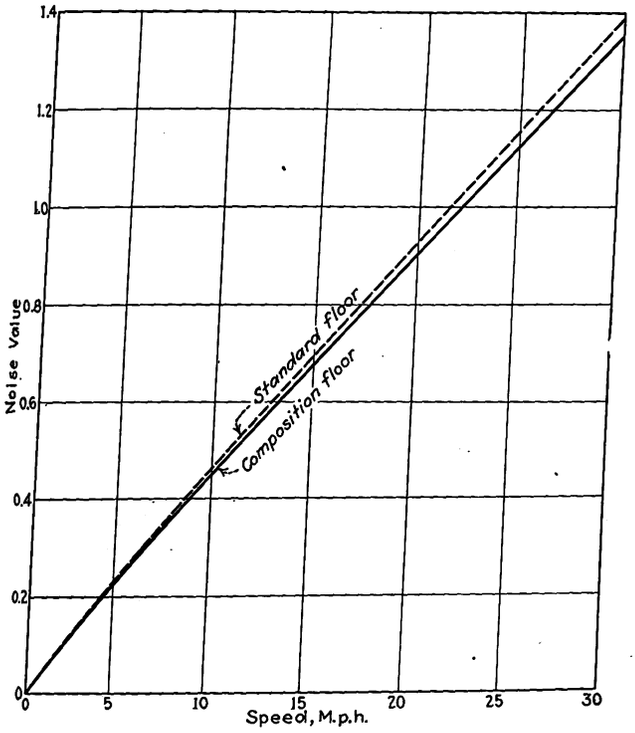

Fig. 8—Comparison of noise with wood and composition floor cars

on wooden ties, as shown in Fig. 11. The sound was measured inside and outside the car, and typical curves showing the results are given in Figs. 12 and 13. These tests indicate that the wooden tie construction is materially quieter than the monolithic concrete type. It is hoped that additional tests on track noise can be made during the coming year, as it is felt that this is important and has been inadequately studied.

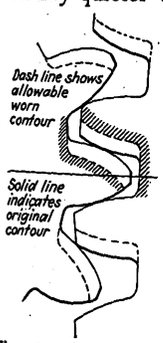

Fig. 9—Gear and pinion, showing original outline and worn condition allowable with present standard gear discard gage

Much has been done through tests to show what can be accomplished in the way of making present car equipment quiet. A modern type car seating 52 passengers and equipped with four 35-hp. motors was selected, it being at the time a noisy car. Progressive changes were made in the car to make it quiet, and by measurements taken the noise value of each step was determined.

Tests were first made with the car as found, to measure the amount of noise which it was creating. It was apparent to the ear that the gearing was very noisy so the car had its gears and pinions changed and the test repeated. In changing the gearing no special gears were used, merely new stock gearing

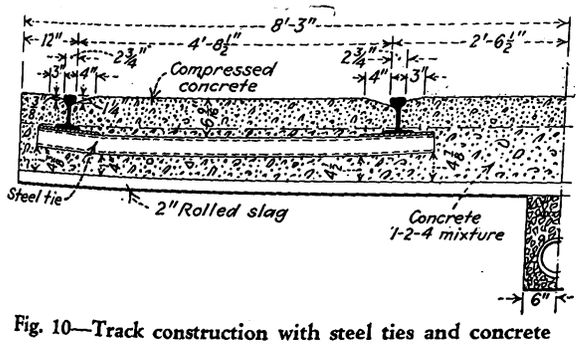

Fig. 10—Track construction with steel ties and concrete

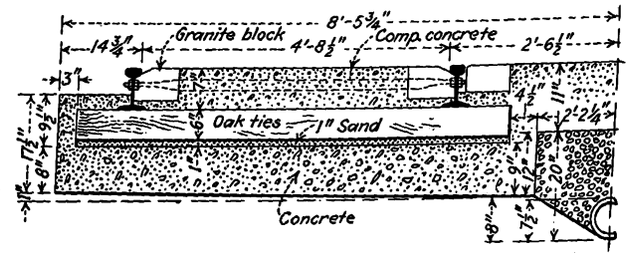

Fig. 11—Granite nose block and compressed concrete pavement with rails on wooden ties

without special selection. This change showed much improvement.

Following this test the gear cases were covered all over with ¾-in. felt and a third set of tests made. This was found to have resulted in still further reducing the noise. Next, the underside of the car floor was covered with ¾-in. soft felt and tests under this condition again showed material betterment.

The next step was to equip the trolley base with a resilient mounting. Rubber was used for this purpose,

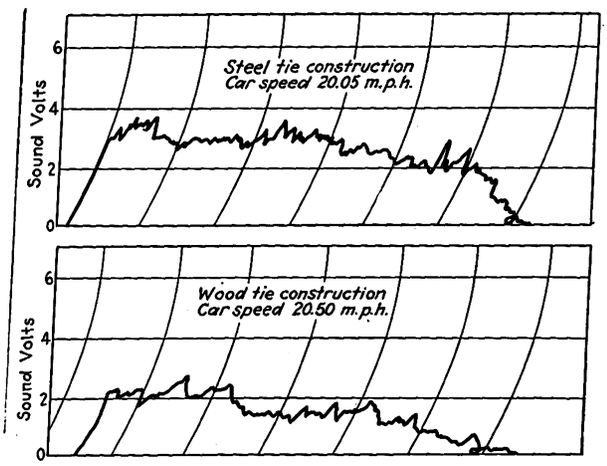

Fig. 12—Comparison of noise measured inside car while operating over track with wood and steel ties.

the type of support being identical with that used by the noise reduction committee in its air compressor tests of 1927. The entire weight of the base was carried on four rubber supports, one of which is shown in detail in Fig. 14. This mounting effectively absorbs the trolley vibration.

The final experiment included changing the car wheels

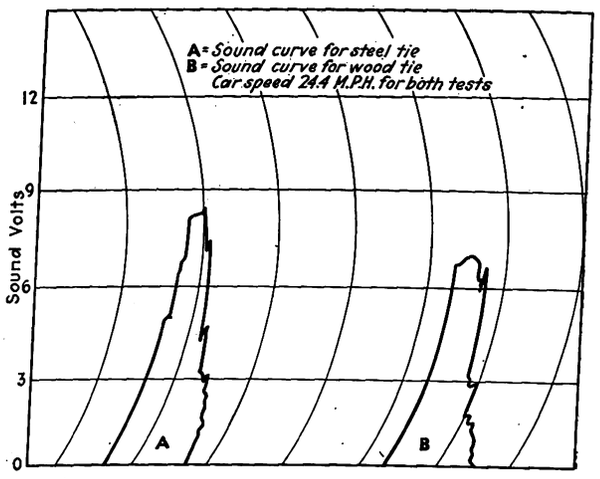

Fig. 13—Comparison of noise measured at the curb line while car was operating over track with steel and wood ties

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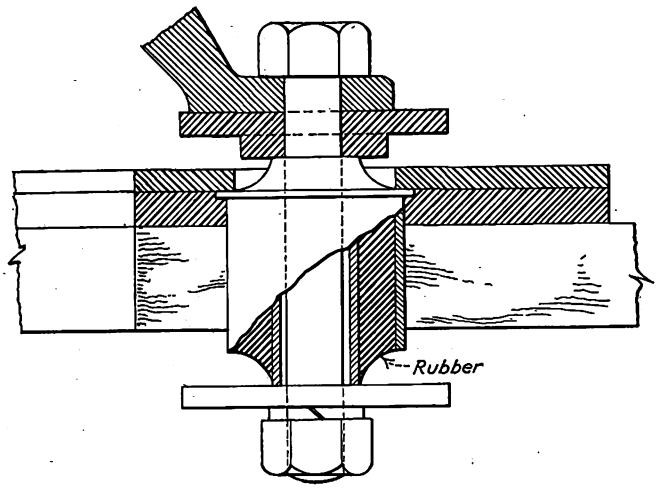


Fig. 14—Method of mounting trolley base to eliminate noise

and equipping with resilient wheels as shown in Fig. 3. One pair of these wheels uses heat-treated aluminum for the central section. Moreover, the construction of this wheel permits not only vertical motion but radial motion as well. Consequently, in starting the sudden jar on the gear is cushioned. In addition, this type of wheel improves the riding qualities of the car very materially.

Results of these progressive tests are shown in Fig. 15, from which it will be seen at a glance that each step has been productive of definite results. It must be remembered that these curves represent definite scientific measurements made with all possible care and the personal element is eliminated. Sound vibration amplitude measurements are made with a recording meter while speed measurements are taken from an indicating tachometer. The same car was used throughout the tests and they were made over the same track with as nearly identical weather conditions as possible.

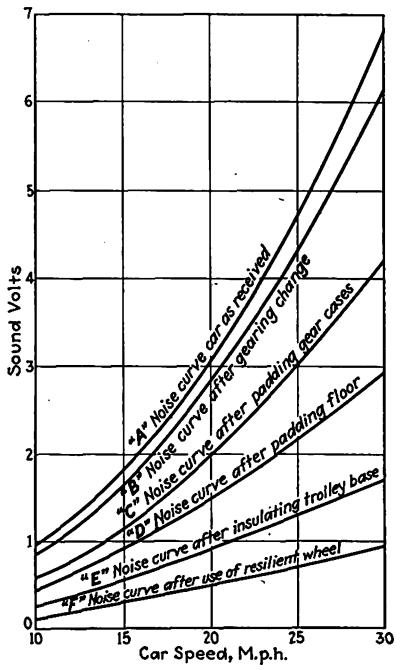


Fig. 15—Progressive results obtained in eliminating noise

In Fig. 15 the results are plotted exactly as taken from the instruments. However, we are chiefly concerned with the effect of this sound upon the ear. The ear does not interpret sound in a direct ratio to the amplitude of the wave which produces it. The ear is affected in a nearly logarithmic ratio. So, in order to get a correct picture of the situation it is necessary to change Fig. 15 to a logarithmic scale, which has been done in the chart appearing at the beginning of this article, which shows the true view of the situation.

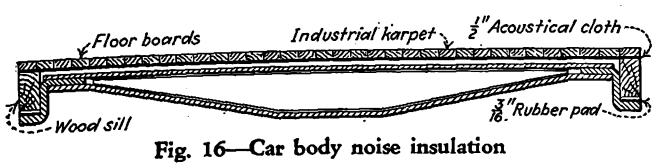


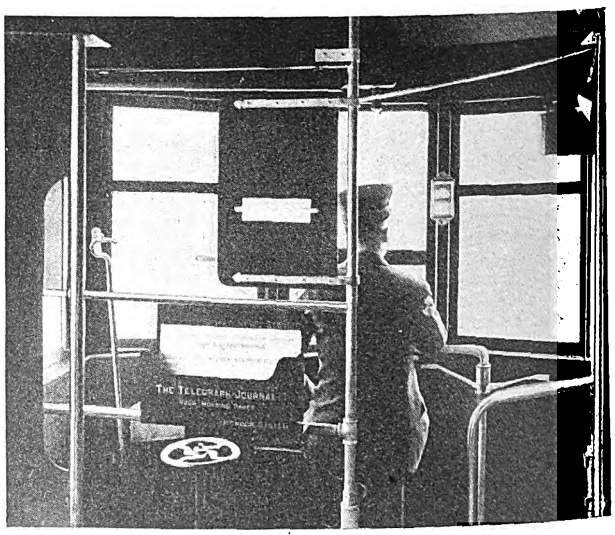
Fig. 16—Car body noise insulation

As a result of this investigation, it has been demonstrated that with moderate expense the noise inside the car—that is, the noise which is heard by the passenger—can be reduced by 31 per cent. This refers to the progressive changes mentioned up to the last step, which is the use of the resilient wheel. The last step is a much more expensive item, but with it included the total noise within the car can be reduced 47 per cent. The noise as measured at the curb is reduced 18 per cent by the whole procedure mentioned in this article.

As so much effort is being expended upon noise reduction, special attention is called to one of the basic principles involved in making sound insulation of maximum effect. This principle is to treat sound insulation exactly as if it were electrical insulation. Resilient padding is effective to damp the noise, but so long as there is metal contact between the parts a large amount of vibration will be transmitted. For example, with the resilient wheel the rim is entirely carried on rubber and no rigid metallic contact of any kind is permitted between the rim and the hub. If the bolts which assemble the parts of the wheel permitted metallic contact between the parts the effectiveness of the wheel would be reduced. The same is true of the trolley base mounting.

Newspapers Sold on Cars

MORNING newspapers are now sold on the cars of the New Brunswick Power Company, which operates the street railway in St. John, N. B. Every car on the system has been equipped with a box of the type shown in the illustration, which has a rack for holding the papers and a cash box which forms a receptacle for



the coins. Payment is made on the honor system. Results of this service have been very gratifying, both to the publishing company and to the railway. It has been of value to those who do not have delivery of papers at their homes. There has been no conflict with the local distributors or the newsboys, and it is stated that sales from these sources have not fallen off. Many remarks of commendation have been received from passengers. The honor system is respected and the loss from theft of papers is quite small.

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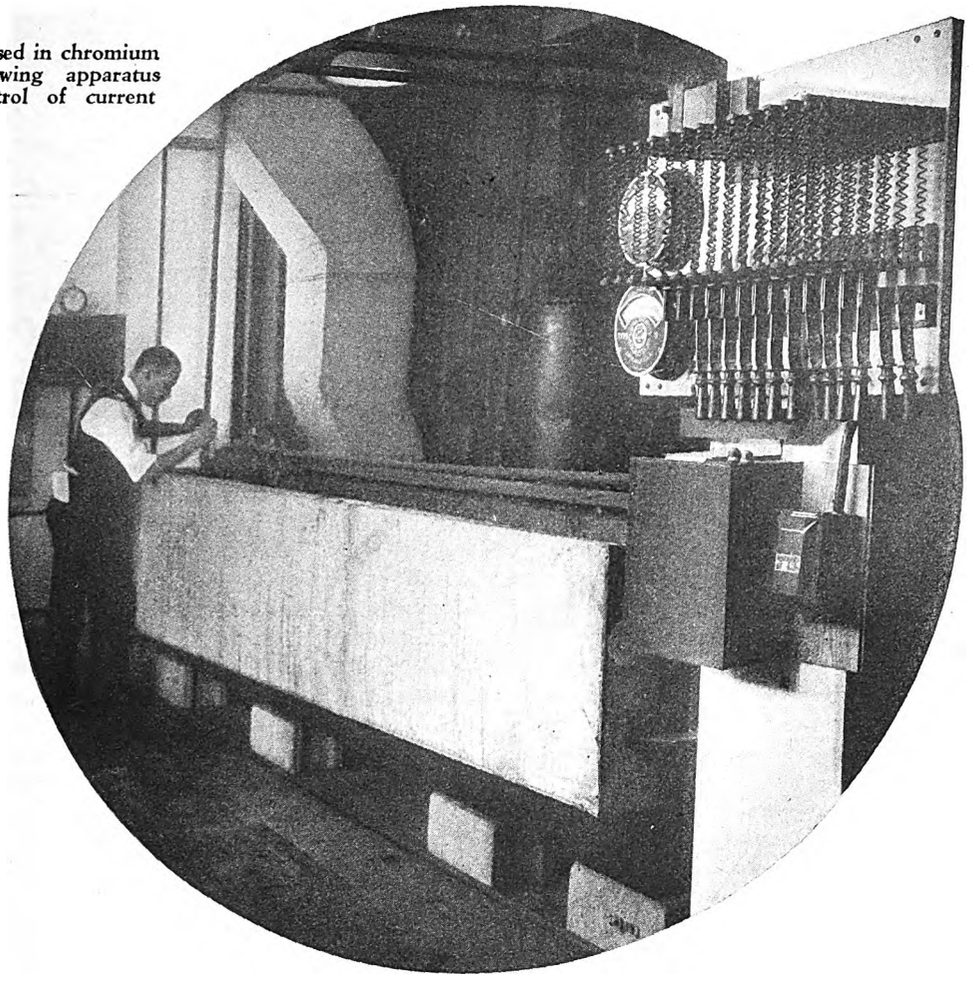

Type of tank used in chromium plating, showing apparatus for the control of current strength

Life of Mechanical Parts

Prolonged by Chromium Plating

Simple and comparatively inexpensive process offers opportunities for substantial savings in electric railway field

CHROMIUM as a finish on exposed metal has become relatively commonplace of late and its application for wear resistance is rapidly receiving wide recognition. In the electric railway industry it is used considerably for car accessories requiring a non-tarnishable finish and its use has recently been extended to car side and center bearings. Its possibilities for other parts exposed to excessive wear, however, have received comparatively little consideration. Nevertheless it seems likely that the application of chromium to trolley wheels, journal and armature bearings, other wearing surfaces, and even car wheels, may offer many advantages.

Electro-deposited chromium is extremely hard, non-corrosive, immune to alkalies and to most organic acids. It is resistant to atmospheric conditions and is affected by fewer known abrasives than any other metal. Chromium can be applied directly to most metals, and when properly applied produces a product that will wear many times longer than the same base without a coating of chromium. It is not attacked by concentrated nitric acid, aqua regia and cold oil of vitriol. Chromium will also resist weather, sulphur compounds and food acids. Molten tin, one of the most corrosive fluids known, is without effect on chromium.

Considering the diamond as the hardest of any known material and assigning it a value of ten on the Moh hardness scale, chromium is given a value of nine by the same rating, a hardness greater than that of glass. In

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The methods of procedure in the application of chromium are similar to those attended in the depositions of nickel or copper. If the base metal is iron or steel or die-cast, it is scaled or cleaned, a splash of copper is applied, and it is then immersed in a nickel bath. In some instances the nickel is applied directly to the base metal without first striking the object in the copper. Striking an object is done by placing the object in a bath and then passing the current through for a flash. Great care must be taken that upon entering the nickel bath the object should be chemically clean. An alkaline solution is used to accomplish this. Caustic soda dissolved in hot water makes a good cleaner. The caustic removes whatever grease there may be on the object. Rinsing is also very important. The object should be rinsed in clean water several times after each bath. If it goes into the nickel tank with any particles of dirt or grease clinging to it, the deposit of nickel will peel.

For protection against corrosion a piece of iron or steel is plated in a nickel tank for a duration of from 30 minutes to one hour, depending on the thickness of the coating desired. After the object is taken from the bath completely covered with nickel, it is rinsed and dried. As a bright deposit of chromium usually is desired, the article next enters the polishing room. Here the deposited metal is polished to a degree of smoothness and buffed to a finish. Then it is again cleaned and is ready for the chromium tank.

The object may be left in the chromium tank for a period of from three minutes to three hours, depending on the thickness of the deposit required. Under proper conditions, a three-minute deposit will measure 0.00002 in. This deposit, though very thin and shell-like, will be found to be an impervious metal coating, bright in appearance and hard in substance.

Chromium has been evenly plated by a commercial process up to 0.015 in. in thickness, according to W. N. Phillips of the General Motors Corporation. This deposit was on a ring gage and was very evenly plated. On plug gages about 0.0005 in. of chromium has been found to be a satisfactory thickness.

Friction Between Chromium and Other Metals Usually Very Low

Oil seems to adhere to the surface of chromium in a satisfactory way, and the coefficient of friction between chromium and other metals is usually very low. In testing an automobile fan with a cast-iron bearing and carburized shafting with no lubrication, with a chromium-plated shaft the bearing operated fairly successfully for two hours with very little scuffing, whereas a carburized shaft almost cut out the cast-iron bearing in less than two hours.

Occasionally electroplated chromium has failed to adhere to the base metal under severe conditions of service. According to W. Blum, chemist of the United States Bureau of Standards, its adherence depends on the conditions of deposition, the composition of the base metal, the method of cleaning or preparing the base metal, and the conditions of service. Although the hardness of chromium is said to be produced at relatively high current densities, it has been observed that these chromium deposits may have, on the surface, a network of hairline cracks. It is probable, therefore, that with severe conditions of service, deposits with less than maximum hardness but with slightly greater ductility will be more satisfactory. As a rule, it is more difficult to plate certain of the alloy steels such as those for tools and dies, than to plate carbon steel.

It is the belief of J. M. Braunstein that a thorough and complete knowledge of the process is necessary in order to apply it successfully. The ordinary elements—current density and thermal control—are important factors that require careful study. The concentration of the bath is as important as the temperature at which the bath is used. This knowledge, however, is easily acquired and will enable the inexperienced to apply chromium successfully.

Two convenient methods exist for chromium plating parts used by electric railways. For the larger companies, the most economical plan probably will be to install the necessary equipment in their own shops. For the smaller companies, however, it probably will be cheaper to send out the parts to some commercial chromium plating plant.

Oil in Barrels Should Be Protected from the Weather

By Harold L. Kauffman
Petroleum Consultant, Denver, Col.

RAILWAY maintenance men complain frequently to oil refiners or jobbers who furnish lubricating oils in barrels, that an appreciable quantity of water is found mixed with the lubricant. Precautions taken by oil refiners make it certain that the oil is free from contamination when shipped. How, then, does the water get inside the barrel?

During the past ten years the writer has had occasion to adjust a number of such complaints, and it was found in almost all cases that the barrel of oil had been allowed to stand exposed to the weather. Variations in temperature, together with extremely humid atmospheric conditions, may cause a tightly sealed barrel to "breathe in" water.

As an example, if a closed barrel containing 50 gal. of oil has a certain volume at 65 deg. F., the volume will be greater at 95 deg. F. Hence, as the temperature and volume increase the air above the oil is forced out through the vent plug or bung. If the barrel is stored outside, a rainstorm may result in several quarts of water collecting on the barrel head. When the temperature of the oil decreases a vacuum is created, which draws in some of the water from the head. Under extremely humid atmospheric conditions water may be drawn from the air into the barrel.

This shows the necessity for keeping barrels of oil safely protected from weather conditions. Railway maintenance engineers or others in charge of storage of lubricants for electric railways should make certain that adequate protection is given, and then troubles from the accumulation of water will decrease.

"Quick Transportation for Everyone"

IN a recent advertisement, captioned "What Makes a Public Utility?" the Buffalo *Evening News*, Buffalo, N. Y., compared the service rendered by its classified section to public utility services. The advertisement pays a tribute to the electric railways with the following words: "Street railways mean quick transportation for everyone."

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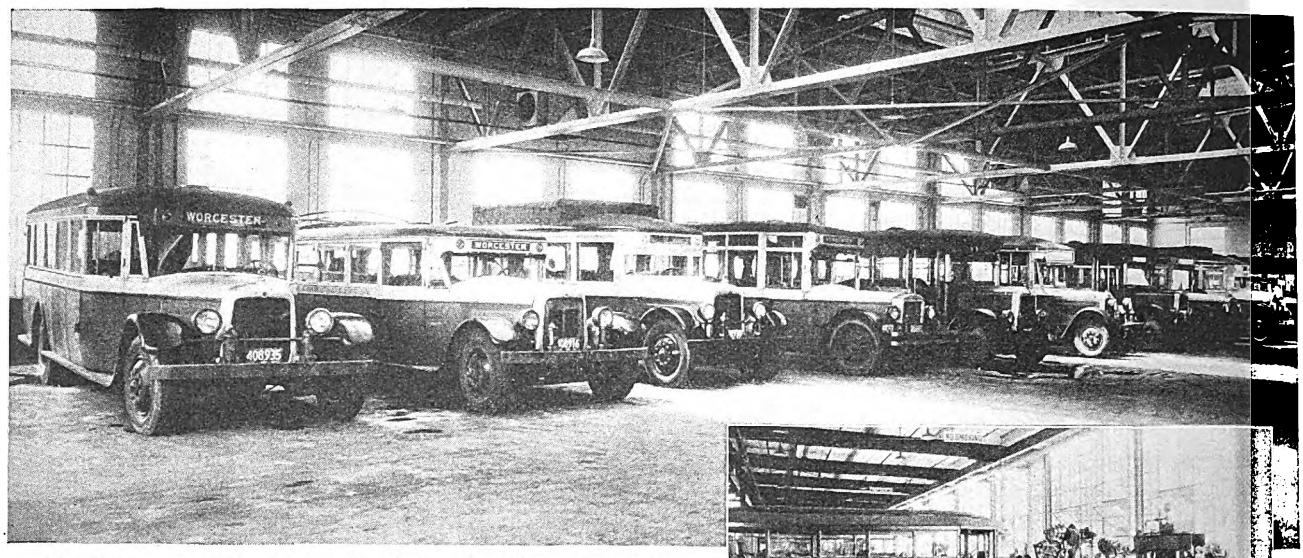
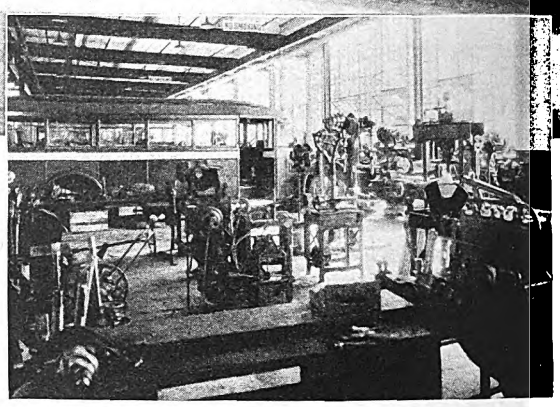


Excellent natural illumination is a feature in this garage of the Worcester Consolidated Street Railway



Large side windows admit plenty of light into the bus repair shop of the Twin City Rapid Transit Company

Bus Maintenance WELL

Survey of garage facilities and practices on 41 electric railway properties emphasizes importance of frequent and regular bus inspection. Structures specially built for garage purposes are favored over remodeled car houses. Careful attention paid to training of personnel

INFORMATION disclosed by a survey made by ELECTRIC RAILWAY JOURNAL covering 41 of the largest bus operating companies in the United States and Canada shows that bus maintenance practices are well standardized. These companies, which operate in all some 6,200 buses, have a total of 141 garages. While many of these garages are remodeled carhouses, the trend of late has been strongly toward the use of buildings specially designed and equipped for bus operation and maintenance. The survey shows that in most instances an ample and well-trained personnel is employed in this work.

From data collected on the size of the garages it appears that an average of 300 to 350 sq.ft. per bus answers the needs on most properties. Although a smaller area would probably be sufficient for mere storage, this amount of space is needed for inspection, cleaning and making minor adjustments while the buses are out of service. Good lighting, which is essential to proper maintenance, has received special attention in the recent design of garages.

A number of railways have garages capable of accommodating from 100 to 200 buses, but the majority appear to favor a capacity of about 40 to 60 buses. The largest garage included in the survey is one belonging to the Department of Street Railways, city of Detroit, where 190 buses can be accommodated in a space 139x498 ft.

The survey shows that a considerable number of companies have remodeled former carhouses to serve as bus garages. Although this procedure undoubtedly possesses certain advantages from the standpoint of economy, the results are not always entirely satisfactory from an operating standpoint. It was pointed out by one large railway bus operator that the ordinary carhouse is too narrow to serve efficiently as a bus garage. There is a marked tendency nowadays to build bus garages more nearly square. Storage of buses over long, continuous pits, such as are found in carhouses, is not considered to be the best practice. On account of their being free-wheel vehicles, great care must be exercised under these conditions in moving them in and out. Moreover, their

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construction is such that many heavy parts can be removed only by being lifted upward instead of being lowered into the pit, as is customary with street cars. Despite these advantages possessed by buildings specially designed for bus maintenance, the layout and location of various departments in garages continue to reflect strongly the influence of carhouse layout and design.

No general rule is followed with regard to the location of garages in relation to the routes on which the buses operate although the desire to reduce dead mileage to a minimum seems more than anything else to be the determining factor. The majority of operators prefer to have their garages at or near the outer end of the routes, but there are also many who believe that by having the garages in the center of the area served, the buses can be operated with a smaller amount of dead mileage.

Frequent Inspection Necessary

Bus maintenance usually is classified under the four general headings of inspection, adjustment and minor repairs, unit changes, and general overhaul. In most instances the first two are taken care of in the garage, while the last two are performed in some central repair shop which often forms a part of the railway's general car repair shop.

It is generally conceded that inspection is the most important of these four items, because it is the pivot upon which the whole process of maintenance turns. It was shown by the survey that the average inspection period of a bus is about 1,900 miles. The lowest reported was 500 miles on the property of the San Antonio Public Service Company, and the highest was 5,000 miles at St. Louis. With this company, however, the inspection period is the same as the overhaul period. In other words, the company makes no distinction between inspection and overhaul.

It was emphasized by several operators that this inspection is not merely a casual examination to see that everything is all right, but that it consists of a thorough examination of engine, chassis and body, as well as tightening up of all bolts and general greasing. Many companies believe that the oil in the crankcase should be drained at this time, although others think it bad practice to wait for general inspections and they advocate oil renewal after every 1,000 miles of service.

Practice varies concerning night work in garages. Most operators hold the opinion that no heavy repair work should be done at night, but it is thought that minor repairs which are reported by the drivers as being necessary can be performed by the night force, so as to have the bus ready for the morning rush-hour service.

With mechanically-driven buses it appears that the most satisfactory results are obtained when buses are taken off the road for their annual overhaul after about 60,000 miles of service. Most of the maintenance officials consider that after this amount of

AVERAGE MACHINE TOOL EQUIPMENT OF ELECTRIC RAILWAY GARAGES

One	electric drill	for	every	17 buses
"	lathe	"	"	38 "
"	grindstone	"	"	28 "
"	welding set	"	"	38 "
"	grease pump	"	"	18 "
"	jack	"	"	4 "
"	hoist	"	"	27 "
"	gas pump	"	"	23 "
"	oil pump	"	"	15 "

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Gas and oil filling station is located just inside the door of this garage of the Twin City Rapid Transit Company

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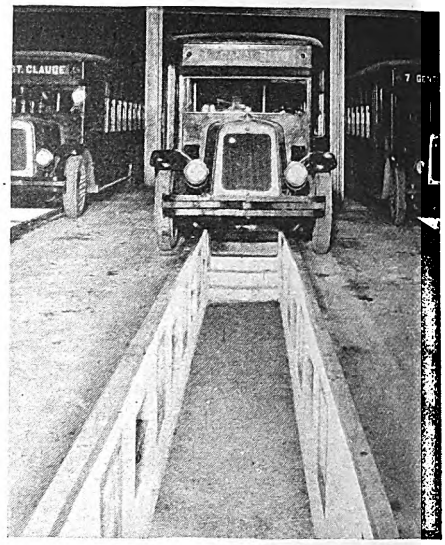
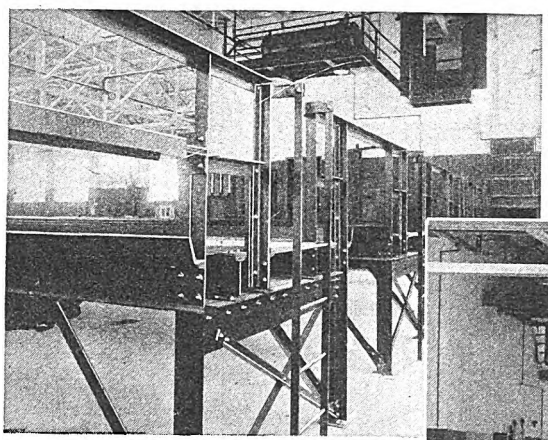
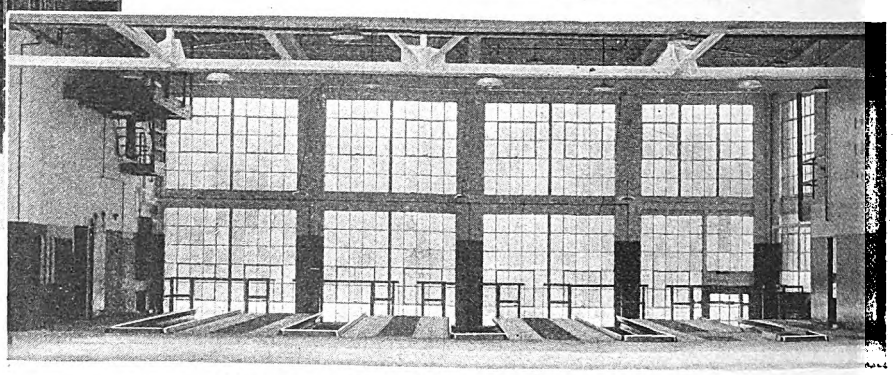
Inspection Facilities of Various Kinds Used in Electric Railway Garages



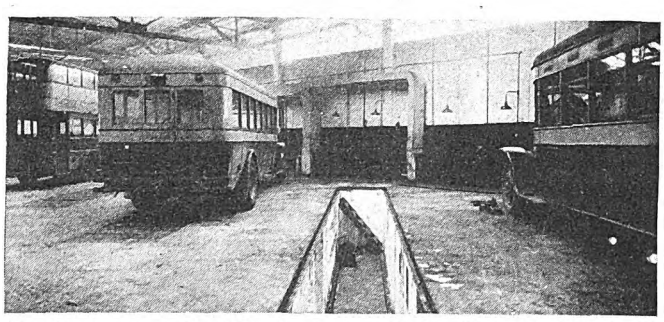
Convenient pit arrangement in bus garage of the New Orleans Public Service, Inc.



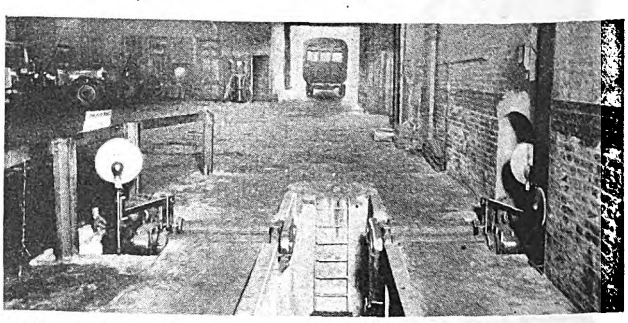
Pit construction in the Dorchester garage of the Boston Elevated Railway is of unusual design with exceptionally good ventilation and light



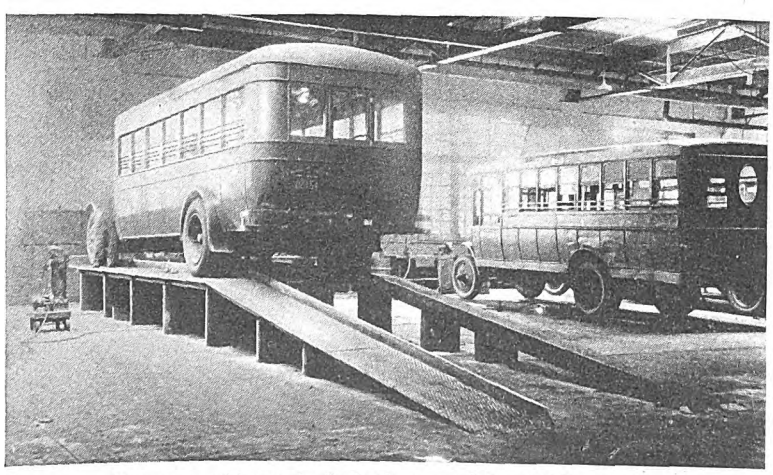
Top view of inspection pit in Dorchester garage of Boston Elevated Railway



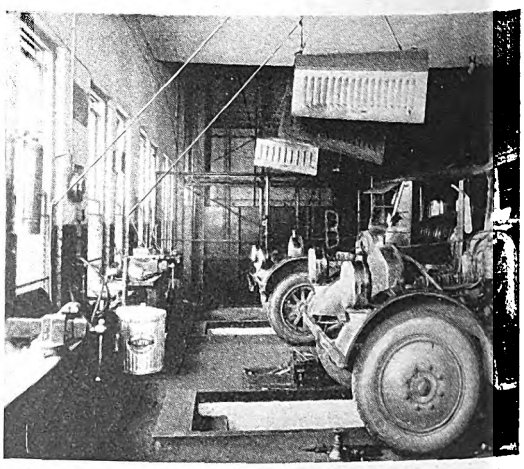
Pits in the new Frankford garage of the Philadelphia Rapid Transit Company are arranged at an angle of 45 deg. with the side walls



Brake tester and pit in the Charles Street garage of the United Railways & Electric Company of Baltimore



Ramps used instead of pits in one of the Public Service Co-ordinated Transport garages



Ingenious method of raising hood for inspection at Milwaukee

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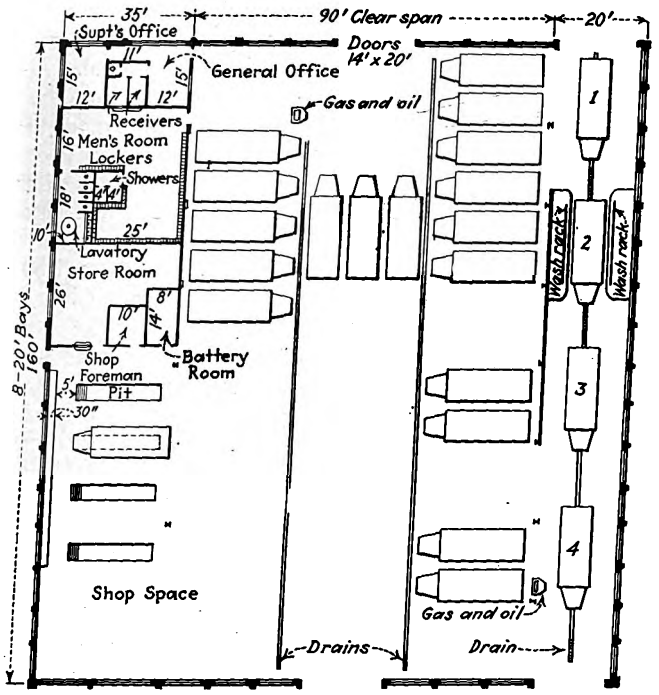
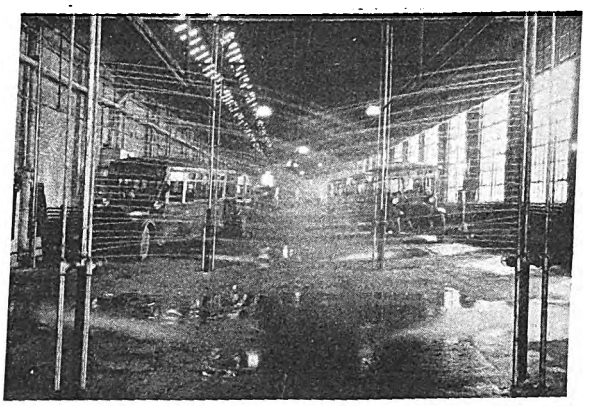


Typical layout for garage to accommodate 45 buses

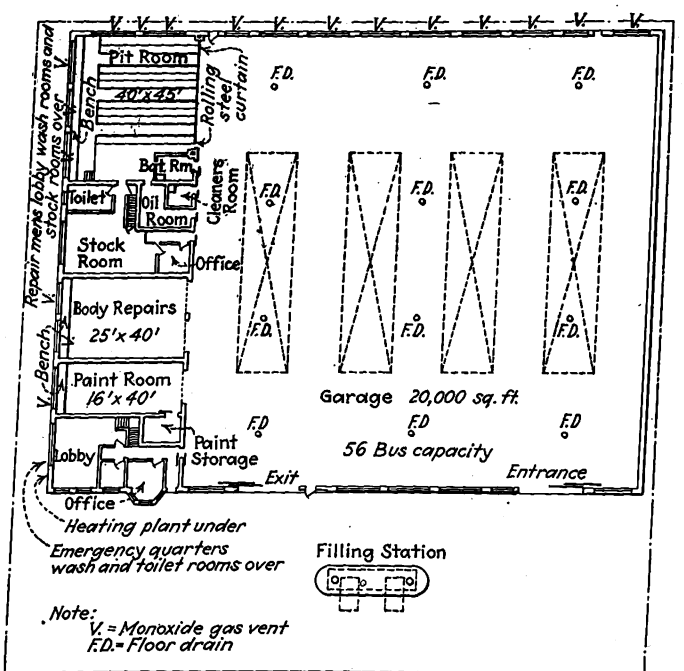


Bus shower bath in the garage of the Northern Ohio Power & Light Company at Akron

service the vehicle will be badly in need of a fresh coat of paint, and usually the body also needs many repairs for which the garage repair shops are not fully equipped. The maximum overhaul period used by any company included in the survey was 105,000 miles at Springfield, Mass.

It was found that most companies maintain their mechanical-drive buses according to the unit system. In other words, when a unit needs major repairs it is taken out and another unit substituted. After removal the old unit is sent to a central repair shop where experts on that particular kind of work make the necessary repairs. Such replacements usually can be made during the hours that the bus is out of service, thus keeping a maximum number of vehicles on the road for the morning and evening rush hours.

With regard to gas-electric buses, it seems that many operators have not yet ascertained the most satisfactory basis of inspection. Some companies operating gas-electrics are of the opinion that they can be maintained according to the same schedules which govern the upkeep of the mechanically-driven equipment. Kilowatt-hour meters are used frequently as a guide to determine the overhaul period for street cars, however, and this method of determining inspection dates appears to have possibilities for buses also.



Design of garage to accommodate 56 buses as proposed by A.E.R.E.A. committee

Recently built garage of the Virginia Electric & Power Company at Richmond

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Summary of Garage Capacities and Personnel

Name of Company	Number of Garages	Names of Garages	Number of Buses	Number of Mechanics	Number of Helpers	Number of Pits
Boston Elevated Railway	5	.....	306	66	1	8
Capital Traction Company, Washington	2	Main	37	6	4	2
		Takoma	1	..	..	..
Cincinnati Street Railway	1	.....	75	23	17	6
Community Traction Co., Toledo	1	.....	125	21	3	5
Connecticut Company	9	.....	138	..	..	..
Delaware Electric Power Company	2	No. 1	18	5	..	1
		No. 2	36	12	..	2
Dept. of Street Railways, Detroit	5	Coolidge	104	36	2	5
		Clark	29	9	1	1
		Hercheval	109	45	3	2
		Gary	33	19	1	4
		Second Ave.	190	85	3	2
Eastern Massachusetts Street Railway	6	.....	82	..	..	2
Georgia Power Company, Atlanta	1	.....	29	4	3	1
Houston Electric Company	1	.....	67	15	13	7
Interstate Public Service Company	3	Greenwood	15	8	4	1
		Greenwood	9	..	..	..
		Louisville	6	1	..	1
Kansas City Public Service Co.	1	.....	70	..	6	5
Louisville Railway	1	.....	40	6	6	2
Miami Beach Railway	1	.....	50	7	2	4
Middlesex & Boston St. Ry.	5	Waltham	41	12	6	..
		Auburndale	17	2	3	..
		Natick	13	2	1	..
		Lexington	7	3	..	..
		Hopkinton	4	1	..	..
Milwaukee Electric Railway & Light Co.	2	No. 1	60	21	30	9
		No. 2	52	4	2	4
Montreal Tramways	1	.....	98	14	..	3
New Orleans Public Service, Inc.	1	.....	37	7	6	5
New York State Railways	6	Rochester	27	8	7	3
		Pittsford	3	1	..	..
		Syracuse	19	6	6	2
		Utica	11	3	4	1
		Rome	4	1	..	..
		Dodgeville	5	1	..	..
Northern Ohio Power & Light Co.	5	Kenmore	103	43	5	..
		Central	90	33	10	..
		Brittain	19	7	2	..
		Canton	39	11	5	..
		Dover	4	1	1	..
Penn-Ohio System	4	Youngstown	85	21	14	8
		Cleveland	8	4	1	1
		Warren	14	1	3	..
		New Castle	5	1	1	..
Philadelphia Rapid Transit Co.	8	No. 1	175	..	..	14
		No. 2	125	..	..	10
		No. 3	106	..	..	9
		No. 4	140	..	..	12
		No. 5	75	..	..	6
		No. 6	27	..	..	2
		No. 7	12	..	..	1
		No. 8	9	..	..	1
Pittsburgh Railways	2	Lexington	50	27	6	..
		Northside	20	6	3	..
Potomac Edison Company, Hagerstown, Md.	2	No. 1	20	8	4	1
		No. 2	10	3	2	..
Portland Electric Power Company	1	.....	40	15	..	For 10 buses
Pub. Serv. Co-Ordinated Transport (New Jersey)	33	.....	1,781	..	..	..
St. Louis Public Service Co.	2	No. 1	27	5	3	2
		No. 2	25	15	6	3
San Antonio Public Service Co.	1	.....	75	18	..	5
Seattle Municipal Railway	2	No. 1	22	4	3	1
		No. 2	21	5	1	2
Springfield Street Railway (Mass.)	3	Bond Street	34	5	3	..
		Westfield	7	1	1	..
		Palmer	5	1	..	..
Terre Haute, Indianapolis & E. Traction Co.	1	.....	19	6	3	..
Third Ave. Railway, New York	1	.....	125	..	..	11
Toronto Transp. Commission	4	Davenport	90	22	9	3
		Howard Pk.	46	2	2	1
		Sherbourne	13	3	5	1
		Hamilton	6	2	1	..
Twin City Rapid Transit Co., Minneapolis.	3	No. 1	69	38	5	3
		No. 2	25	..	..	..
		No. 3	7	..	..	..
United Elec. Ry., Providence	2	Providence	72	44	..	..
		Woonsocket	19	6	..	2
United Railways & Elec. Co., Baltimore	2	Center	58	36	..	4
		Outer End	41	19	..	..
United Traction Co., Albany	2	Troy	30	9	3	4
		Albany	46	24	3	7
Virginia Elec. & Power Co.	4	Richmond	80	21	11	3
		Norfolk	80	26	12	1
		Portsmouth	30	5	3	..
		Petersburg	8	1	1	..
Washington Ry. & Elec. Co.	2	No. 1	92	12	17	2
		No. 2	4	..	..	1
Winnipeg Electric Co.	1	.....	48	8	12	1
Worcester Con. St. Ry.	3	Grove Street	42	15	6	4
		S. Bridge	14	3	2	..
		Uxbridge	8	2	..	..
Total	141		6,176	...	...	...

The Philadelphia Rapid Transit Company has obtained particularly good results with this system. Although the kilowatt-hour inspection plan was originally instituted for the electrical equipment only, it has been found also to be a good guide for the maintenance of the mechanical parts of gas-electric buses. After a bus has run an equivalent of 2,500 kw.-hr. it receives a general inspection similar to that given to a mechanically-driven bus, and in addition an examination of all connections of the electrical equipment. These inspections are repeated every 2,500 kw.-hr., until a total of 35,000 kw.-hr. has been reached, when the electrical units are removed from the vehicle and subjected to a thorough inspection to see that all insulated parts, commutator and field coils, etc., are in perfect running condition. This process is repeated until the meter records 105,000 kw.-hr., when the bus is given a general overhaul and a new coat of paint is applied. The same cycle then begins anew and continues until the bus has been in service amounting to a total of 210,000 kw.-hr., when it is considered that major improvements should be made in order to avoid approaching obsolescence.

Machine Tool Equipment

From the figures of the companies included in this survey it is evident that the machine tool equipment of the garages is ample, particularly with respect to the smaller apparatus such as jacks, grease pumps, grinding stones and hoists. The larger tools, such as lathes, electric drills, and welding sets, are usually confined to those garages which do heavy repair work and, of course, to the central repair shops. The average number of buses served by each tool is shown in an accompanying table.

With regard to the number of pits required in a garage there seems to be a wide variety of opinion. The survey indicates, however, that on an average one pit for every sixteen buses will be adequate for the ordinary run of maintenance work. Although the latest design of pits is well arranged with respect to ventilation, many maintenance men believe that ramps provide greater safety from carbon monoxide poisoning as well as better lighting. On the other hand, pits can be more easily provided with shelves for small tools. The construction of ramps is usually cheaper than that of pits. It is necessary, however, to have a somewhat larger

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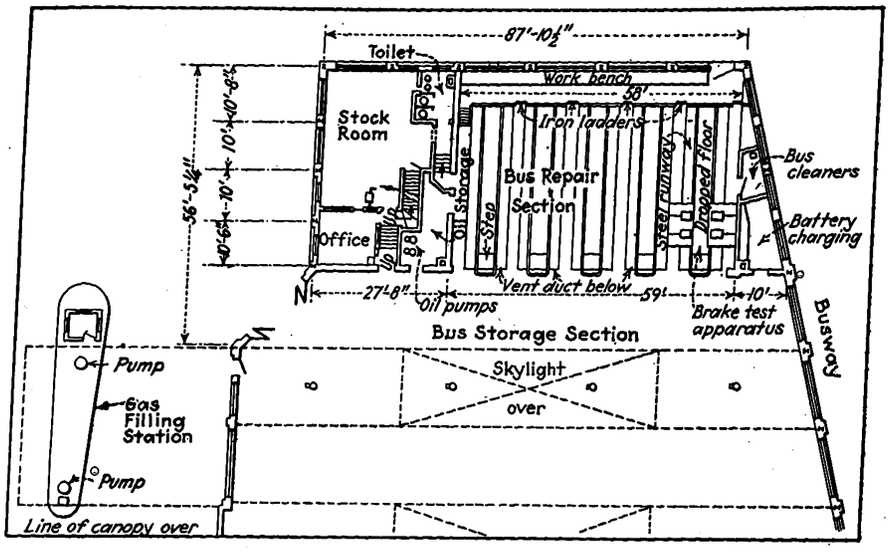
space available where ramps are used, as inclined approaches are necessary.

The survey shows that there is a marked preference for separating the repair shop for buses from the car shop. The majority of railways also have separate maintenance personnel for buses and cars even where they operate gas-electric vehicles. A type of organization frequently found is that where one foreman is in charge of bus maintenance and a second foreman in charge of car maintenance, both reporting to a general foreman.



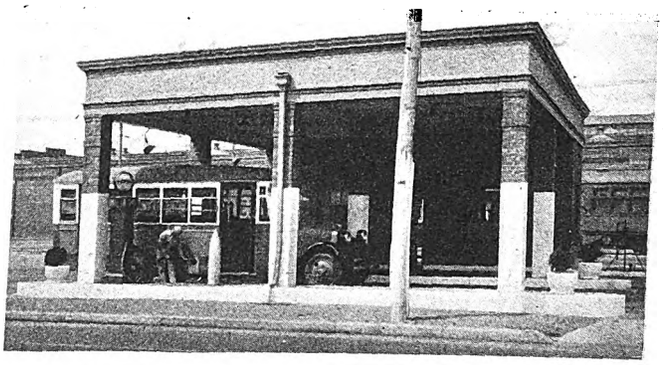
Arrangement of new Dorchester garage of Boston Elevated Railway

Training of Personnel Important

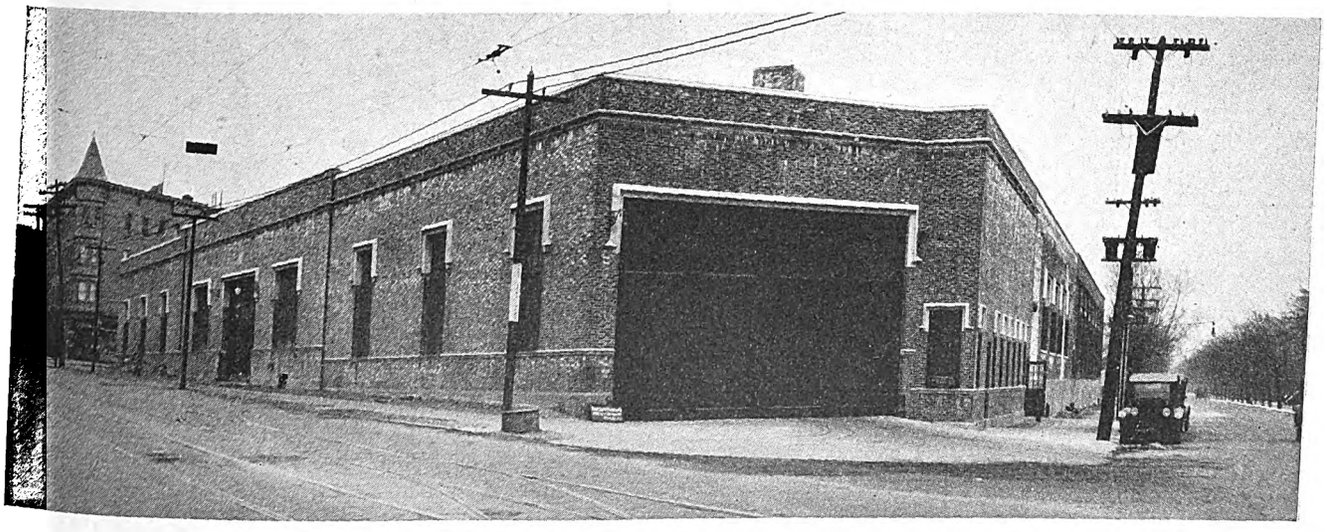
The personnel engaged in bus maintenance work at the garages covered in this survey averages about four men for every ten buses. Of this number three are mechanics and one is a mechanic's helper. Some companies, however, say that they do not differentiate between mechanics and helpers.

Training of mechanics for bus maintenance work is considered to be a very serious problem. The natural training school for these men seems to be in factory work in allied trades. Formerly this was the source from which most of the bus mechanics came, but in recent years the demand has become greater than the available supply and many railways now train their own mechanics. This has been found advantageous due to the fact that with mass production methods in the larger factories the mechanics do not receive the all-around training which they used to get, and hence come to the garages familiar with only one or two parts of the vehicle. The survey shows that a majority of railways prefer to train their own mechanics, due partly, perhaps, to the fact that necessity compels them to follow this course but influenced also by the fact that a mechanic who has been trained elsewhere often is hard to change to the standards required in railway bus maintenance.

Not the least important among the facilities for maintenance and repair of buses is the garage storeroom. In 48 garages on the 41 railway properties included in the survey the average size of storeroom was found to be slightly under 1,000 sq.ft. A total of some 3,000 buses are housed in these 48 garages, making the average amount of storeroom space provided about 16 sq.ft. per bus. In a few instances the companies use the railway storeroom for holding bus material and supplies also, although most companies prefer to have separate storerooms. The largest storeroom in any garage included in the survey is that of the Second Avenue garage of the Department of Street Railways, Detroit, which has an area of 4,400 sq.ft., or about 22 sq.ft. per bus.



Outside filling station of the Virginia Electric & Power Company at Richmond



Recently built Lake Street garage of Public Service Co-ordinated Transport

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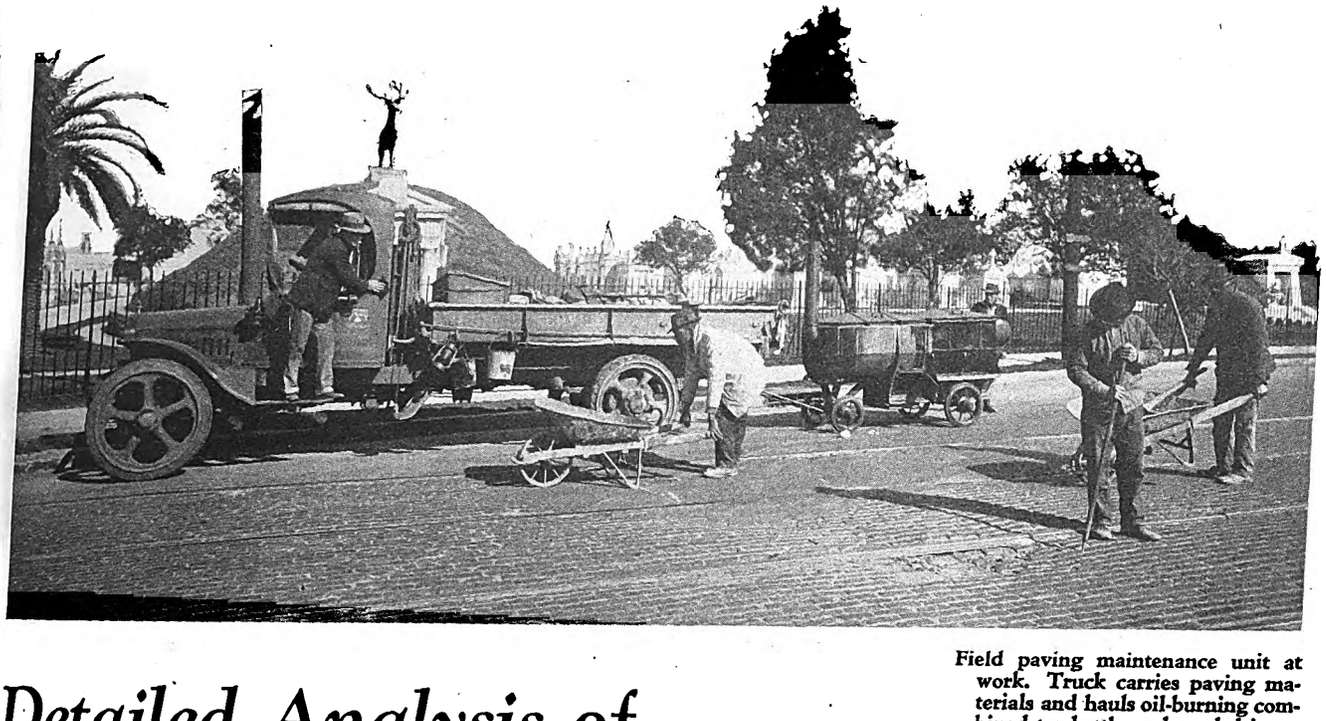

Field paving maintenance unit at work. Truck carries paving materials and hauls oil-burning combined tar kettle and sand drier

Detailed Analysis of TRACK COSTS *Promotes Economy*

Street railway trackage in New Orleans is classified according to type and age of construction and accurate records are kept of all expenditures. These figures permit determination of most economical designs and methods

By

I. O. MALL

Assistant Superintendent of Roadway
New Orleans Public Service, Inc.

EXPENDITURES for the construction and maintenance of tracks are a factor of prime importance in electric railway operation, as analysis shows that the investment in permanent roadbeds, in general, comprises one-half or more of the entire property investment. Intelligent analysis of track maintenance costs is dependent upon a record of such nature that a detailed study can be made of the expenditures. Track costs, when recorded under the usual classification of accounts established by the I.C.C., are merely a group of figures that permit of balanced bookkeeping. This system does not permit of analysis and affords a convenient means for covering up expensive mistakes.

Due to the absence of recognized standards of track design in the past the average operating company has acquired numerous types of construction through its period of development. When the total maintenance cost is spread over the net mileage of such a variable track system it is impossible to analyze performance. Unless maintenance methods and cost records are given detailed attention and kept under complete control, it is inevitable that large sums of money will be wasted that might otherwise be made productive. Efficient operation requires that the roadbed be designed, built and maintained in a manner that assures an economic life commensurate with the investment. It is imperative, therefore, that a co-ordinated system of maintenance methods and cost records be utilized.

With this thought in view there have been developed in the roadway department of the New Orleans Public Service, Inc., methods and records that furnish a basis for investigating the economical aspects of track construction and maintenance. The track system is divided into track stretches. The limits of the stretches are variable, being governed by type and age of construction, and terminated at points where service is duplicated.

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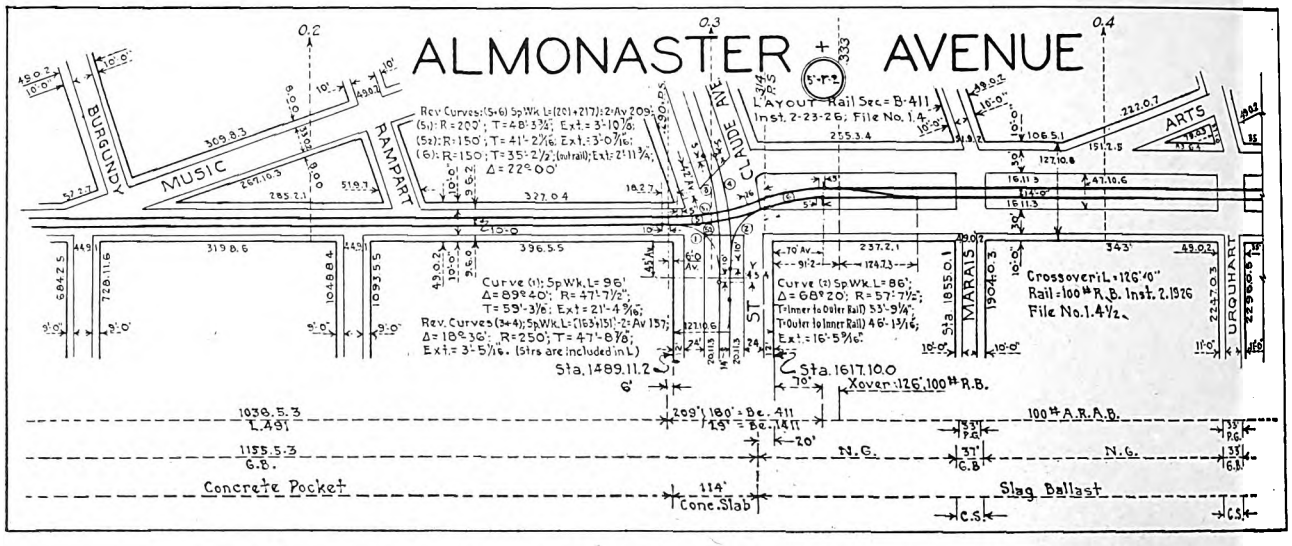


Alignment drawing gives complete picture of physical features of track structure

This latter feature allows the maintenance cost to be properly proportioned to each of the car lines on tracks where service is duplicated. Each track stretch is designated by a symbol location number, which appears on all orders and records pertaining thereto.

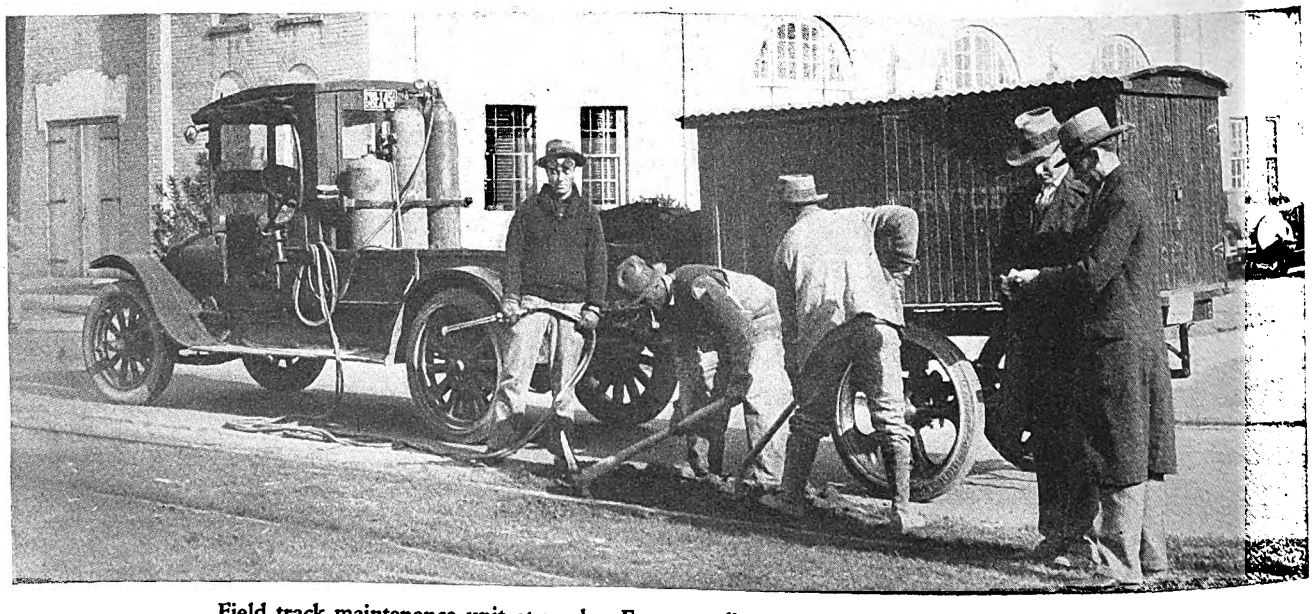
A plan record of construction, commonly known as an "alignment drawing," showing a complete picture of the physical track structure in the street, is available for reference in studying stretch maintenance costs. This drawing defines and locates intersecting streets, lineal distances, cross-sectional street dimensions, types of construction, materials of construction, all represented in such a manner as to afford a basis for analysis.

Assignment of repair work is based upon a system of thorough track inspection. Tangent track mileage is segregated into divisions and a track inspector is responsible for reporting the condition of the track in each division. The inspector makes his observations while riding the cars and supplements his notes with a careful examination made while walking along the track and watching conditions under car operation. A written report is made of all track defects and conditions. These inspection reports are forwarded to the assistant roadmaster in charge of maintenance operations.

The assistant roadmaster conducts tri-weekly meetings with the track inspectors, at which time the inspection reports are thoroughly discussed. The repair jobs are separated and classified in accordance with the urgent need of repairs. The consecutive order in which the jobs are to be executed is recorded on the "Future Maintenance Schedule." Sufficient work is outlined in advance to keep each maintenance unit busy for at least two weeks.

Every maintenance job, whether of minor or major proportions, is performed with a "Maintenance Work Order." This work order gives a complete description of the work to be done and specific directions and instructions for doing the work. It shows the track stretch symbol location that the work is to be charged to. In the assignment of jobs an effort is made to group work of a similar nature, in order that the maintenance units may become specialized. Each maintenance unit consists of an automobile truck and a trailer tool cart, properly equipped to do the required work. When a job is completed the maintenance work order is checked and the job removed from the future maintenance schedule.

The foreman of each maintenance unit makes a daily "Labor Distribution Report." This report indicates the



Field track maintenance unit at work. Foreman discussing features of work with supervisor

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total charge against the particular track stretch, as designated by the track stretch symbol number. The labor charges are distributed in accordance with the conventional classification of accounts, which enables the accounting department to keep books on this basis. Material and supply issues also carry the track stretch symbol, which completes the total charge accumulated on a given job.

Track expenditures are budgeted yearly in advance. The probable amount of money required is determined after a thorough study of the physical condition of the track. The assistant roadmaster in charge of maintenance operations, with the aid of the track inspectors, develops an intimate knowledge of track conditions. This information enables him to specify within very close limits the amount of money necessary to meet standard maintenance requirements. A cumulative statement of "Monthly Maintenance Expenditures" is prepared which shows the budget performance. At the end of each month a general meeting of the supervising personnel and maintenance unit foremen is held, at which the track stretch cost record is analyzed in detail. Variable or excessive costs, as brought out by this statement, are given special attention, together with a complete analysis of all work performed on the track stretch in question. This discussion also provides the basis for an efficient study of maintenance methods and measures the relative efficiency of different types of track construction.

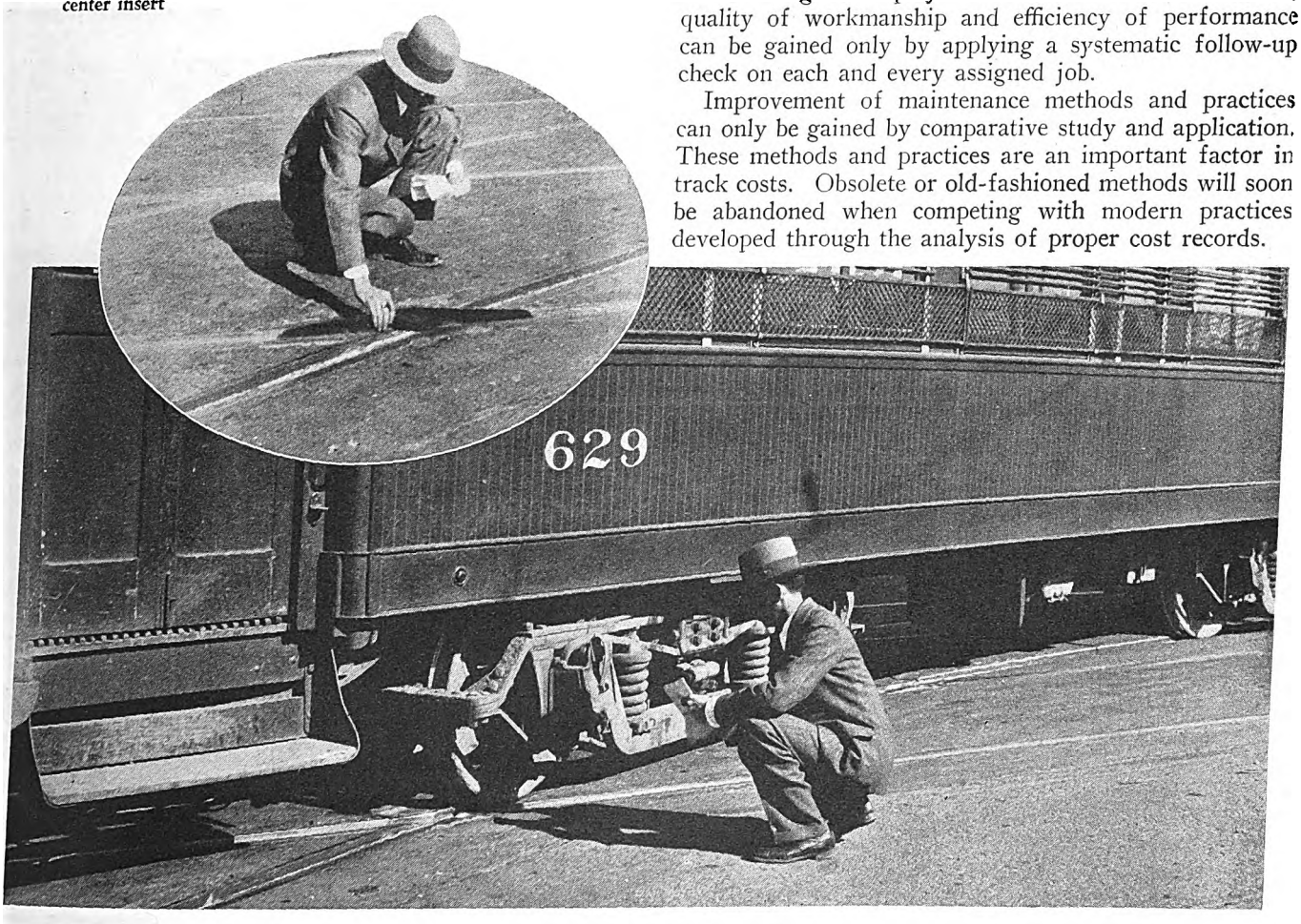
Maintenance procedure, that detects failures or defects in the track structure and completes the necessary repairs while these defects are of a minor nature, minimizes the net maintenance cost. Such a procedure is possible and practical when based upon a system of regular and thorough inspection.

Advance scheduling and assignment of work eliminates delays and lost time that usually occur when work is assigned without planning. The information furnished by track inspection forms a specific basis for planning a schedule of maintenance work, so outlined as to employ the minimum of maintenance forces efficiently.

The most careful scheduling and planning of work may be of no avail unless a very rigid follow-up system of checking is employed. Adherence to instructions, quality of workmanship and efficiency of performance can be gained only by applying a systematic follow-up check on each and every assigned job.

Improvement of maintenance methods and practices can only be gained by comparative study and application. These methods and practices are an important factor in track costs. Obsolete or old-fashioned methods will soon be abandoned when competing with modern practices developed through the analysis of proper cost records.

Track inspector using straight edge gage on frog to determine extent of wear or cupping and alignment and condition of center insert



Track inspector observing effect on track of passing car watching for track movement and listening for impact noises

In making minor repairs developed practices give very little consideration to the quality of workmanship required. It is a difficult problem to educate foremen and laborers to the fact that the success of minor repairs is dependent upon high standards of workmanship. A system that provides a record of job performance creates an atmosphere of respect for the work performed and is, therefore, a conducive factor in developing the best standards of workmanship.

The written and filed record of track maintenance costs, in conjunction with a description of the work done, is of particular value in the study of track performance. This record shows when operating costs reach an amount that justifies reconstruction of the track. Comparative studies of maintenance costs, as related to types of track design, afford a basic guide for the selection of the type of track design that should be used in future construction work.

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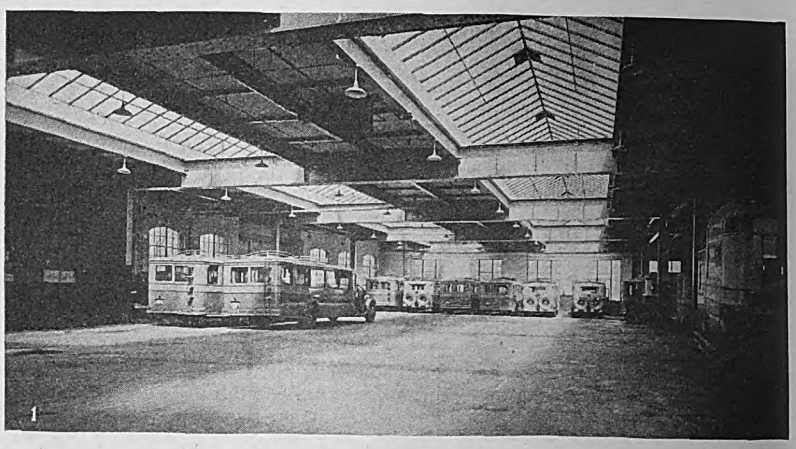
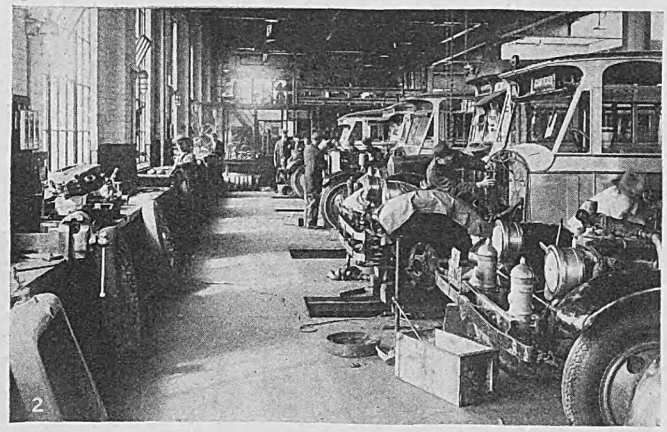
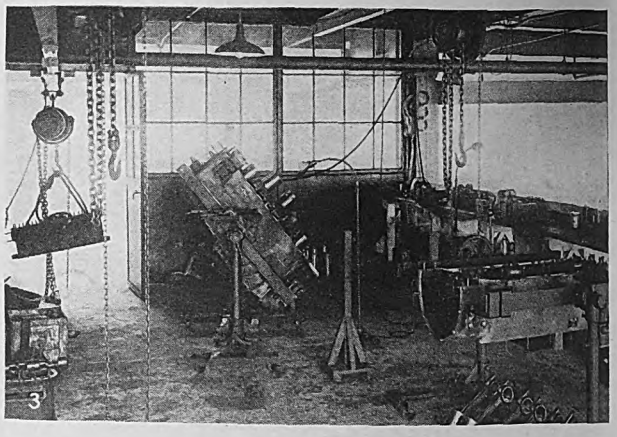
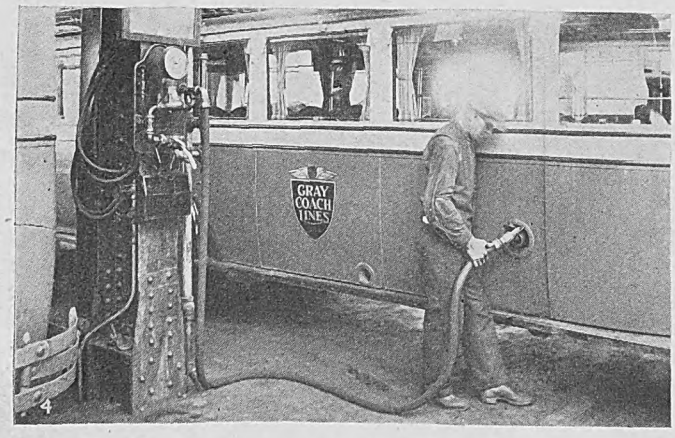
Co-operation

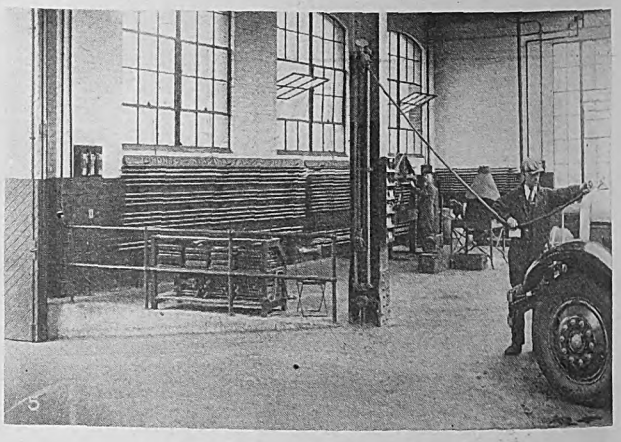
between departments is an important factor in bus maintenance at Toronto

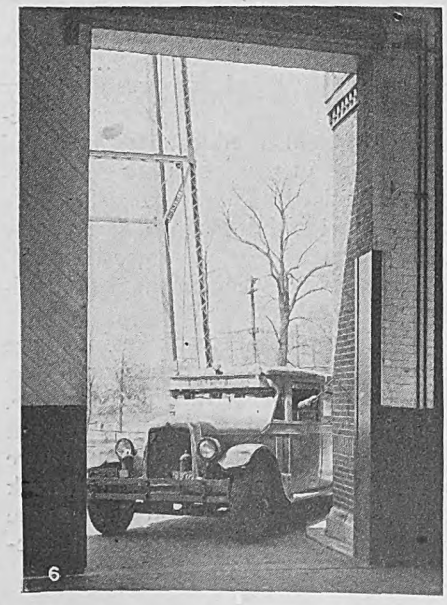












No. 1. Upper floor of Davenport garage, which has a clear space 66 ft. wide.

No. 2. Overhauling chassis at Davenport garage.

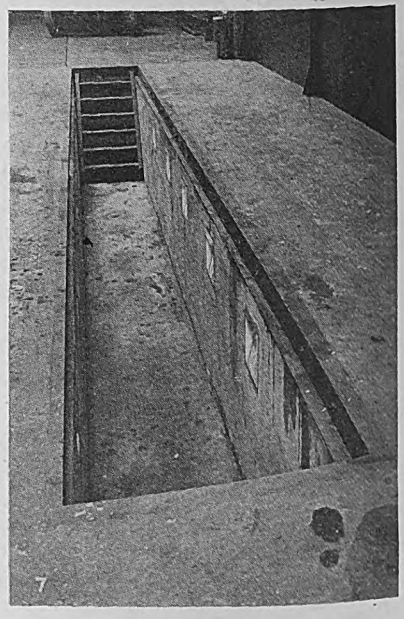
No. 3. Bus engines are removed and taken to this room for repairs.

No. 4. Hydraulic refueling system is used at the Davenport garage.

No. 5. Checking up water, signs, seats, etc., before bus leaves garage.

No. 6. Driver opening air-operated garage door without leaving his seat in the bus.

No. 7. Typical bus inspection pit in T.T.C. garage.



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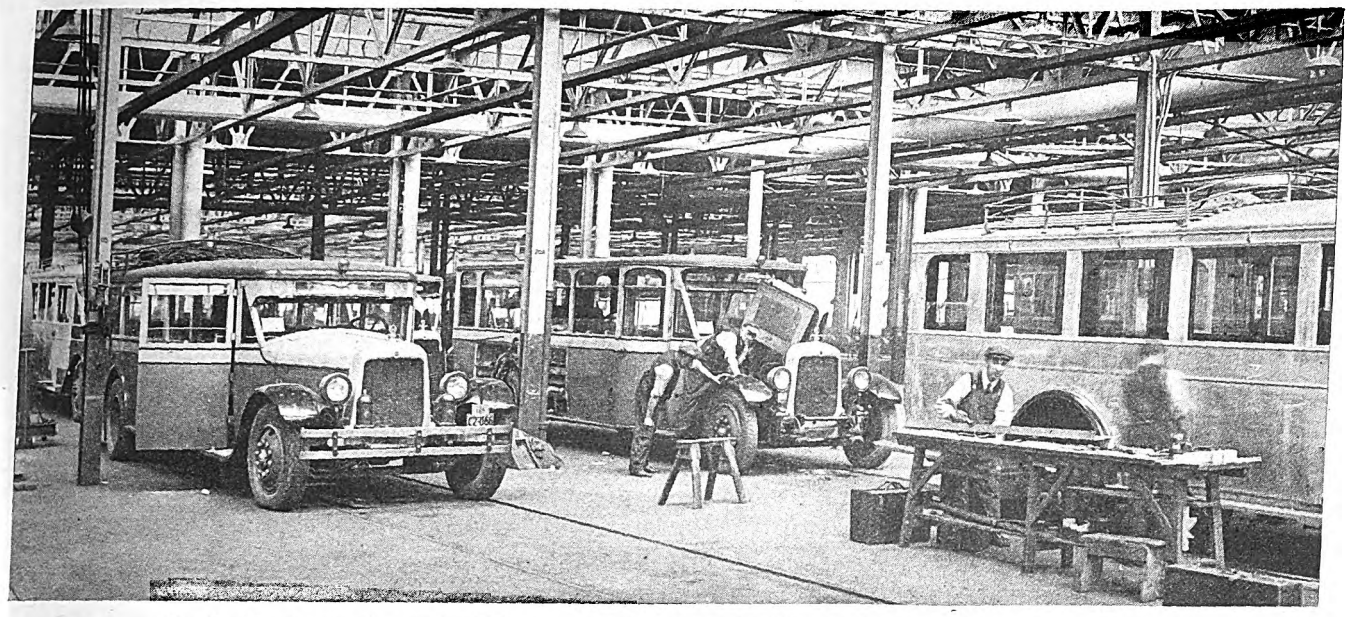


Overhauling bus bodies at the Hillcrest general shops of the Toronto Transportation Commission

Accurate Garage Records

Insure Reliable Bus Performance

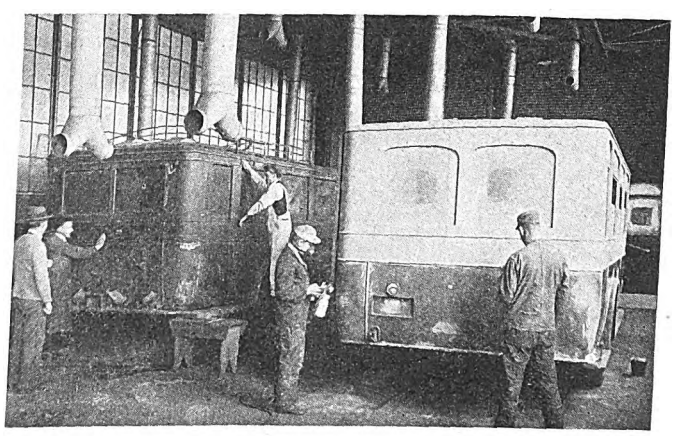
By

A. S. McARTHUR

General Superintendent Toronto Transportation Commission

VARIOUS departments co-operate in the maintenance work for the 81 buses, 90 coaches and 63 trucks and service vehicles operated by the Toronto Transportation Commission. Body repairs and painting for these 234 vehicles are carried out at the Hillcrest general shops by the rolling stock department. Chassis and engine repairs are made by the garage department at Davenport garage. This department also looks after the inspections and overhaul schedules, and all preparation of vehicles for service at four garages in Toronto and one in Hamilton. All battery repairs are done by the electrical department at the Yonge Street substation, but batteries are charged at three garages. In all of this work the keeping of accurate records plays an important part.

For the operation and maintenance of its large fleet of automotive vehicles the T.T.C. owns four garages and rents one. Howard Park garage was built in 1921, and will accommodate twelve large vehicles. It is located on the west side of the city and is equipped with facilities for all regular maintenance work but not for major repairs. The Hillcrest emergency garage was completed in 1923, primarily for overhead tower, emergency and service trucks. It is located almost in the center of Toronto and accommodates eighteen trucks. Davenport garage on the northwest corner of the Hillcrest yards property was opened in 1925 and accommodates 100 vehicles on two floors. The upper floor is at street level and the lower at the yard level, to which a ramp leads down from Davenport Road at the west end outside the



Spray painting at Hillcrest shops. "Bus" bodies are painted red, while "coaches" are painted in two-tone gray

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TORONTO
TRANSPORTATION
COMMISSION

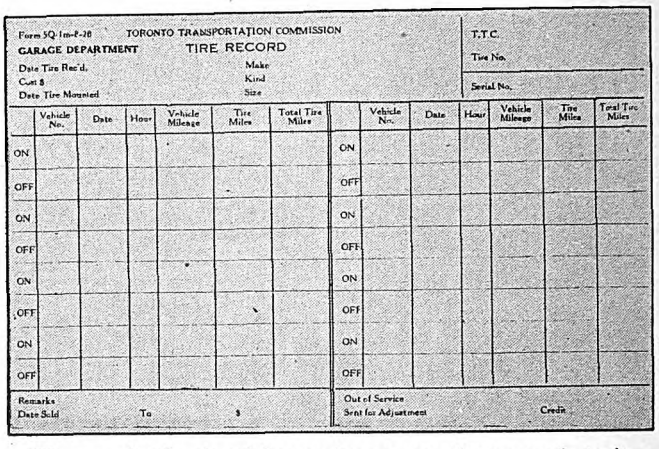
TIRE ON

T.T.C. TIRE NO.	
COACH NO.	
DATE	
HOUR	
RIGHT FRONT	
LEFT FRONT	
RIGHT INSIDE REAR	
RIGHT OUTSIDE REAR	
LEFT INSIDE REAR	
LEFT OUTSIDE REAR	
SIGN HERE	

MARK-X

Tire Card

When a tire is removed from service or placed in service this card is filled in by the tire staff and entered on tire records by office staff.


Form 5Q-1m-8-28 TORONTO TRANSPORTATION COMMISSION
GARAGE DEPARTMENT TIRE RECORD
Date Tire Rec'd. Make
Cost $ Kind
Date Tire Mounted Size

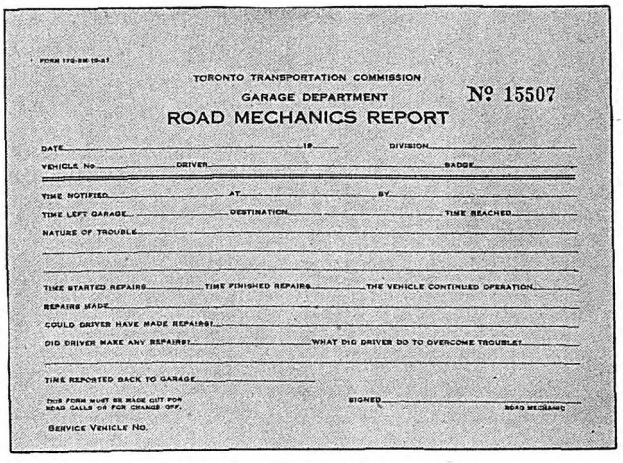
T.T.C.
Tire No.
Serial No.

	Vehicle No.	Date	Hour	Vehicle Mileage	Tire Miles	Total Tire Miles		Vehicle No.	Date	Hour	Vehicle Mileage	Tire Miles	Total Tire Miles
ON							ON						
OFF							OFF						
ON							ON						
OFF							OFF						
ON							ON						
OFF							OFF						
ON							ON						
OFF							OFF						

Remarks
Date Sold To $
Out of Service
Sent for Adjustment Credit

Tire Record

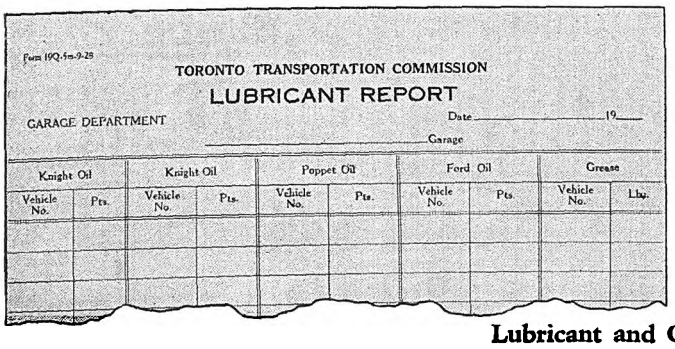
When a tire is placed in service or any change made to it, a record is transferred to this card from the "Tire On" and "Tire Off" card, and the mileage entered from the mileage book.


TORONTO TRANSPORTATION COMMISSION
GARAGE DEPARTMENT Nº 15507
ROAD MECHANICS REPORT

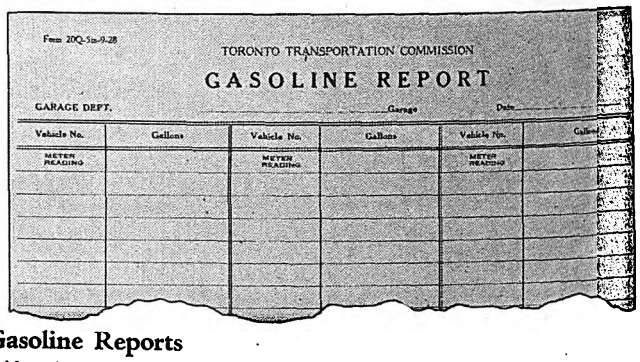
DATE 19 DIVISION
VEHICLE No DRIVER BADGE
TIME NOTIFIED AT BY
TIME LEFT GARAGE DESTINATION TIME REACHED
NATURE OF TROUBLE
TIME STARTED REPAIRS TIME FINISHED REPAIRS THE VEHICLE CONTINUED OPERATION
REPAIRS MADE
COULD DRIVER HAVE MADE REPAIRS?
DID DRIVER MAKE ANY REPAIRS? WHAT DID DRIVER DO TO OVERCOME TROUBLE?
TIME REPORTED BACK TO GARAGE
THIS FORM MUST BE MADE OUT FOR ROAD CALLS OR FOR CHANGE OFF. SIGNED ROAD MECHANIC
SERVICE VEHICLE NO.

Road Mechanic's Report

When a "trouble" call is received at the garage, the person taking the call enters on this report the time and destination of the bus and the nature of the trouble. The mechanic making the repairs fills in the rest of the form and turns in the completed report to the garage foreman.


Form 19Q-5m-9-28
TORONTO TRANSPORTATION COMMISSION
LUBRICANT REPORT
GARAGE DEPARTMENT Date 19
Garage

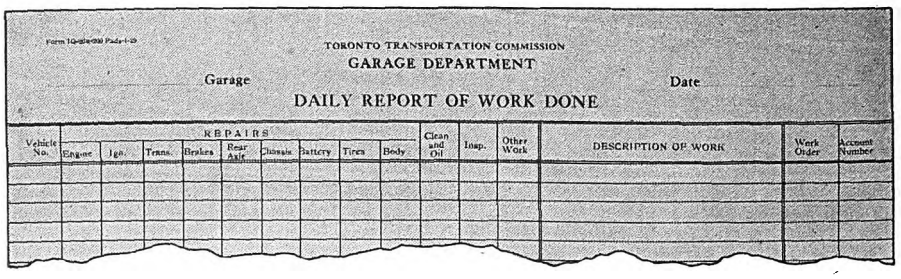
Knight Oil		Knight Oil		Poppet Oil		Ford Oil		Grease	
Vehicle No.	Pts.	Vehicle No.	Pts.	Vehicle No.	Pts.	Vehicle No.	Pts.	Vehicle No.	Lbs.


Form 20Q-5m-9-28
TORONTO TRANSPORTATION COMMISSION
GASOLINE REPORT
GARAGE DEPT. Garage Date

Vehicle No.	Gallons	Vehicle No.	Gallons	Vehicle No.	Gallons
METER READING		METER READING		METER READING	

Lubricant and Gasoline Reports

These are made up by the floorman on each shift, checked and entered in records in the office.


TORONTO TRANSPORTATION COMMISSION
GARAGE DEPARTMENT
Garage Date
DAILY REPORT OF WORK DONE

Vehicle No.	REPAIRS									Clean and Oil	Insp.	Other Work	DESCRIPTION OF WORK	Work Order	Account Number
	Engine	Ign.	Trans.	Brakes	Rear Axle	Chassis	Battery	Tires	Body						

Daily Report of Work Done

These are made out by mechanic, turned in to timekeeper, who sorts them and gives them to garage foreman, who in turn gives them to the gang foremen for their O.K. After this they are turned over to the timekeeper to be allotted account numbers and time distribution. Garage foreman finally checks the time sheets with the repair cards.

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garage building. All regular maintenance work is done here in connection with the vehicles operating from this point, as well as the major repairs and overhauls for all vehicles. All tire repairs are made here.

At the Sherbourne terminal for radial express and freight service downtown, part of the old street car shops were rearranged to give garage accommodation for 57 vehicles. All interurban and sightseeing coaches operate from here, as well as several bus routes operating in the east end of the city. Garage space is rented at Hamilton, Ontario, for cleaning and running repairs only and accommodation is furnished for whatever coaches are at this terminal overnight. The motor coach department, in charge of operation, has divisional offices in Davenport and Sherbourne garages and the garage department has its office at the Davenport garage.

Buses and coaches are allocated for their runs according to the schedules and requirements of the motor coach department. Assignments are posted on blackboards at the various garages. The buses are placed in readiness for the drivers with the appropriate run numbers and signs showing, and are booked out of the garage on leaving. On its return each vehicle is inspected, filled with gasoline and water, oiled and classified as for service, general inspection or repair. If it is classified for service, it is cleaned inside and out and placed in position for the next booking. Then the tires and battery are checked and minor adjustments made. A typical exit is shown in an accompanying illustration. Water is checked there. An air hose for tires is provided also. Extra seats are readily available, and the demountable side signs are racked near by, as well as the run number signs.

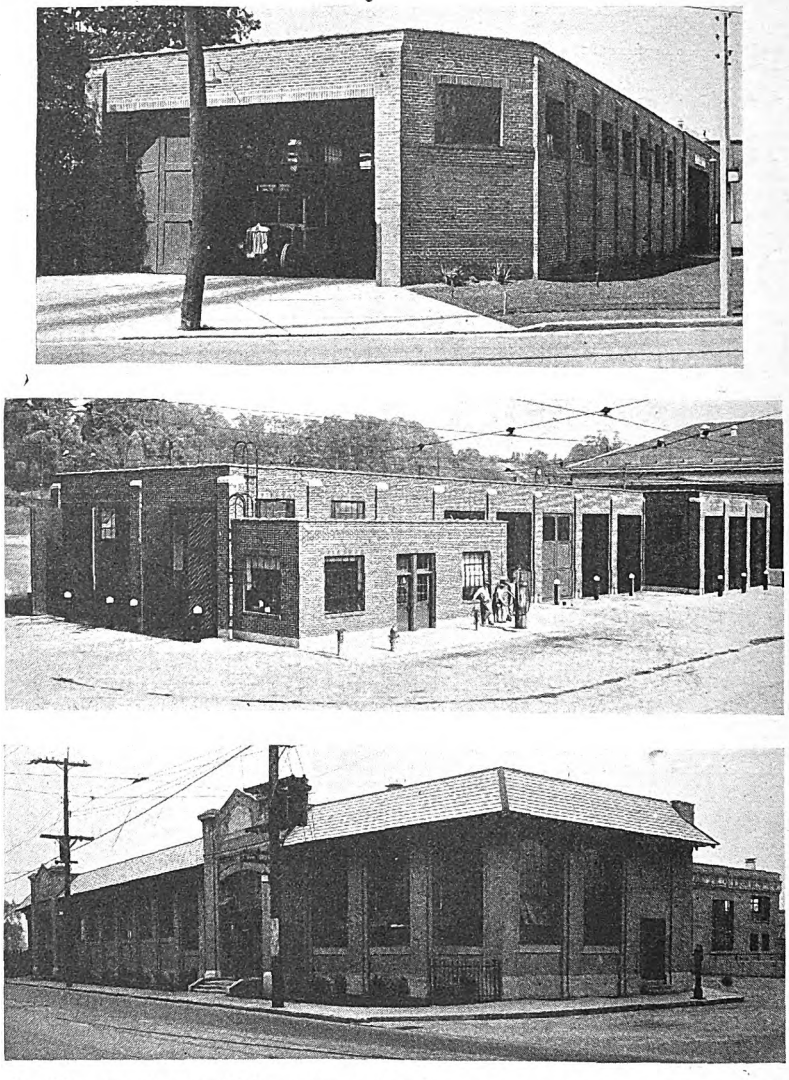
Greasing is done thoroughly every 1,250 miles and a general inspection is made every 2,500 miles. The vehicles are "called" the day previous to inspection. Of great value at this time is the record which has been kept of every defect of that particular vehicle since the last inspection. The work done at this time consists of thorough lubrication and a check over of all working parts and the body. The brakes are examined and tested. The engine is cleaned and tuned. Tires are carefully gone over for minor cuts and are replaced if necessary. Every effort is made here to insure uninterrupted service for the next 2,500 miles. Every 5,000 miles a more complete inspection is made.

Vehicles requiring major repairs on account of accident or breakdown, or on being due for general overhaul, are placed in special bays in readiness for the repair staff the following day. The overhaul period is about 65,000 miles, or every second year. At this time the engine and chassis are gone over thoroughly and all necessary replacements made to run a second period. However, as the equipment gets older the general overhaul process will gradually be changed to replacement of the major units at inspections.

The whole maintenance program is based on the mileage operated, which is tabulated daily for every vehicle. From this individual record the usefulness of any unit may be determined.

Garage equipment is not elaborate. Machine and blacksmith work is sent to the general shops. The four repair pits are adjacent to the tool-room and stores. Brake relining is done on a machine here and all air-brake equipment is rebuilt and tested in one department. The motor overhaul shop is alongside the tire shop. On the completion of the chassis work the vehicle is tested and then moved to the general shops for the body overhaul and painting. At this time improvements or additions are made as desired. With the finish of the painting the vehicle is then ready for the road.

The commission has found that best results are obtained when repair work on bus chassis is performed by a separate force than engaged in car repair work. Experience, however, has shown that the repair work on bus bodies can be more economically performed by the same staff which does the repair work on car bodies. This results in economy and keeps the bus maintenance staff down to a minimum.



Architectural simplicity gives pleasing appearance to garages of the Toronto Transportation Commission

At top, Howard Avenue—the first bus garage—built in 1921.
In center, garage for service trucks adjacent to Hillcrest general shops.
At bottom, Davenport garage, showing entrance drive at the right and exit door at left.

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Light Oils for CAR BEARINGS Have Possibilities

Experiments on Chicago Surface Lines and Chicago, North Shore & Milwaukee Railroad indicate that better lubrication with smaller temperature rises can be obtained by use of one grade of light oil for all season

By

E. H. HILLMAN

Technical Division, Standard Oil Company of Indiana, Chicago, Ill.

OILS which have a light body more like kerosene than like ordinary car lubricants, are now being used by some electric railways. They possess such a high degree of adhesion to metals that even after the journal has been at rest a long time sufficient oil remains to provide adequate lubrication and prevent overheating. Such oils have been used both on high-speed interurbans and on city street cars, with marked reductions in bearing temperatures as well as savings in energy consumption. Tests made on equipment of the Chicago Surface Lines and Chicago, North Shore & Milwaukee Railroad show many advantages for low viscosity oils.

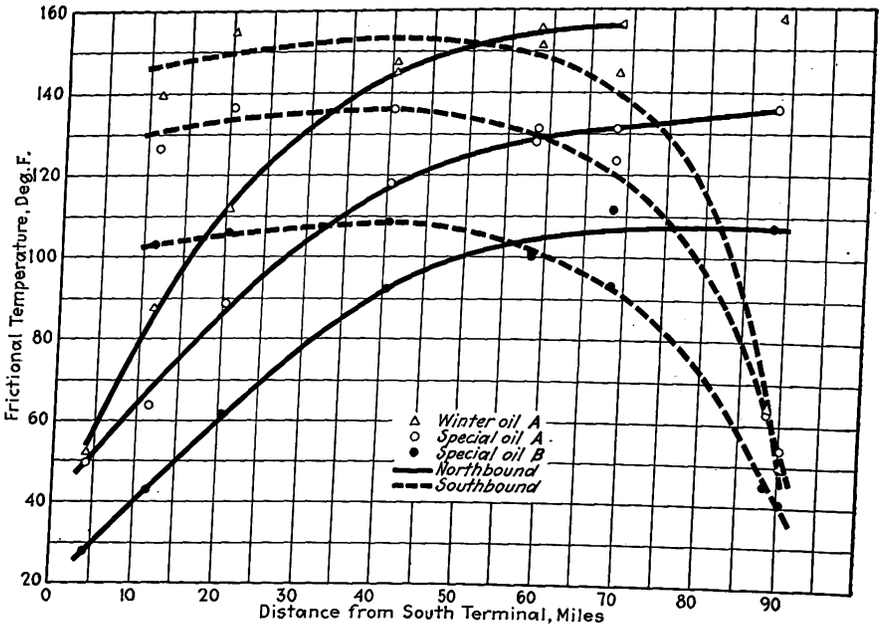

Fig. 1—Journal bearing temperature rise on high-speed interurban runs averaging 39 m.p.h. schedule speed between terminals. Five round trips were averaged for winter and special oil "A" and three for special oil "B"

Besides forming an oil layer between the brass and the journal, a good car oil must adhere strongly to the surfaces. Small amounts must remain even under the very high pressures and severe rubbing encountered when cars are accelerated or braked rapidly. This second requirement has been given the lesser consideration, but is really the more important. According to Karelitz[1] in the Westinghouse laboratories, the amount of oil supplied by capillary feed through waste is frequently negligible compared to the oil pumping capacity of the bearing. This indicates that oils which will feed rapidly and adhere tenaciously to the bearing surfaces can be used with advantage. Various car oils differ in this respect to a considerable extent.

In a typical journal box the waste must lift the oil several inches, at the same time retaining sufficient resiliency to maintain good contact with the journal in spite of a tendency to settle because of the jarring action of the truck.

Lubricants differ widely in their tendency to make a specified grade of waste become soggy and fall away from the journal. Oils differ also in their rate of feed through waste. To complicate matters further, various grades of waste possess different degrees of resiliency and capillarity—ability to maintain journal contact and draw up oil. Other things being equal, the lower the oil viscosity the faster it will feed and the more positive the resulting lubrication. The lighter oils usually have much less tendency to make the waste soggy or heavy. Soap fillers tend to reduce the rate of oil feed.

Adequate bearing lubrication requires an oil with suffi-

[1] *Valuable discussion of journal lubrication theories will be found in the works of the following authors: A. Kingsbury, W. H. Herschel, S. A. McKee, D. P. Barnard IV., W. J. Harrison, H. A. S. Howarth, Petroff, G. B. Karelitz.*

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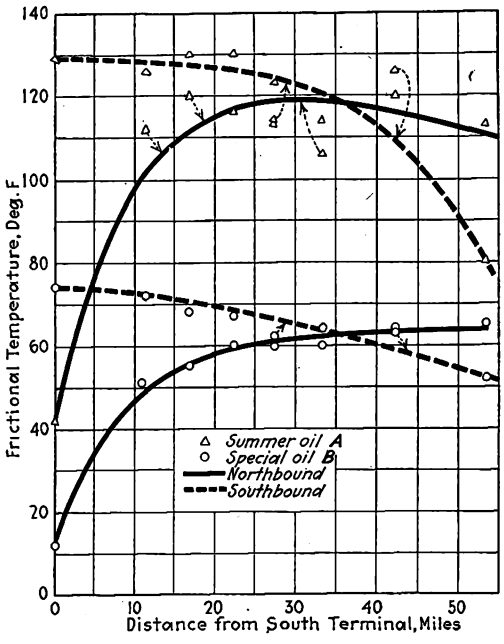

Fig. 2—Journal bearing temperature rise on moderate speed interurban runs averaging 25.6 m.p.h. schedule speed between terminals

cient body to form a fluid layer separating the journal and the bearing. This layer of oil is constantly being forced out at the edges of the bearing and as constantly being replenished by a new supply from the waste in contact with the oil. The usual practice has been to secure an oil film of the necessary thickness by making the oil so heavy that it could not readily be forced out of the bearing. Such an oil necessarily feeds more slowly through the waste, especially in cold weather. The rate of feed is reduced even more when soaps are compounded with car oils. The net result is that with a viscous oil there may be less oil on the bearing surface than with a thin oil. Heavy lubricants require more force to move the bearing surfaces over each other. This appreciable energy loss can, to a large extent, be avoided.

Light Car Oils Coming Into Use

Car oils have ordinarily been characterized by their high viscosity, running from about 200 seconds Saybolt at 100 deg. F. for a low viscosity winter oil to 1,000 seconds for a heavy summer grade. Light oils are not entirely new in railroad experience, however. Some years ago oils of about 57-66 viscosity at 100 deg. F. were in use on a French railroad.[2] More recently, Dr. W. B. D. Penniman of Baltimore[3] has done much to demonstrate the advantages of lubricants having low viscosity and high adhesiveness.

[2]*Proceedings International R.R. Assn., Vol. 7, No. 4, April, 1925.*
[3]Electric Railway Journal, *October 13, 1928.*

The tests described in this article were made jointly by the Standard Oil Company of Indiana, the Chicago Surface Lines and the Chicago, North Shore & Milwaukee Railroad to study further the possible merits and advantages of such low viscosity car oils. Tests were made in warm and cold weather, on both light and heavy cars under a variety of speed and service conditions. Of seven oils undergoing the test the first four were typical car oils of well-known brands, while the last three were made according to the principles previously outlined.

The boxes were packed by the regular oilers in the usual manner. No attempt was made to measure either oil or waste, but comparable conditions in lubrication were sought by having some free oil in the bottom of the boxes at all times. With heavy oils the waste holds

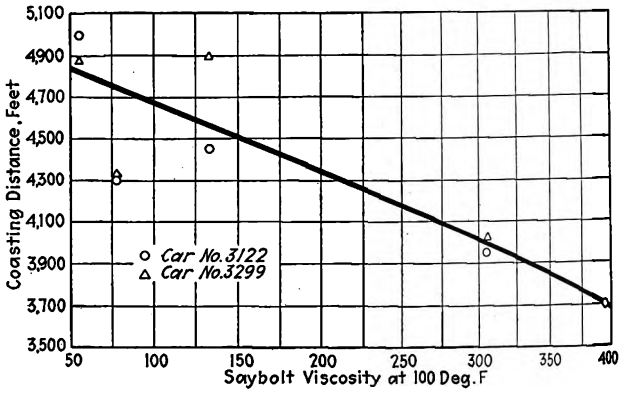

Fig. 3—Street car coasting tests conducted in La Salle Street tunnel, Chicago Surface Lines. Oil was changed in journal bearings only

much oil which will be forced out as it is pressed into the box. On the other hand, light oils drain very completely from the waste but feed rapidly due to their high capillarity.

During runs with the test cars bearing temperatures were taken by means of thermocouples inserted in holes drilled to the center of the brass, the end of the hole being as near the bearing surface as possible.

In regular service it was found impossible to standardize runs so that reliable data on relative energy consumption could be obtained. Therefore simulated service tests were arranged to show the differences in energy consumption between the various oils. For convenience, these are expressed in kilowatt-hours per car-mile.

These tests consisted of runs back and forth on a level track 1.781 miles long. On each run four starts at predetermined points were made, followed by running with maximum acceleration and full power for a fixed distance, then coasting to the next starting point. When bearing temperatures reached equilibrium, test runs (usually twenty) were made. Thus service operation was

TABLE I—STREET CAR RUNS—SIMULATED SERVICE CONDITIONS

Oil	Number of Tests	Number of Runs	Temperature, Deg. F. Journal	Temperature, Deg. F. Air	Temperature, Deg. F. Rise	Corrected Rise, Deg. F. Air*	Corrected Rise, Deg. F. Air and Speed†	Speeds, M.P.H. Schedule	Speeds, M.P.H. Running	Kw.-Hr. per C.M.	Relative Energy Used	Viscosity at Journal Bearing Temperature Saybolt	Viscosity at Journal Bearing Temperature Absolute
Special oil "B"	9	170	100.5	51.0	49.5	37.5	37	13.49	20.53	1.670	0.973	77	0.132
Winter oil "B"	7	130	129.0	57.5	71.5	59.0	60	13.49	19.80	1.716	1.00	148	0.282
Special oil "B"	5	100	111.5	67.5	44.0	39.5	37	13.49	21.33	1.662	0.968	68	0.104
Summer oil "B"	2	40	145.0	69.5	75.5	68.0	72	13.50	19.28	1.754	1.022	137	0.248
Special oil "A"	8	160	121.0	76.5	44.0	42.0	39	13.48	21.51	1.674	0.976	89	0.155
Special oil "C"	4	80	116.0	84.0	31.5	36.0	34	13.49	21.73	1.638	0.954	48	0.063

* Temperature rise (frictional temperature) corrected to an air temperature of 80 deg. F. was taken as standard since the data were not sufficient to estimate the rise for special oil "C" at lower temperature.

† Temperature rise corrected to an air temperature of 80 deg. F and a speed of 20 m.p.h.

These groups of runs are listed in the order in which the work was done. Each test represents a group made on the same day. Oils were changed in all bearings.

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simulated closely but the running speed of about 20 m.p.h. was higher than that ordinarily maintained. The same motorman operated the test car throughout.

In every instance journal bearing temperatures represent the average for the eight journals. In the street car tests armature and axle bearing temperatures were also taken. They show the same general trend but the temperature rises are lower and the average figures more erratic. Results of these tests are summarized in Table I.

Results of tests on regular suburban runs on different roads, at high and low schedule speeds, are shown in accompanying charts 1 and 2. The temperature rises are shown, as this eliminates variations due to differences in air temperature. Frictional heat represents lost energy; excessive heat represents inefficient lubrication and frequently excessive wear. These runs show the improved lubrication obtained with special oil "B." That energy which can be saved by improved oiling is limited, of course, as bearing friction is only one of the various energy losses which occur in moving a car.

Table II gives results of higher speed runs with the same street car used in the simulated service tests. The car made ten runs back and forth on a track 3.653 miles long, averaging 27.33 m.p.h. running and 23.49 m.p.h. schedule speed, after all bearings had reached an equilibrium temperature. As could have been predicted from the relation that fluid friction losses vary as the square of the speed, the actual savings with light oils are greater than in the low-speed runs. The proportional savings are also greater because relatively less energy is used in accelerating.

It was found that considerable variations in speed and energy consumption were caused by track and weather conditions, changes in line voltage, and sometimes by traffic interruptions. It was not possible to standardize these runs as carefully as those shown in Table I. This undoubtedly accounts for the advantage observed with special oil "A" as compared with "B" and for the difference between Winter "B" and Special "A," which is larger than would have been expected from their viscosities. The general trend is the same as in the other tests.

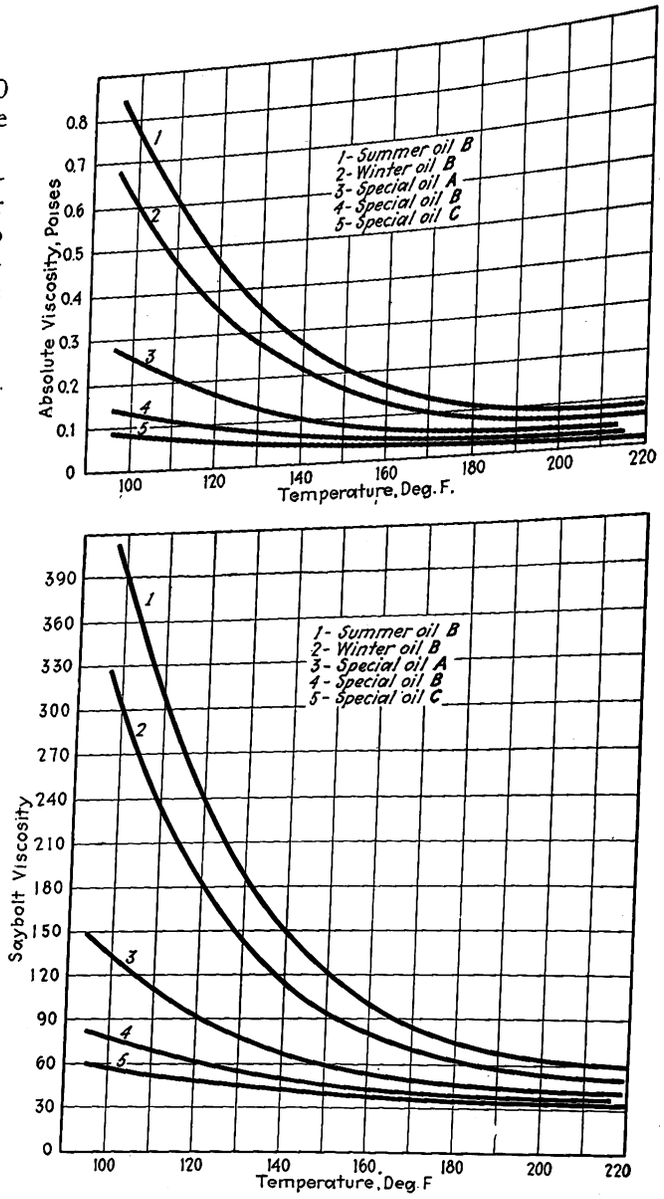

Fig. 4—Viscosity-temperature chart of oils used in street car tests. Absolute viscosities were used in all calculations since they are proportional to power loss in the oils. Special oils "B" and "C" possess a much more uniform viscosity at all temperatures

Street Car Coasting Tests

Relative friction with the various oils was further shown by coasting tests on a track between two grades, forming a valley with approximately equal slopes (La Salle Street tunnel, Chicago Surface Lines). The set cars were allowed to coast with trolley pole down and brakes released from slope to slope until they came to rest. The motion thus consisted of a series of oscillations. Before each test the car was run in service for a day or so to make sure that equilibrium conditions were obtained and was then taken directly from service to the test so that the bearings could not cool. The sum of these oscillations, averaging at least five tests for each oil, is shown graphically in Fig. 3. The accuracy is shown by the close agreement obtained with different cars at different times.

Tables I and II show the corrected temperature rise. Where other factors are kept uniform the temperature of the bearing does not remain at a constant difference above air temperature, the difference between air and bearing temperatures tending to decrease as the air temperature goes up.

The bearing temperature rises until the oil thins down to a point where the rate of heat generation is equal to the rate of dissipation. The rate of dissipation is dependent on the difference between air and bearing temperatures, but the rate of generation is dependent principally on oil viscosity at the operating temperatures. The higher the air temperature the lower the viscosity and the less the temperature rise. When air temperature is plotted against average journal bearing temperature for each oil, a family of curves is obtained which are almost straight lines at ordinary temperatures and are roughly parallel.

Such curves were drawn for each oil in the test and each point was moved parallel to it to a position opposite an arbitrarily selected standard air temperature from which the corresponding temperature rise was found. The resulting figures are only approximate since often there were not enough data to locate the curves accurately, but they more nearly represent true comparisons than do the uncorrected temperature readings.

In all the tests no special precautions were taken in the preparation or packing of bearings. The street car bearings were not machined or scraped. The interurban bearings were machined to $\frac{1}{32}$ in. oversize diameter.

The conclusion that no change in shop practice is necessary with the new oils was confirmed by large scale tests

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TABLE II—STREET CAR RUNS—HIGH SPEED. OIL CHANGED IN JOURNAL BEARINGS ONLY

Oil	Number of Tests	Number of Runs	Temperature, Deg. F. Journal	Air	Rise	Corrected Rise, Deg. F.*	Speed, M.P.H. Schedule	Running	Kw.-Hr. per C.M. (27.33 M.P.H.)	Relative Energy Used†	Viscosity at Journal Bearing Temperature Saybolt	Absolute
Winter oil "B"	3	30	173.0	28.0	145	91.0	23.52	27.33	2.113	.....	67	0.105
Special oil "A"	5	50	151.0	17.0	134.5	70.5	22.96	26.94	1.875	0.91	57	0.090
Special oil "B"	6	60	127.5	33.5	94.0	45.5	23.79	27.79	1.899	0.92	57	0.078
Winter oil "B"	4	40	158.0	25.5	132.5	75.0	23.88	27.22	2.052	.....	90	0.140

*Temperature rise corrected to an air temperature of 80 deg. F. and a running speed of 27.33 m.p.h.
†Based on average of two groups of runs with Winter "B" as 100 per cent.

Each test represents a group of ten runs made on the same day, in each instance bringing the bearing temperatures to equilibrium with air temperature before taking these data. The oils were changed in the eight journal bearings only. Since slower runs frequently were alternated with faster runs, there was no time for bearing temperatures to adjust themselves; hence temperatures shown here are averaged without correction for running speed.

on hundreds of street cars with special oil "B" and other oils of similar viscosity. The cars were lubricated with these oils without special instructions. No overheating was found except where a few cars with new bearings were sent on long trips without stops at the beginning of their runs. Even then hot boxes did not develop.

Axle and motor bearings carry lighter loads than car journals and hence are easier to lubricate. The street car tests confirmed this, showing lower temperatures on these bearings.

There was no trouble with the oils working out of motor bearings and into the windings. This will not occur in modern rolling stock equipped with overflow pockets, but it may cause some trouble on old equipment. No exact data were secured on oil consumption, but on all types of bearings observed it was only a little more with the lightest than with the most viscous oil.

The journal bearings on the street car were 4¼x8 in., giving a projected area of 34 sq.in. Since there were eight journals the total projected area was 272 sq.in. The car weighed 47,000 lb. The weight on the bearings was this, less the weight of the axles, wheels and half the motors, or 38,600 lb., making a bearing pressure of 142 lb. per square inch on the projected area.

The revolutionary nature of these experiments will be appreciated when it is remembered that such bearings have been lubricated at low speed, using waste, with an oil of 56 seconds Saybolt viscosity at 100 deg F. Others have lubricated similar bearings with an oil of 35 viscosity at 100 deg. F.

Summer and Winter Oils Not Needed

Heretofore car oils have been made in two grades—summer and winter. For instance, where the average summer and winter air temperatures are 80 and 25 deg. F., typical oils having viscosities of 100 and 46 at 210 deg. F. will both have a viscosity of 3,500 at the summer and winter temperatures respectively. This method of oil selection is faulty, as in summer or winter after a few minutes due to frictional heat the temperature rises above summer temperatures. As the frictional heat is less in summer than in winter, and as it was found that oils much lighter than those customary for winter lubrication could be used in hot weather, the theoretical advantage of two oils was largely removed.

Car oils are seldom changed in accordance with the seasons. Where boxes are repacked at intervals of three months or more, it is obvious that frequently summer oil will remain in use during the coldest weather, while the winter oil must lubricate on many a hot day. On steam roads, where boxes are repacked twice a year at most, the use of two oils has even less justification.

TABLE III—OILS USED IN TESTS

Oil	Viscosity at 100 Deg. F.	Calculated Viscosity at 0 Deg. F.
Summer "A"	629	150,000
Summer "B"	396	30,000
Winter "A"	272	15,000
Winter "B"	305	32,000
Special "A"	133	8,000
Special "B"	78	1,550
Special "C"	56	650

Oils such as special oil "B" or "C" can be used in hot weather and at the same time are more fluid at low temperatures than the old winter car oils.

Several distinct advantages result from the use of light car oils. These include (a) saving in energy consumption, (b) lower bearing temperatures resulting in fewer hot boxes, (c) less bearing wear, (d) longer life of waste, (e) same oil summer and winter, and (f) fewer pull-ins.

The results obtained on typical properties under (a) and (b) above have already been shown. Less bearing wear has not been proved experimentally but must follow from the power and temperature effects.

Waste will last longer with these oils on account of the entire absence of heavy ingredients which clog the waste, making it soggy. The dirty waste can be reclaimed with surprising ease and with a minimum loss. On some roads waste consumption was reduced greatly, while the time between reclaiming was much longer than with ordinary oils.

By reducing bearing friction greatly the use of an oil such as special "B" will reduce the need for roller bearings. Mechanical lubricators designed to replace waste will be of less advantage due to the increased life of the waste.

Car Oil Specifications

Future experience will show just how low in viscosity modern car oils can be made. Oils lighter than special "B" were not tried in the interurban tests, nor have they been given extensive street car service tests. For the present the following safe limits can be set for electric railway car journal oils:

Viscosity at 100 deg. F.—75 to 80.
Viscosity at 0 deg. F.—As low as possible consistent with the above.
Pour test—10 deg. below 0 deg. F.

The viscosity at 0 deg. F. is an important property which heretofore has been given little consideration. High fluidity at low temperatures is just as important as proper viscosity at ordinary temperatures. If the oil becomes too viscous when the car is at rest in the winter, proper feed through the waste may be interrupted and bearing friction increased. The maximum demand load will be decreased materially by the use of oils having low viscosity at low temperatures. This property of low viscosity at low temperatures has no relation to pour or solid point. The pour should be as low as the lowest probable winter temperature. Even a very light oil may have a high pour point due to the formation of wax crystals. The wax before solidifying is a very thin liquid.

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Attention to Fundamentals Reduces

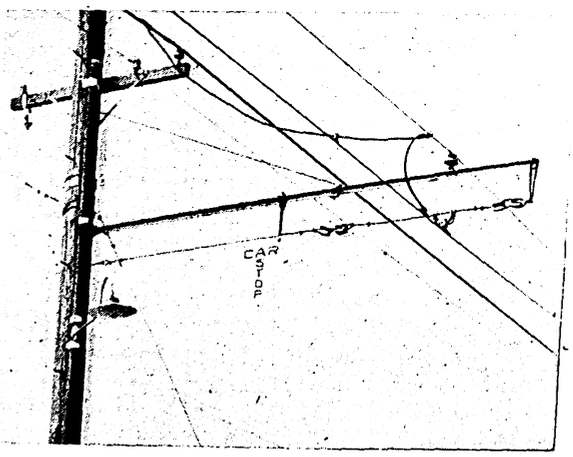
Overhead Maintenance

By
L. W. BIRCH
Assistant Manager Railway Division
Ohio Brass Company

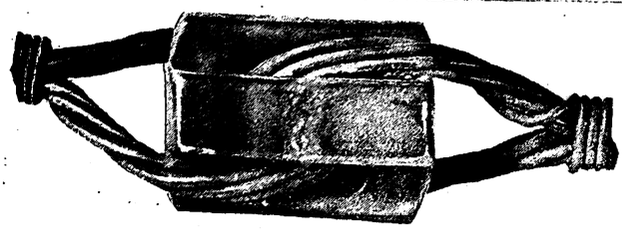
Use of high-grade materials and proper construction methods results in longer life and less need for repairs. Insulation is of the utmost importance

REDUCTION in maintenance costs usually is based on one fundamental principle. This is, "Build to stand." This principle obtains particularly in overhead work. The class A pole outlasts the second grade, the galvanized steel fitting resists corrosion better than the painted one, and double insulation in a span wire prevents an attempt to heat all outdoors through current leakage. Following this principle is far better than skimping and deferring needed repairs. The following discussion considers some of the recognized good practices, and some which are worthy of greater use than is found today. Every one of them is based on the principle of building to stand.

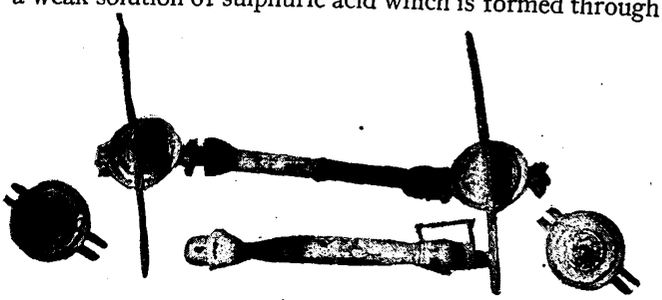
In some of the larger cities, particularly where the atmosphere is smoke laden, there is corrosion of the span wires. The same is true along the sea coast where salt fogs prevail. Corrosion of steel span wires, even though galvanized, may take place quickly in the presence of salt or smoke. It is produced by a number of conditions.



Leakage currents over the surface of insulators cause a plating action that deposits metal on the face of the porcelain, rendering it useless as a non-conductor



To begin with, the lineman, in serving a span wire at an insulator or fitting, strips a certain portion of the zinc coating off the wire by permitting the strands to slide between the cutting edges of his pliers. While this is a recognized method, it exposes the steel strand to the atmosphere, and rusting or corrosion immediately starts. When the span wire is attached to an insulator, particularly a span insulator, that is coated or dirty, leakage of current is likely to take place. This in turn sets up a plating action which not only tends to destroy the strand but also deposits a metallic conducting layer on the surface of the insulator. This plating action only takes place in the presence of some electrolyte, such as salt or a weak solution of sulphuric acid which is formed through the presence of sulphur in a smoke-laden atmosphere. Again, if the strand and the part to which it is connected are made of dissimilar metals the well-known battery or cell action is set up where an acid solution is present. Current leakage if of sufficient severity will burn the strand. This, of course, is not helped out materially by the choice of strand except in so far as a metallic deposit



An example of burning due to leakage of current in a salt fog vicinity. Flat spans did not permit the drip water to avoid the insulator. Greater slope to the span wire and drip points in the fittings would have decreased this trouble

Double insulation is good practice, especially in a coast district. Note that the porcelain strain insulators are connected in series on each side of the contact wire under the mast arm. Connections are made with clips which serve as drip points

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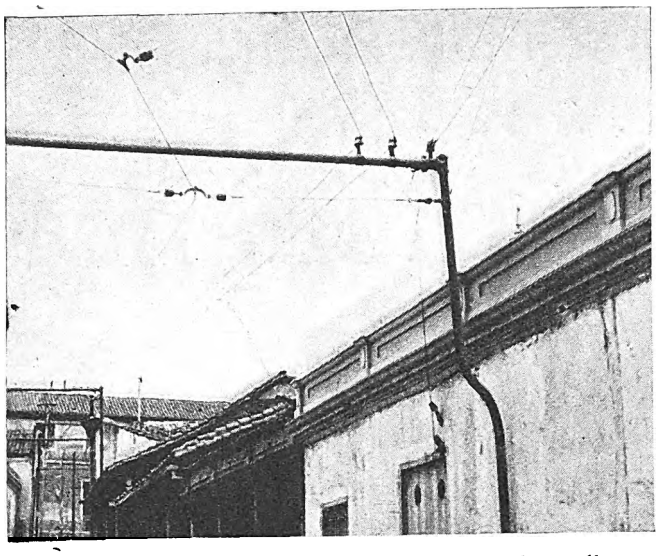


A contact wire does not have long life when only a few pull-overs are placed to support a curve. Excessive wear develops at the ear joints

on a span insulator might be averted, providing the plating action referred to has been stopped through the proper choice of materials.

To obviate such troubles as this, spans of non-ferrous material have been installed on a number of the larger properties. The practice was started along the seacoast where salt fogs prevail, but later several of the larger operators in the interior of the country began the use of non-ferrous span wires to reduce maintenance cost by safeguarding against corrosion. As an example of the difference, in Havana it formerly was necessary to replace ½-in. steel span wires at twelve-month intervals as they disintegrated through salt water corrosion. Now with non-ferrous wire a number of spans have been in use four years and the life of the span has not yet been determined.

Copper feed-in spans have been in use for many years. The life of these spans is usually much greater than that of a steel span in the same district, providing the copper span is not overworked mechanically. Of course, the non-ferrous span is more expensive in first cost, but if it lasts twice as long as a steel span it is a good investment when the cost of labor for replacing is included. It is not the purpose of the writer to advocate non-ferrous span wire universally instead of steel span wire. But there are many locations where the steel span wire has short life and must be constantly replaced. These locations warrant study and usually maintenance costs are decreased through the use of non-ferrous materials.

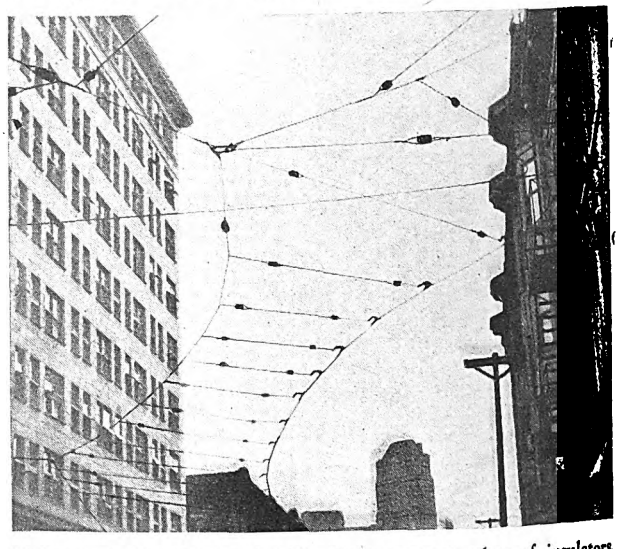
The use of non-ferrous strand must necessarily call for some study of fittings. A combination of bronze or copper strand with iron fittings tends to produce cell or battery action through the presence of the dissimilar metals. With a bronze or copper span wire, bronze fittings must necessarily be used in order to get full life out of the strand.

Span-Wire Tensions Vary Over a Wide Range

While there is no standard definition of tightness or looseness of a trolley wire span wire, a tight span wire is usually considered as one which is pulled up to the point where it is being worked close to its elastic limit at minimum temperatures. It is then working at its maximum allowable load under the most severe conditions. The loose span wire is permitted to sag deeply and is working at a reduced load with consequent reduction in side pull to the supporting pole. The tight span wire has an advantage for city work in that a shorter pole can be used. However, the side pull is of sufficient magnitude to require a fairly husky pole. While there is very little difference in the cushioning effect, the loose span wire will permit equalization of tension in successive spans. For instance, the "cutting-in" of a splicer may eliminate a few inches of trolley wire. This necessarily increases the tension which exists in this span but it can be equalized throughout a number of adjacent spans if fairly slack span wires are used. With very tight span wire, the span wires adjacent to the point where the splicer was inserted tend to act as anchors and pick up an additional load, thus imposing a greater side pull on the pole.

In the February *Aera* the subject of span-wire tension was discussed in the "Question Box." In the answers all types of city and interurban properties have been represented. It is interesting to note that one large property reports the tight span wire as correct, while an equally large property asserts the loose span wire to be satisfactory.

For city work where the number of car passengers is high and where the contact wire has a very short life, the equalization of tension in the span wire is of less



This curve is supported with the proper number of insulators. Note the double insulation in the pull-over wires

importance. The length of contact wire between turnouts and street intersections is comparatively short, consequently excessive trolley wire sags do not exist. On systems where the contact wire lasts for many years the question of slack in the contact wire is always a problem. Slack may be taken out of the wire at the splicer points and at special work. However, it often is necessary to cut the wire, pull out slack and insert a new splicer. If it is necessary to eliminate 1 ft. to 2 ft. of trolley wire to secure the proper sag and tension the tight span wire is a hindrance. The slack span wire will permit of some pulling without too great a loss of alignment at the ear. In brief, the ear need not be stripped from the wire when this pull is made.

There seems to be no difference in the pounding of ears under a tight or a loose span wire, provided the trolley wire is maintained at the proper tension.

Curves with too few pull-overs invite trolley wire wear at the pull-overs due to the change in direction of the wheel at these points. At the other extreme, if too many

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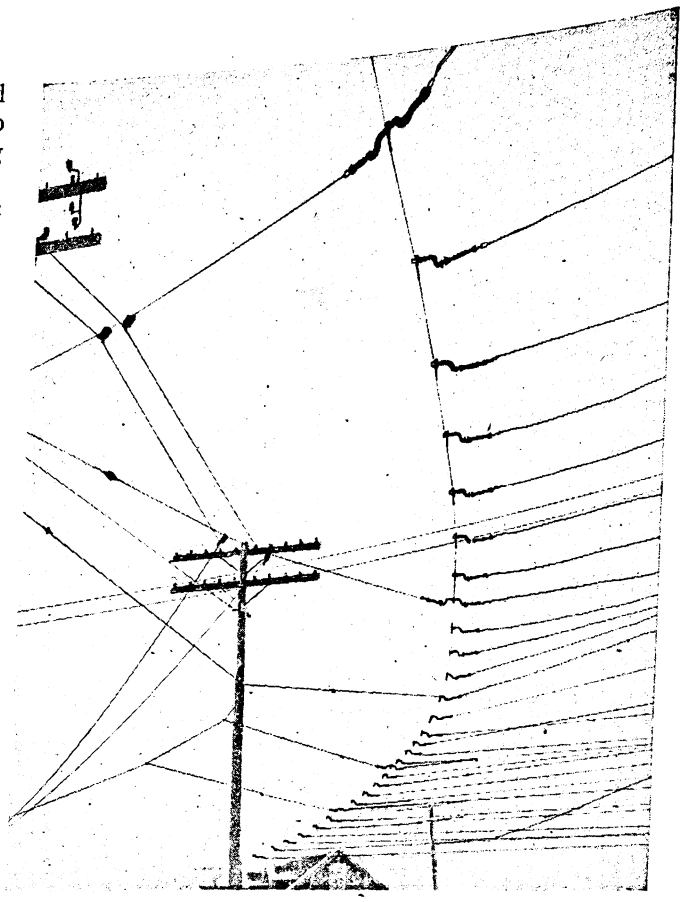
pull-overs are installed on the contact wire a more rigid system is secured and the side pull is not sufficient to prevent the weight of the pull-over fitting from tilting the ear and causing side-swipe.

The engineering manual of the American Electric Railway Engineering Association gives the following pull-over spacing for various curves:

Radius of Curve, Feet	Spacing of Pull-overs, Feet
40	7
50	8
60	9
70	10
80	11
90	12
100	13

This spacing is sufficient to maintain uniform curvature of contact wire and at the same time permit single curve pull-over fittings to hold their alignment and not permit the trolley wheel to strike the side of the trolley ear. The A.E.R.E.A. tabulation has worked out satisfactorily both from the standpoint of maintenance and from the standpoint of the theoretical number of pull-overs which should be used. Accompanying illustrations show the results of too few pull-overs as well as too many.

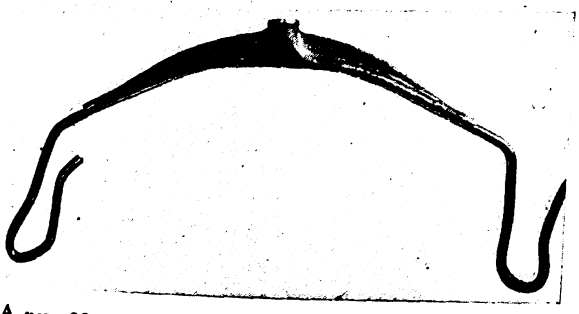


Too many pull-overs form a rigid overhead system. Usually it is impossible to maintain sufficient tension in the pull-over wires to prevent tilting of the fittings and side-swiping of the ears

Secondary Span Insulation Should Be Near Poles

Three types of span insulation are recognized as good practice: The wood stick insulator, the composition insulator, and the porcelain insulator. The present-day tendency is to use as much porcelain insulation in the overhead system as is consistent. Ordinarily, a porcelain strain insulator is inserted as a secondary insulation where an insulated hanger is used for supporting the trolley ear. Often the secondary insulation is placed within a few feet of the pole, while sometimes the insulation is carried farther into the span. As mentioned previously, corrosion of the span wire may occur through the leakage or plating action at the strain insulator. This leakage is greatest during rain, or when there is the most fluid or electrolyte on the insulator. Naturally the straight current leakage due to smoke or dirt deposit is greatest in the presence of water. Its slope forces the drops of water to run down the span wire to the first insulator or attachment in it. The water usually drops off where the attachment or the insulator forms drip points. These drops of water carry particles of dirt which further tend to increase leakage during a rain, although a dashing rain sometimes cleans the span wire and insulators, thus diminishing the leakage. For the above reason the secondary insulation in the span wire should be placed as near the supporting pole as the law will permit and should be so attached in the span that water drips from the span or attachment rather than from the insulator. Most span insulator attachments are shaped to permit this drip on the attachment rather than on the insulator.

There is a greater drip at the insulation nearest the contact wire whether it be a separate insulator or an insulated hanger. Usually the length of clear wire between contact wire and secondary insulation is greater than the length between secondary insulation and pole. Thus there is more opportunity for the collection of water and dirt and the insulation at or near the contact wire must stand more than the secondary insulation.



A new 00 trolley ear, 12 to 15 in. long, usually withstands 1,000 lb. dead load as this one did. Note the central holding section continues to surround the wire, while the approach ends are slightly loose

Long Trolley Ears Are Used Most

Proper length of trolley ears has been the subject of many discussions. There is no "best" length, inasmuch as various ears have their particular operating advantages. In the first place an ear must withstand the dead weight of the trolley wire and other fittings suspended from it, which in the 100-ft. span rarely exceeds 100 lb. A very short length of ear will hold a 100-lb. weight providing there is nothing to burn the ear or reduce the section through wear. The average clinch ear has sufficient length and section to support approximately 1,000 lb. This requires a middle section in the ear of approximately 6 in. Depending on the thickness of the lips, the approach section which is added to the holding section varies in length from 3 in. to 4½ in., making a total length of from 12 in. to 15 in., depending on the degree of grinding or sloping on the approach ends. The approach of an ear does not clamp the contact wire as tightly as does the center holding section, partly because the approach must permit the wheel to ride over the ear with as little bump as possible. However, the

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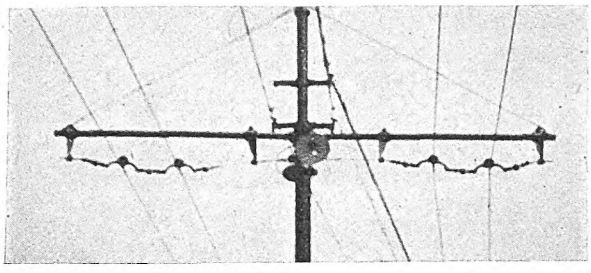
approach ends of an ear must also partially damp the wave produced in the trolley wire by the trolley pole and wheel. The gradual damping of this wave at the ear decreases the fatigue in the wire and prolongs its life. With the longer ear the trolley wheel approach is gradual and the shock of the wheel falls directly against the ear rather than beyond as it does with the short ear.



The secondary insulation between the positive and negative wires is so low it forms a drip point. The collection of sediment and eventual leakage of current and burning may be expected on the surface of the insulators

For the average 100-ft. span the 12-in. to 15-in. ear is giving the best results. With short pole spacing it is possible to use the short ear successfully inasmuch as the loads are lighter and the trolley wire sag in the short span is not sufficient to injure the wire at the ear point. An example is in catenary construction, where short clips or ears are used at frequent intervals. However, a recent survey of the power distribution committee of the Central Electric Railway Association found that approximately 95 per cent of the ears being used at the present time are 12 in. to 15 in. long.

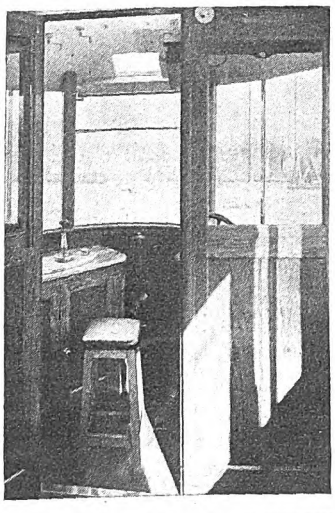
A survey of the complaints on radio interference in the states of Ohio, Kentucky and West Virginia in 1927 indicated that 5,900 complaints were received by 39 companies. Of the 5,900 complaints 14.4 per cent were due to street railway troubles. The sources of interference from street railways were classified as: (a) Poor rail bonding; (b) commutation of station converters and motor-generator sets; (c) commutation of car motors, and (d) trolley arcs.

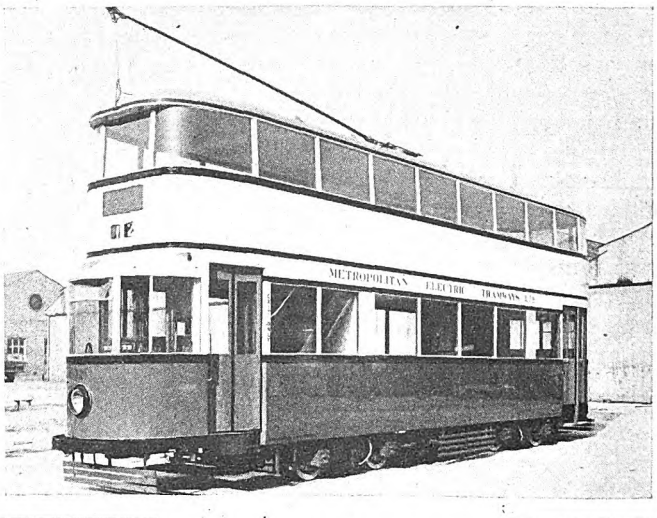
Special Cases of Trolley Arcing

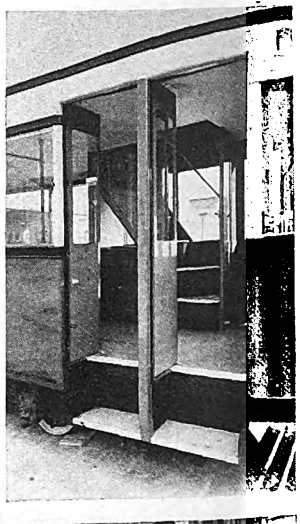
A few trolley arcs exist only when a car with the controller on passes a section insulator or an insulated cross-over. These points are carefully watched by the operating company. However, they fall in this classification and react directly on the maintenance of insulated parts and on the cost of radio interference. Besides arcs at section insulators and other insulated points frequent leaks have been found where the feed-in wire was loose in the feed tap, or where the solder had melted out due to a grounded trolley or overloading. Leakage of hangers or insulators will also produce annoyances which are classed as radio interferences. Fortunately the latter are few and only occur in extreme cases of poor maintenance or accidental line trouble.

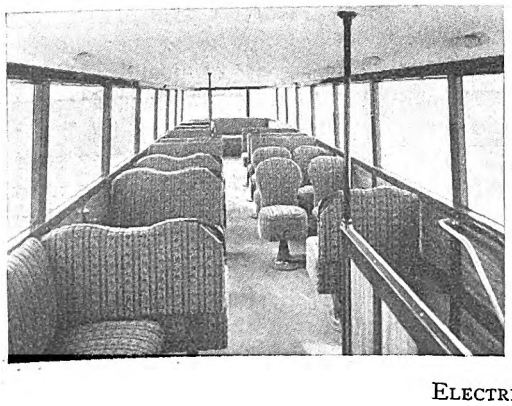
Another source of radio trouble is the trolley frog. Many of the older trolley frogs with the open pan permit the trolley wheel to jump as the wheel passes over the pan. An arc occurs and is readily picked up on the radio, even at some distance away. The newer types of frogs, such as those which permit the wheel to operate on the runner rather than the pan eliminate much of this jumping and reduce the arcing to a minimum.

New Type Car for Metropolitan Electric Tramways

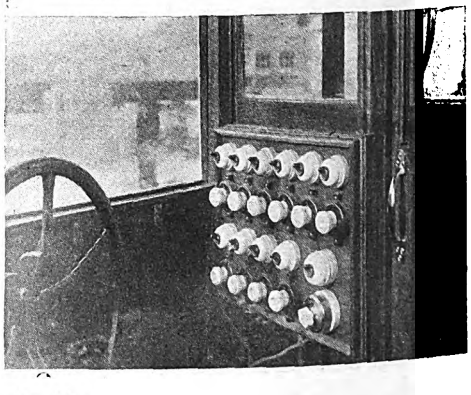








As a result of experience with two experimental cars, a new vehicle has been designed for the tramways of the London Underground group. Separate entrance and exit are provided. Cross seats have been installed, upholstered in moquette. The cab has a comfortable seat for the motorman. At his side are switches to control the lights. The car has four 35-hp. motors and eight-wheel electric brakes.



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Overcoming Controller Finger Trouble*

By H. J. Beadle
Dallas Railway & Terminal Company, Dallas, Tex.

For some time past trouble has been experienced on cars of the Dallas Railway due to sagging of the ground fingers on controllers. In many conditions they do not make contact with the ground conductor mounted on the insulation disk. With the original method for supporting the ground finger, shown in Fig. 1, the finger is rather flexible, so that a small bump causes it to sag below the disk, which carries the contact to the ground on the controller shaft.

In Fig. 2 a new method of supporting the ground finger is shown. In this a wooden block is attached to the back of the controller frame and the ground finger is screwed directly to the block. A solid support is thus made for the finger. The position of the conductor to the ground was changed as shown. With this construction we have been able to eliminate the extra angle piece which gave the trouble, and as a result we have avoided many pull-ins. This change has been made on 176 controllers and the ground fingers are kept in alignment with the disks without trouble.

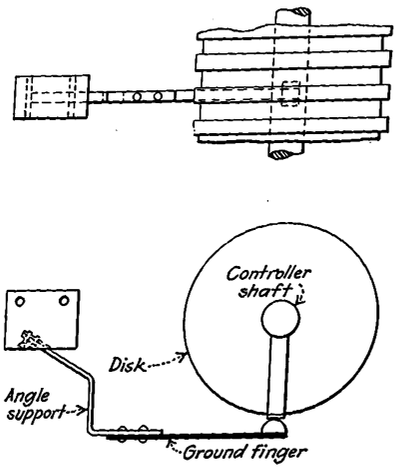

Fig. 1—Old type of construction for supporting ground finger

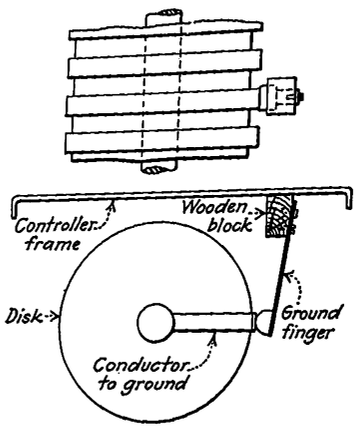

Fig. 2—New type of construction now used for ground fingers

*Submitted in Electric Railway Journal Prize Contest.

Expansion Joint for Girder Grooved Rail*

By C. R. Kinnear
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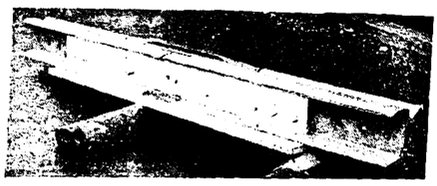
Toronto Transportation Commission,
Toronto, Canada

Following the adoption of the A.E.R.E.A. standard 7-in. 122-lb. girder grooved rail in 1921 by the Toronto Transportation Commission, it became necessary to procure an expansion joint primarily for use on bridges. Accordingly, a type of joint was designed and built by the way department, wherein the central or stationary portion is cut from a filled groove girder guard section rail with the guard left high at the center. The two end or traveling parts are of girder grooved rail and slide on the baseplate.

Wheels of cars are carried over the variable gap in the tread by the flange bearing section of the center piece, which has flange bearing risers at each end to lift the wheel to the minimum groove depth of $\frac{9}{16}$ in. The maximum expansion provided for use on lines of the Toronto Transportation Commission is 3 in.



Type of construction used for expansion joint of girder grooved rail

*Submitted in Electric Railway Journal Prize Contest.

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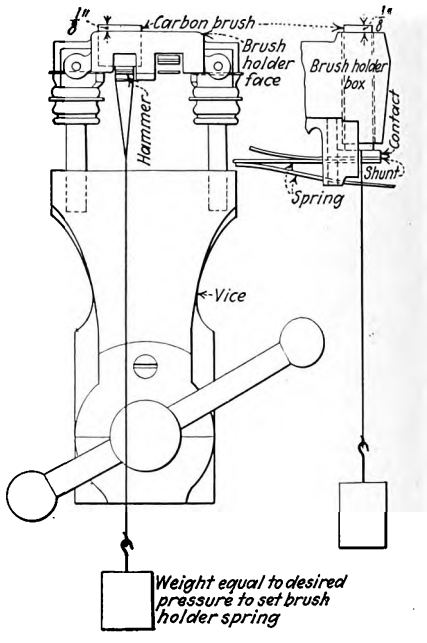
Method of Adjusting Brush Pressure*

By Arthur E. Clegg
Foreman Electrical Department
San Diego Electric Railway,
San Diego, Cal.

WHEN brush-holders are repaired it is the practice of the San Diego Electric Railway to adjust the pressure accurately. After defective parts have been replaced the brush-holder is clamped in a vice, with the hammers at the bottom as shown in the accompanying sketch. A carbon brush with a groove across the top is placed in the brush-holder box and a cord is placed around the hammer at the center of the carbon way. A weight is attached to the other end of the cord. This weight is just sufficient to give the proper amount of pressure.

If the weight does not balance the pressure of the hammer the ratchet is adjusted so as to change the brush pressure. Correct adjustment is obtained with the brush projecting $\frac{1}{8}$-in. outside the face of the brush-holder.

Proper brush pressure for the different types of motors has been determined and weights are made to be used in adjusting each type of brush-holder. These weights are stamped with the type of motor with which they are to be used. This method of measuring brush pressure provides a quick and accurate means of adjustment.



Method of adjusting brush pressure used by the San Diego Electric Railway

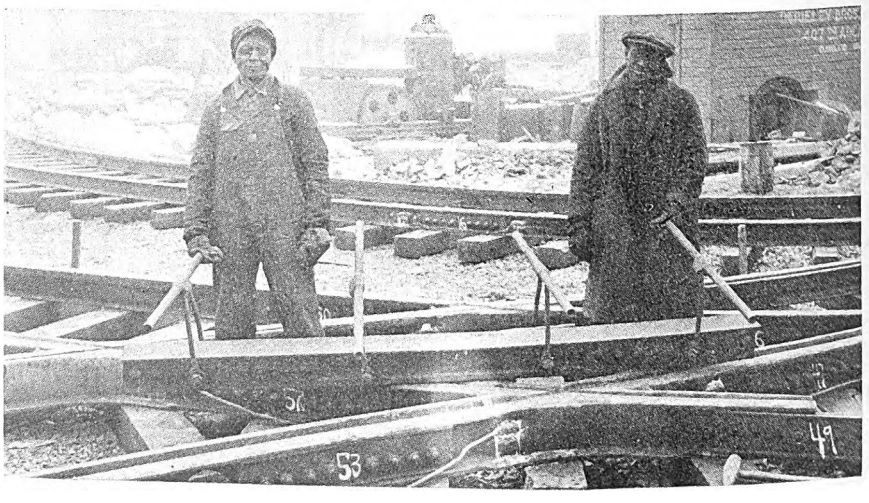
**Submitted in* Electric Railway Journal *Prize Contest.*

Bumping Rail for Installing Special Track Work*

By E. B. Spenzer
Way Department Cleveland Railway,
Cleveland, Ohio

WHEN installing special trackwork, a bumping rail is considered by the foremen of the Cleveland Railway to be an essential tool. A special rail is now used for this purpose; previously, a short length of standard rail was used. This was held by tongs and, in the course of the work, the tongs often slipped off, which was unsatisfactory. Moreover, it was usually hard to find a rail that would answer the purpose satisfactorily. With the use of the special bumping rail accidents and lost time have been cut down considerably.

The special bumping rail is 8 ft. long and weighs 500 lb. It is equipped with four sets of handles, placed 2 ft. apart. A pair of splices is riveted on each end of the rail to give more weight and to provide a broader surface. These bumping rails have fulfilled all expectations. The cost of changing from the old method to the new is only the cost of assembling.



Bumping rail in position for use

**Submitted in* Electric Railway Journal *Prize Contest.*

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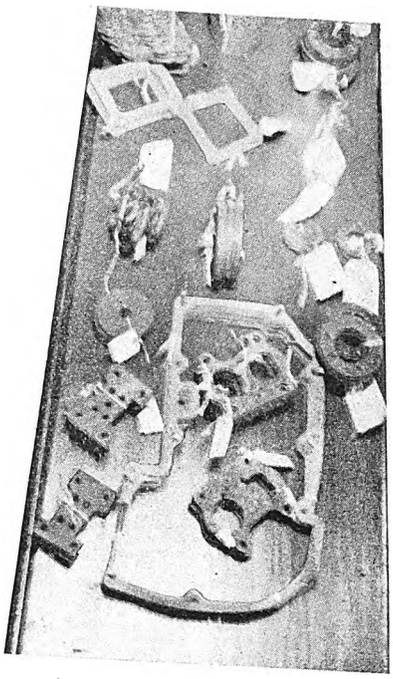
Method for Storing Air-Brake Gaskets

IMPROPER storage of air-brake gaskets in the store room of the Richmond Railways, Inc., Staten Island, N. Y., was the cause of a great deal of destruction until a method was devised as shown in the accompanying illustration. Previously, the gaskets were stored in bins and when a certain style gasket was required it was found necessary to remove practically all of them before the one desired could be found. This often resulted in destruction of some of them. At present they are stored on a common panel and the type is visible and marked plainly. Any gasket can now be picked up readily without disturbing the remaining ones.

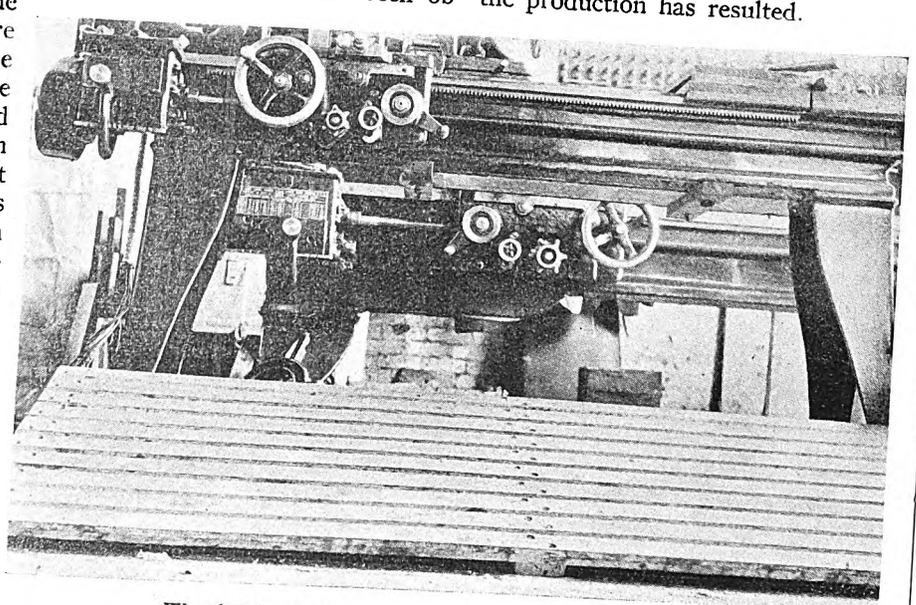
This arrangement improves the store room appearance, prevents unnecessary destruction and decreases the time required for the filling of orders.



Board for storage of gaskets

Strip Platforms Improve Production

IT WAS noticed in the shop of the Surface Transportation Company, bus subsidiary of the Third Avenue Railway, New York, N. Y., that there was a tendency on the part of the machine workers to slow up in the afternoon. Investigation disclosed the fact that they were standing on the hard concrete floor and that it tired their feet. Wood strip platforms were constructed and installed in front of each machine for the operators to stand upon. These platforms are made in various lengths and widths depending upon their location and the type of the machine they are used with. They are made of 1-in. x 2-in. maple strips, spaced $\frac{1}{2}$ in. apart. They are screwed to three $\frac{7}{8}$-in. x 3-in. maple cross strips. One of these platforms is shown in the accompanying illustration. Since these platforms have been installed, it has been observed that a vast improvement in the production has resulted.



Wood strip platform saves workmens' feet from fatigue due to standing all day on concrete

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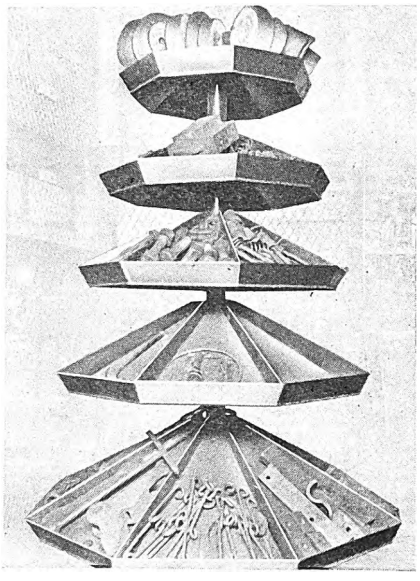


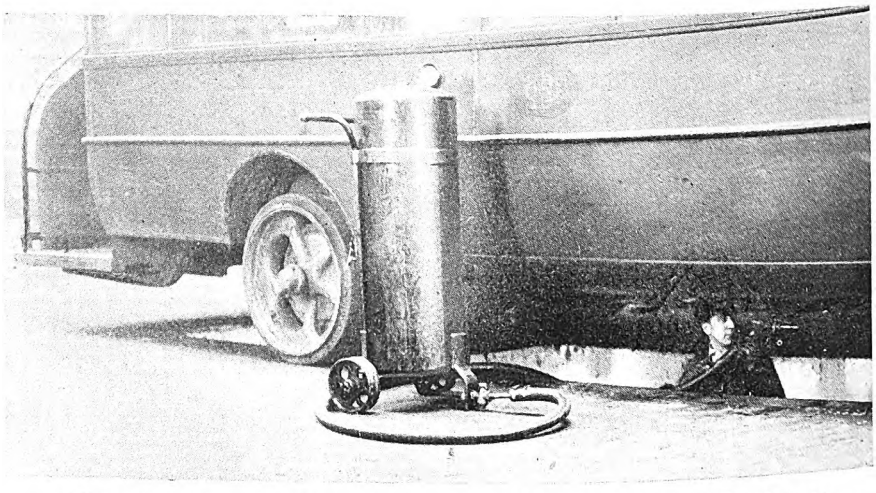
This rack permits of storing a vast quantity of small material and tools in a minimum of floor space

Revolving Tool and Material Rack

ONE of the most useful devices in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y., is a revolving tool and material rack. It is conical in shape, 72 in. high, and occupies a floor space of 2,500 sq.in. There are five octagon-shaped conical trays varying in diameter from 24 in. at the top to 50 in. at the bottom. These trays are made from $\frac{1}{8}$-in. sheet iron and all joints are welded. Each tray is partitioned into eight equal sections. They are welded to a $2\frac{1}{2}$-in. solid vertical shaft and arranged so that the three upper trays can be revolved independently of the two lower ones. The bottom of the shaft supporting the three upper trays is provided with a shoulder fitting into a piece of pipe welded to the top of the lower section of the shaft. This arrangement provides a bearing for the rotary movement of the three upper trays. The bottom of the shaft, to which is attached the two lower trays, fits into a special floor flange providing a bearing for revolving these trays.

Air Tank Converted to Portable Grease Reservoir

GREASING of bus transmissions and differentials has been expedited considerably at the Walden garage of the International Bus Company, Buffalo, by the use of a regular street car air reservoir as a grease supply tank. The tank, mounted in a frame on wheels, can be moved directly to the bus to be serviced. No. 600-W grease is forced under 80 lb. air pressure from the tank to transmission or differential through a 12-ft. length of $\frac{3}{4}$-in. flexible hose equipped with the usual grease gun nozzle and control valve.



Originally built as a street car air reservoir, this tank holds 100 lb. of grease for bus lubrication work

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Power and Line Maintenance Notes from Cleveland

Cable Rack Leakage Detector*

By F. W. Braund

Superintendent of Power Conversion Cleveland Railway, Cleveland, Ohio

CONNECTION between positive bus bars of conversion plants and the overhead distribution system of the Cleveland Railway is made by use of flameproof, rubber-covered cable installed in vertical iron pipes at the curb line. These pipes, into which additional insulation in the form of fiber duct is installed, are arranged in a group termed a feeder rack. Some method to determine the leakage between cables and the rack is of immense importance because continued leakage would have rather disastrous effects and perhaps cause serious interruption to service, particularly in non-attended stations.

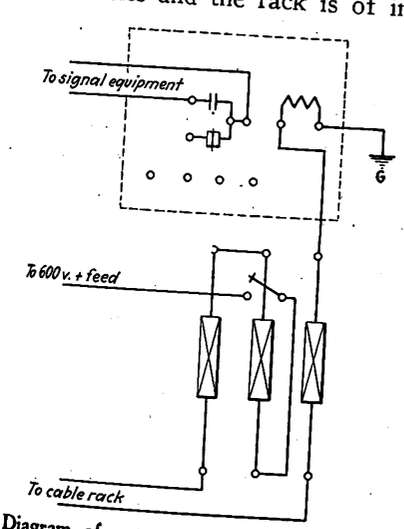

Diagram of connections for cable rack leakage detector

As a solution of this problem a standard voltage regulating relay has been adopted. This is equipped with a coil to operate contacts at approximately 20 volts. The positive lead of the coil is connected to the structural portion of the rack with the negative tied directly to ground. The contacts of the relay are wired so as to operate a signal at the load dispatcher's office in case of automatic plants, and a bell or trouble lamp within manually-operated plants. The accompanying diagram shows the connections.

To facilitate periodical calibrating and testing of the circuits of the rack leakage relay, a test circuit is arranged through resistance tubes from a 600-volt circuit. The amount of resistance is such as to give a feed to the coil of the relay of approximately 20 volts. With this test circuit a simulation of rack leakage potential can be set up on the rack for the purpose of checking the rack leakage detector's functioning.

Submitted in Electric Railway Journal Prize Contest.

Reclaiming Trolley Ears*

By Angus G. Scott

Assistant Superintendent of Overhead Lines Cleveland Railway, Cleveland, Ohio

BY MEANS of a machine for reclaiming slightly worn trolley ears in the overhead department of the Cleveland Railway, ears removed from the wire before they are worn out can be straightened and rendered fit for further service. Pole relocations, span rearrangements, removal of temporary trolley wires, as well as trolley renewals, require the removal of a surprisingly large number of trolley ears long before they are worn out. These ears are in good condition, except for the half moon bend caused by the stripping iron. It was found by experiment that this bend could not be removed satisfactorily or economically by hand. However, the saving possible warranted the construction of a simple machine to perform this operation.

The machine now in use resembles a letter press in appearance, into the base of which a die is fitted. This is cut to conform with the upper side of a new ear. The upper face of the press is movable and consists of a metal block connected to the top of a ball and socket joint, to a screw passing through the upper frame of the press. The lower face of this block consists of a metal strip which is shaped to correspond with the under side or groove of the ear.

The ear to be straightened is placed in the press, as shown in one of the accompanying illustrations. The boss rests on a coil spring extending up through the center of the lower die. The handwheel is turned to close the press and force the ear into the die. Moderate force applied to the wheel is sufficient to accomplish the desired results. Upon opening the press the spring in the base raises the ear to the position shown in the second illustration, from which it may be removed readily. The entire operation can be completed in less than a minute.

After reclaiming, the ears are used on temporary jobs, such as side-track trolley, temporary crossovers, etc. Each ear reclaimed represents a net saving of 45 cents. The Cleveland Railway used 573 reclaimed ears during the year 1928, which resulted in a saving of approximately $257.85.

Submitted in Electric Railway Journal Prize Contest.

At right, trolley ear in press for reclaiming. At left, straightened ear after the pressing operation

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LABOR-SAVING PRACTICES *from* Rolling Stock

Testing Insulation of Armatures During Baking*

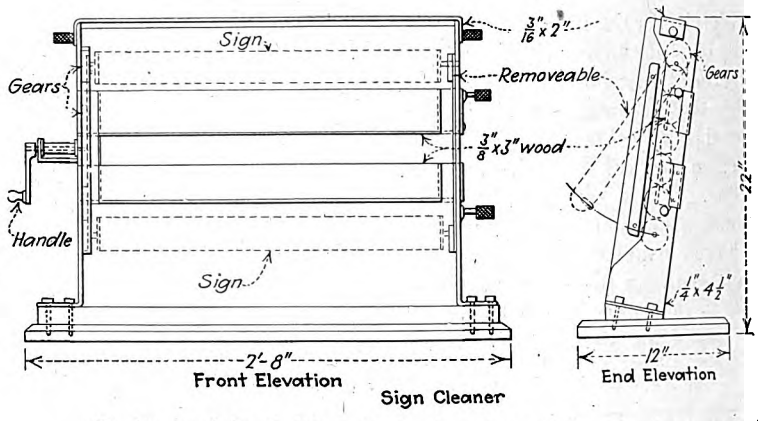
By A. J. Naquin
Equipment Engineer
Rolling Stock and Shops Department
New Orleans Public Service, Inc.,
New Orleans, La.

A TESTING set which provides easy and reliable means for checking the condition of armatures which are preheated or baked is used in the shops of the New Orleans Public Service, Inc. The equipment includes a Leeds & Northrup portable insulation testing instrument of the B battery type. This is wired to a special selector switch from which ten pairs of asbestos covered leads are wired permanently into the baking oven. Phosphor bronze spring clamps form the terminals of the leads inside the oven. The selector switch and the wiring must have a very high insulation resistance value of their own, otherwise a false reading may be obtained.

The accompanying illustration shows the connections of the testing set, the selector switch and the method of carrying the leads into the oven. It has now been in use for more than a year and its use soon showed that the length of time required for baking could be reduced safely. Before the testing set was installed armatures were baked a much longer time than was necessary in order to be on the safe side.

At the present time a reading of 600,000 or more ohms at an oven temperature of 210 deg. to 225 deg. F. is the passing limit. During the past year no armatures were lost during the final high potential test. Armatures which are dipped and baked are given a 1,500-volt test. Rewound armatures receive 2,000 volts. As a further check on the effectiveness of the dipping and baking methods employed, a total of 27 armatures were rewound during the year 1928, from a total of 1,100 motors in service. The cost of the testing equipment used in New Orleans is approximately $300.

**Submitted in* Electric Railway Journal *Prize Contest.*

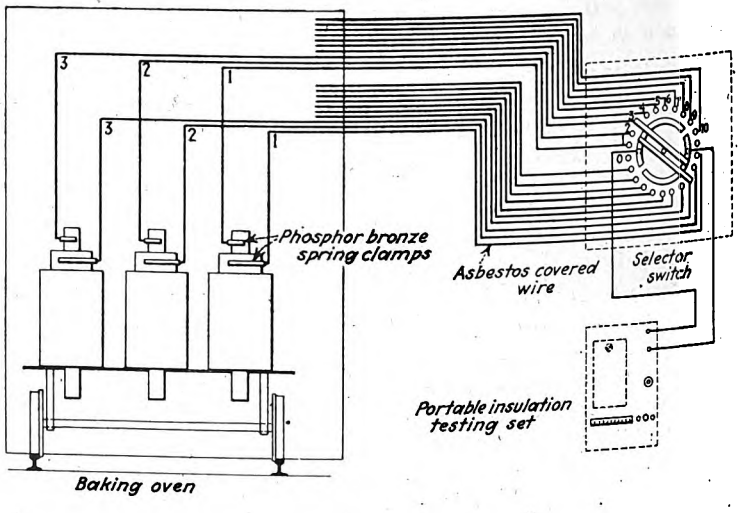


Device used for holding destination signs during cleaning

Roller Sign Holder Assists Cleaning*

By G. H. Watkin
Foreman Brooklyn City Railroad,
Brooklyn, N. Y.

CLEANING of Hunter roller destination signs in the shops of the Brooklyn City Railroad is facilitated by the use of a machine for rotating the signs. The equipment consists of two rollers held in position by two metal side pieces. A series of gears together with a handle connects the two rollers. Metal side pieces are arranged to be detached quickly for insertion and removal of the sign.



At left, armatures are tested during baking at shop of New Orleans Public Service, Inc. At right, connections for insulation test equipment

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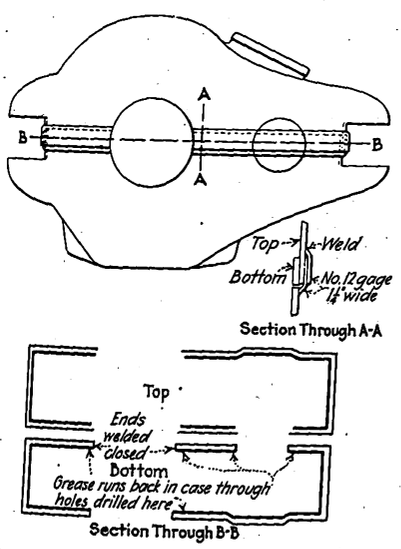
g Std Departments

The framework is mounted on a wooden base. Through the use of this equipment roller type destination signs having 59 destinations, with a width of 22 in., are cleaned in approximately five minutes. Without the machine the cleaning operation would take at least one-half hour.

Making Gear Cases Tight*

By Equipment Department
Georgia Power Company, Atlanta, Ga.

TO PREVENT loss of lubricant and to keep water and dirt from getting in gear cases, the Georgia Power Company welds strips to both the top and bottom halves to form a



Method of welding strips to gear cases to prevent water and dirt from getting in

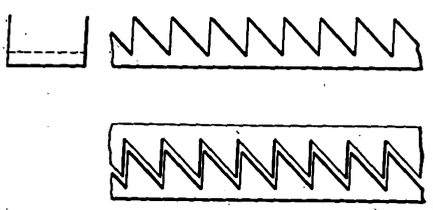
double-tongued joint. Holes of $\frac{3}{16}$-in. diameter are drilled at the bottom of the groove on the lower gear case, so that any grease that might otherwise escape will return into the case. The ends of this groove are welded closed at the axle and armature shaft openings of the case. This prevents any grease from escaping at these points, and reinforces the joint. The outside strip prevents water and dirt that may be thrown up by the wheels from entering the case.

**Submitted in* Electric Railway Journal *Prize Contest.*

Preventing Loose Armature Bands*

By F. A. Marsh
Superintendent of Equipment
St. Petersburg Municipal Railway,
St. Petersburg, Fla.

AFTER an extended trial of methods for banding armatures, the Municipal Railway of St. Petersburg has adopted a design wherein the



Armature band used by the St. Petersburg Municipal Railway is a tin trough with serrated edges

usual type of steel banding wire is used but the clips are omitted and a thin tin metal trough with serrated edges is used in their place. The wire band is wound in the tin trough and then the serrated edges are hammered down and soldered. A solid homogeneous band is thus formed which will not come off in regular service.

With the new type of band the wires are soldered firmly at the top and bottom, thus creating a solid metal band of great strength. These bands cost 35 per cent more than the usual type, but this additional cost is saved many times through the increased mileage that is obtained and through decrease in the number of loose wire bands and consequent destruction of armatures and fields.

Are You Overlooking the

MAINTENANCE CONTEST?

Entries for the Second Group of Prizes Close April 15

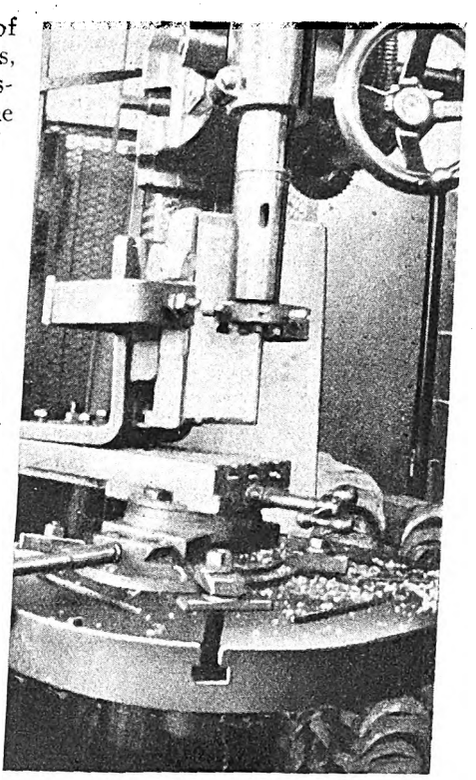
Separate prizes are awarded for items from each of the following departments:

EQUIPMENT	TRACK
BUS	ELECTRICAL

A photograph or sketch together with a letter describing a new maintenance device or method is all that is necessary to enter your ideas.

Journal Bearings Milled in a Drill Press*

By Harvey L. Bullock
Superintendent of Electrical Equipment
Cleveland Union Terminal, Cleveland, Ohio



Drill press attachment for milling journal bearings

AN ATTACHMENT for use with a vertical drill press has been found convenient for facing journal brasses in the White Plains machine shop of the New York Central Railroad. The journal box wedge is attached to an angle plate and the bearing is held in place by two side clamps. A special adjustable milling cutter is used in the drill press spindle. All sizes of journal bearings up to 6½x11 in. are machined rapidly. Bearings are checked for radius and thickness. This attachment provides a convenient method for doing this work in the absence of a special machine.

**Submitted in* Electric Railway Journal *Prize Contest.*

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Four Practical Ways to Cut Track Maintenance

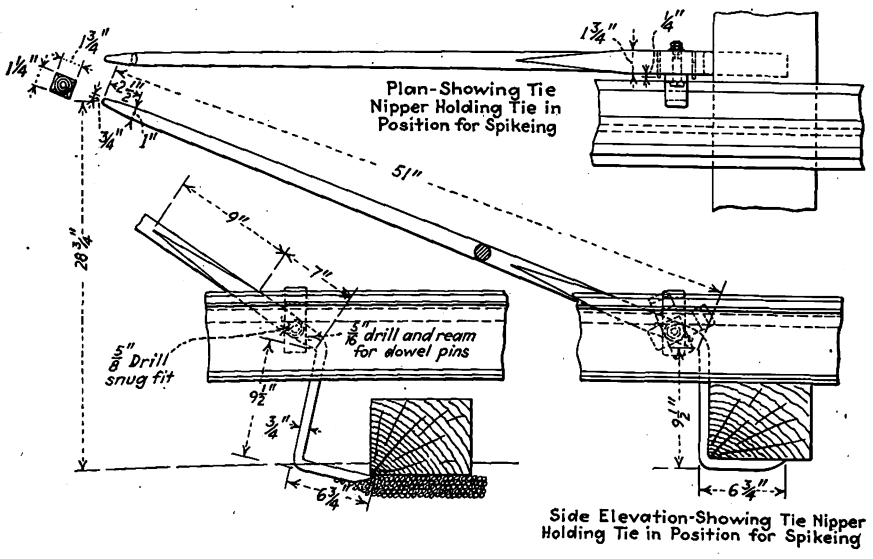
One-Man Tie Nipper*

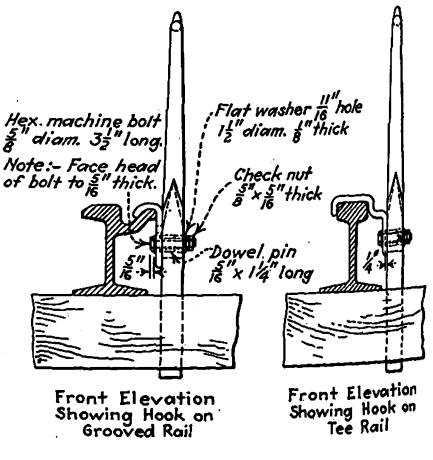
By Joseph Croyle
General Foreman Way Department
Cleveland Railway, Cleveland, Ohio

DESIGNED so that pressure on the lever arm brings the tie up snugly and firmly against the base of the rails during the process of spiking, a one-man tie nipper has been used by the Cleveland Railway during the season of 1928 with marked success. It can be used on any section of rail by changing the hangers as shown in the accompanying sketch. The change is carried out easily and with little work. By use of the nipper the number of men employed in the spiking crew is reduced to three instead of four, as is common practice on most roads. Its use also lessens the hazards of flying spikes and swinging mauls, thus minimizing accidents. The nipper is made easily and cheaply by any blacksmith, and costs little more than the two lining bars generally used for this purpose.

*Submitted in Electric Railway Journal Prize Contest.

Using the tie nipper while spiking special work in Cleveland. By its use one man out of the crew of four is eliminated





Construction details of the tie nipper and hangers

Track Switch Coil Cylinder Vise*

By Charles Herms
General Foreman, San Diego Electric Railway, San Diego, Cal.

CHANGING coils in track switch cylinders was always a two-man job on the San Diego Electric Railway, until a special type of vise was made to hold the cylinder firmly under the heavy strain. A clamp, 8 in. x 16 in., grips the cylinder so rigidly that there is no possibility of slipping. The cylinder is placed in the bottom section of the vise and the top section then placed on. This is hinged on an adjustable eyebolt which is on the opposite side from that shown in the accompanying illustration. With the top in position, the eyebolt *B* is engaged in the slot of the 1-in. x 3-in. plate and the top is screwed down by means of the clamp *A*. The wrench is next placed on the nut and a wedge is inserted in each corner to keep the wrench from slipping off.

The same procedure is used in installing the nut but it is necessary to compress the spring in the cylinder which formerly required two men, but by means of the compression clamps *C* and *D*, this can now be done

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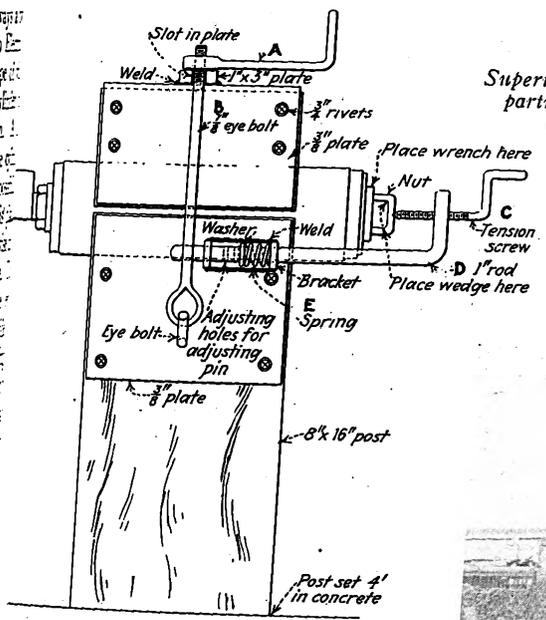
ys to k Maintenance Costs

by one man. The rod *D* is turned up until the tension screw *C* is centered and forced against the cylinder nut. This compresses the spring *E*, so that it acts as a take-up



Handy vise used for removing coils in track switch cylinders

until the nut has been screwed on a few threads. Otherwise it would be necessary to screw the crank C in at the same rate as the nut is screwed in. Several holes are drilled in the rod *D* behind the spring *E* so as to give a small range of adjustment should it be desired. When not in service the rod *D* is pushed back to the post, so that it will not occupy too much space.

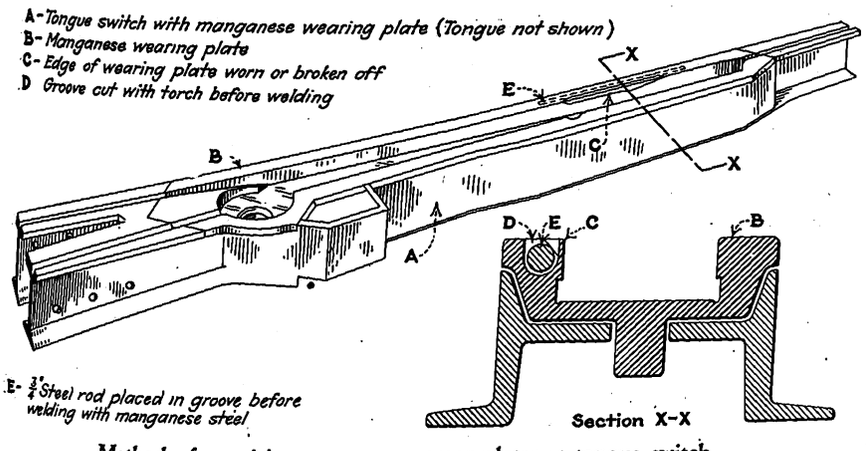
Repairing Manganese Wear Plates

By Louis T. Botto

Superintendent Maintenance of Way Department San Antonio Public Service Company, San Antonio, Tex.

For several years welders of the San Antonio Public Service Company have experienced difficulty in making repairs to manganese wearing plates in switch frames and in building up surfaces. Hair cracks are found across the middle and ends of the work. The switches have been in service from ten to sixteen years, and are worn to a considerable extent. Often they break through the manganese near the center of the switch piece.

An inexpensive method of making repairs which has been found to stand up remarkably well consists of incorporating a piece of ¾-in. round cold rolled tool-steel into the built-up section. The ends of the steel rod project into the sound part of the insert. A trench is cut with a torch and the steel rod fitted into this, after which it is built up.



Method of repairing manganese wear plates at tongue switch

Unloading Trestle Speeds Material Handling*

By C. B. Hall

Chief Clerk Mechanical Department Virginia Electric & Power Company, Norfolk, Va.

Confronted with difficulties in the company's yards due to slow unloading of coal, cinders, ballast, etc., J. C. Newman, engineer maintenance of way Virginia Electric & Power Company, planned and supervised the work of construction

Unloading trestle reduces demurrage charges

of a new trestle, which has resulted in a marked reduction in unloading costs. This trestle is of wood, 96 ft. long and has a concrete base 5 in. thick. Approaches to the trestle are on a 2 per cent grade. Rails are spiked to two 7x14-in. wooden stringers and steel tierods are used to hold the rails to gage. The work of constructing the trestle was completed in ten days at an approximate cost of $750.

There is also a considerable saving in time as previously a crew of six men required a ten-hour working day to complete the unloading routine, while now from six to eight cars are unloaded in the same working time.

**Submitted in* Electric Railway Journal *Prize Contest.*

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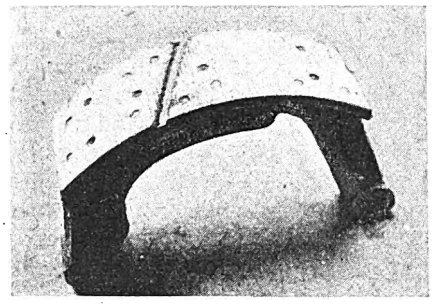
Putting Bus Maintenance Ideas *To Work*

Diagonal Cut in Brake Lining Lessens Glazing

GROOVING the brake lining across the middle for its full depth with a diagonal cut ½ in. wide, at a 60-deg. angle, has been found singularly effective in reducing trouble with the Timken mechanically-operated brakes on the Yellow coaches of the International Bus Company, Buffalo, N. Y. This brake



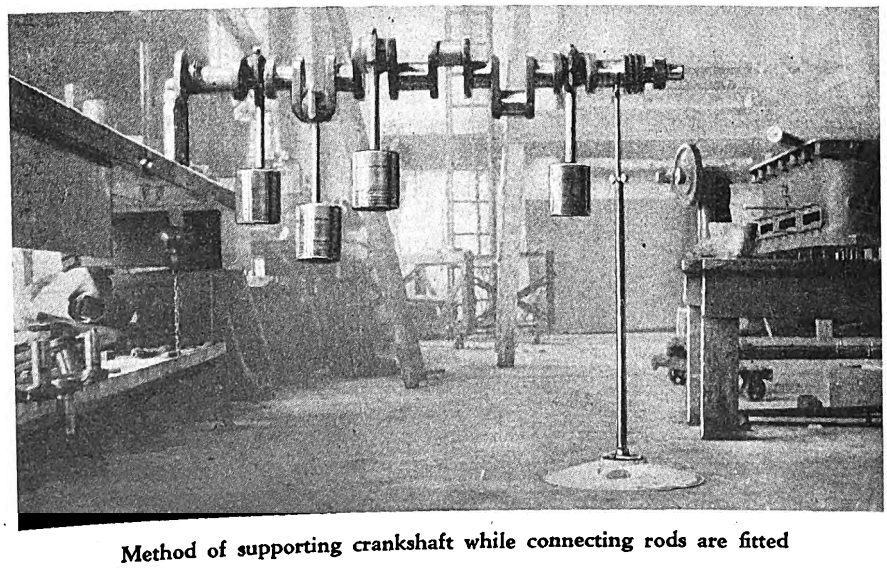
A diagonal groove cut across the face of the brake lining supplies an outlet for dirt particles that ordinarily would be ground into its surface

lining, which is 15½ in. long, 5 in. wide and $\frac{5}{16}$ in. thick, was found to be subject to glazing, which, in turn, produced squeaks and caused irregular wear. The groove apparently has been successful in affording an exit for particles of dirt, gravel, etc., which otherwise would remain inside to be ground into the surface of the brake lining by the shoe and cause trouble.

Crankshaft Supports for Fitting Connecting Rods

FITTING connecting rods to a crankshaft was always a cumbersome job in the shop of the Surface Transportation System, bus subsidiary of the Third Avenue Railway, New York, N. Y., until a method was adopted for supporting the shaft, as shown in the accompanying illustration. The shaft flange is now bolted to a bracket fastened to the upper surface of a work bench near the front edge. This bracket is made of ½x6-in. material. The foot is 4½ in. long and the upright 6½ in. long. The other end of the shaft is supported by a special adjustable stand. The base of this stand is made of sheet iron, is 14 in. in diameter and conical in shape. It is fitted with a ¾-in. pipe flange. A piece of ¾-in. pipe 26 in. long is screwed into this flange and is fitted with a winged cap at the top. This cap is drilled and tapped for a ½-in. bolt thread. A ½-in. rod provided with a jaw 3¼ in. wide and 1½ in. deep and threaded for a distance of 10 in. is screwed into the winged cap. Turning this cap to the right or to the left increases or decreases the height of the stand.

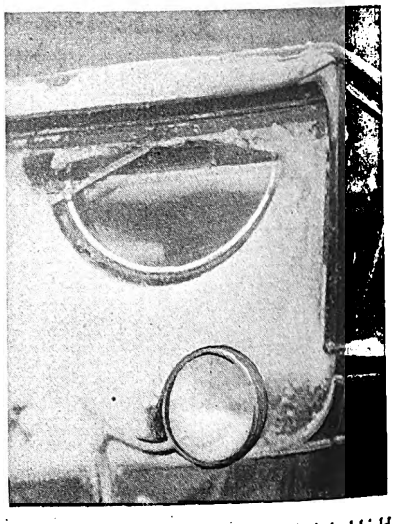
This arrangement permits of accessibility to all parts of the shaft, allows for free circular movement of the rods being fitted and tends to increase the production.



Method of supporting crankshaft while connecting rods are fitted

Heated Chamber Gives Clear Vision for Cars and Buses

TO PREVENT the formation of ice on the windshield of a bus, a heated chamber, 30 in. wide at the top with the bottom shaped in a circular arc slightly shorter than the



Heated chamber installed on the windshield

length of a swinging wiper, has been devised by Joseph O. Marcelais, car mechanic for the Fitchburg & Leominster Street Railway. The back of this chamber is a piece of slightly tinted optical glass fitted into the frame. The front surface is the windshield itself. Three resistance wires are run in the base of the frame. Perforations provide for circulation of air to prevent sweating. A three-way switch connects either one or all three of the wires for use, depending upon the severity of the weather. A cork filler is used to insulate the chamber from outside conditions.

When the air inside the chamber is heated, snow, ice and mist formations disappear and clear vision is obtained. The tinted glass protects the operator from the glare of approaching lights. It is also claimed to ease the strain on the eyes of the operator when glistening snow is on the ground.

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NEWS *of the Industry*

Supreme Court to Get Baltimore Case

An opinion just handed down by the Maryland Court of Appeals denies the United Railways & Electric Company, Baltimore, Md., its appeal for a higher rate of return. The opinion concludes the case in the Maryland courts and opens the way to carry the matter to the Supreme Court.

Some months ago the Court of Appeals remanded the case to the Maryland Public Service Commission. At that time the Supreme Court dismissed an appeal on the part of the company, holding that the case was still pending in the Maryland courts.

In the earlier case the company charged that the 6.25 per cent return fixed by the commission was confiscatory. The court remanded the case, however, on the ground that the Public Service Commission had based the depreciation allowance on cost instead of value. When the case was reconsidered by the commission the company was granted an increase in fare from 9 cents or three tokens for 25 cents to 10 cents cash or four tokens for 35 cents. The case again was carried through the courts and the recent opinion of the Court of Appeals brought it to an end in the Maryland tribunals.

Terms of Toronto Agreement Stand

No increase in wages, no vacation with pay as asked for by the men, and the abolition of extra pay for Sunday work, featured the report of D. W. Saunders and D. L. McCarthy, acting as arbitrators between the Toronto Transportation Commission and the local railway men's union.

The report, is not subject to appeal. It provides for overtime pay after the usual eight-hour-day, plus a half-hour leeway for shopmen and an extra half run for trainmen.

James Simpson, who represented the men, dissented. The arbitrators, in effect, rule that the old agreement will stand except for the fact that overtime will not be paid for Sunday.

A new element enters into the situation by reason of the offer of Manager Harvey, backed by the Board of Control, to restore the overtime rate for Sunday work in return for a three-year agreement, instead of the two-year award made by the board. This is a resumption of negotiations on a new line. As the Toronto *Globe* sees it, Mr. Harvey is evidently prepared to protect the public interests in so doing, because under the circumstances he represents the patrons of the system.

In its comment that paper says:

If his proposal involved an increase in fares he would find himself in trouble. Otherwise he is to be commended for making the offer. This overtime rate has been paid for a number of years, and, while the chairman of the board evidently believed that it was out of line with the usual overtime principle, it is doubtful if the people would object to paying the men working Sunday the extra sum for the loss of this universal day of rest.

Franchise Accepted in Jacksonville

John P. Ingle, manager Jacksonville Traction Company, Jacksonville, Fla., filed the company's acceptance to the proposed new franchise passed by the City Council on March 12. The matter is now ready for submission to the electors of Jacksonville, who probably will pass on the franchise after the general city election in June. The action of the Council and Mr. Ingle concluded negotiations between the city government and the company for more than two years.

When Mr. Ingle filed the formal acceptance of the franchise provisions on behalf of the company and Stone & Webster, Boston, Mass., operators of the company, he said in part:

While this franchise does not contain all of the provisions for which the company has contended and believed would be of mutual benefit to the city and the company, it is essential that the negotiations which have extended over a period of three years be ended.

We shall do everything in our power to give the city adequate transportation service, relying on the co-operation of City Council and the public in our efforts to fulfill these obligations.

Mayor John T. Alsop, Jr., expressed satisfaction at the action of the Council and the company, and indicated that he would sign the bill as soon as it was presented to him.

Improvement on Worcester Equipment Follows Editorial

Prompted by an editorial in the Worcester, Mass., *Telegram*, the Worcester Consolidated Street Railway has decided to have the words "emergency door" painted in red letters, 1½ or 2 in. high, on the emergency exit of every bus which the company operates. Work has already started on order of Vice-President Howard R. Whitney. Mr. Whitney investigated and found that the editorial was right in stating that the emergency doors at the rear of the buses are "so integral with the side of the vehicle as to be almost unseen despite signs."

North Jersey Commission for Co-ordination

The North Jersey Transit Commission submitted to the Legislature on March 11 a report presenting in further detail its plans for the development of transit in the metropolitan area of New Jersey with a view to its ultimate co-ordination with the interstate system outlined in the report of 1926.

The report recommends an elective northern New Jersey metropolitan board with power to finance, construct and administer the rapid transit system of the district, with supervision over water supply, sewage disposal, reclamation of salt meadows and subdivision control. The Port of New York Authority, as the most practicable existing agency with power to construct interstate traffic connections, is suggested as most suitable for co-operating with such a board.

The report explains that the commission's studies have been made available to the suburban transit engineering board and that until the task of co-ordinating the views of diverse locality interests affected has been completed, the commission will take no further steps. In the board's opinion Newark, by reason of its population, wealth, area and variety of industrial plants, is today the natural focus about which North Jersey development must center. To regulate and promote this development the commission recommends the creation of an elective North Jersey metropolitan board along lines suggested in a Senate joint resolution now pending in the Legislature.

Preparing for the Operation of New York's New Subways

Indications are that the city of New York will buy its power from the New York Edison and allied companies for the new municipal subways in course of construction. Chairman John H. Delaney, of the Board of Transportation, presiding at a hearing on March 26 said that bids, based on a price per unit of power delivered, would be submitted probably by June 1.

Unless the city builds its own power plant for supplying the new municipal subways, which is not contemplated, the New York Edison Company is practically the only source from which the city can draw. Even now both the Brooklyn-Manhattan Transit Company and the Interborough Rapid Transit Company purchase power. The city will go through the form of advertising bids because of the legal requirements.

The city decided against building its own power plant to supply the new city-

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owned subways on the advice of Stevens & Wood. They reported that great changes were taking place in methods of power development and that the city might find it advisable to make a contract for ten years with a private power company. Power requirements are estimated at 18,000 kw. the first year, rising to 209,000 within ten years.

Chairman Delaney asserted that the city would begin operation of the first part of its new subways probably in the spring of 1932. The section to be placed in operation is that of the Eighth Avenue-Washington Heights line from Fulton Street to 207th Street. Within a few months after the opening of that line operations will be extended to Brooklyn. Following the opening of the line to Brooklyn operations to Queens will be begun. The entire municipal system should be in operation by the middle of 1932.

Reduced Fares on Indiana Lines

To stimulate the passenger business during the coming summer and fall, the Evansville, Suburban & Newburgh Railway operating to Newburgh and Boonville, Ind., from Evansville, Ind., and the Evansville & Ohio Valley Railway operating railway lines to Grandview, Ind., and bus lines to Owensboro and Henderson, Ky., and to Mt. Vernon, Ind., will offer reduced half-fare rates on holidays and over the weekends.

Change in Commutation Tickets on Chicago Interurban

The Chicago, Aurora & Elgin Railroad has announced that commutation tickets now used between Chicago and the Fox Valley cities are interchangeable and may be used between Chicago and other points on the line. The 10 and 25-ride tickets, sold at $8 and $19 respectively, are good for one year from date of sale, but the 60-ride ticket, sold for $16, is good only for the calendar month in which it is issued.

Milo R. Maltbie Retained by Philadelphia

Following a conference of city officials of Philadelphia with Milo R. Maltbie, public utilities expert, it was announced that Mr. Maltbie and three of his assistants would return to Philadelphia from New York to work in conjunction with the firm of Haskins & Sells, accountants originally engaged to audit the books of the Philadelphia Rapid Transit Company. Mr. Maltbie's efforts, however, will be directed more specifically toward the engineering phases of the investigation.

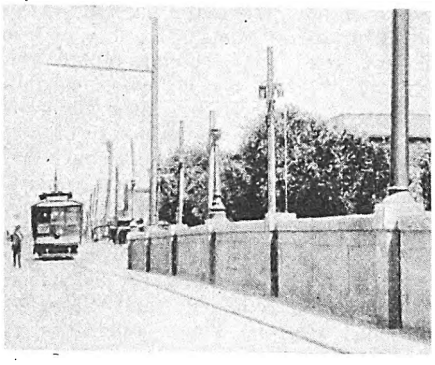
Parking Ban in Toledo Suggested

A city traffic commission appointed by Mayor W. T. Jackson, of Toledo, Ohio, has recommended to the City Council an ordinance to bar all parking in a downtown loop area.

Railroading in the Revolutionary Zone

While the average Mexican soldier, regular or irregular, is a notoriously bad shot, he is by the same token, inclined to be prodigal in his expenditure of ammunition, with resulting danger to the innocent bystander. So when the latest disturbances along the border got fairly under way and it began to appear that Juarez was about to change hands again, F. J. Gannon, manager El Paso Electric Company, influenced, possibly, by the slogan "The Street Cars Can't Dodge," and not caring to have his trainmen live the lives of clay pigeons, withdrew his rolling stock to American territory until the unpleasantness was over.

Long experience has taught them to do things well in El Paso. Whereas on the usual railway property it is customary to have weekday, Saturday and Sunday schedules, the El Paso management provides for revolutionary and peace-time schedules, and when the dispatcher learns that another revolt has



Last Car from Mexico Seeks Safety in U. S. A.

broken out across the line he simply says "ho hum," or words to that effect, posts the revolutionary schedule on the bulletin board, and without further instruction the trainmen arrange to turn their cars back at the river. Then follows the regular rush-hour problem of hauling American spectators to points of vantage along the river bank on the United States side from which to view the proceedings. Ordinarily, a good, stiff border battle, in which the principals are well known, will draw a bigger crowd than a bull fight. Attendance at a border battle, however, is not unaccompanied by hazard.

As previously stated, Mr. Gannon, who knows his *vivas,* had been advised that an attack was impending, and had turned off the power and withdrawn his cars to points of safety, with the consequence that the property was damaged only to the extent of a couple of broken span wires and some shattered insulators. On the other hand, the revoltosos displayed their thoughtfulness in cleaning up the damage within a few hours after the fracas so that Americans seeking their week-end stimulants could be accommodated with as little delay as possible. "Their thoughtfulness in this regard," writes Mr. Gannon, "probably prevented a heavy mortality on the American side of the line."

Now the situation is static, but Mr. Gannon expects a return to normalcy when the federalistas attempt a re-take. "My only fear," he writes, "is that the federal forces will use airplanes and bombs, and if they are as poor shots with bombs as they are with rifles El Paso will probably catch fits when they attack Fort Hidalgo, 4 miles away."

Prospects Bright for Chicago Legislation

Representatives of the Chicago electric railways, who during the week ended March 23 were reported to have withdrawn all opposition to the six legislative enabling bills, drafted by the citizens' traction settlement committee, have since notified the committee that they will not assent to any fixed-term franchise.

The six original bills in the settlement program, however, have been approved by the local transportation committee of the City Council.

In a formal statement introduced at a public hearing on the bills on March 25, the companies declared that they would not endorse the recommendation of the citizens' committee that a seventh bill be drawn to empower the city to grant a 40-year term franchise or an indeterminate permit.

The bill approved by the companies and the local transportation committee during the week ended March 23 authorizes the city to grant either a twenty-year franchise or a terminable permit. The statement protested against any change in the bills in their present form and warned the committee that such changes would stir up new issues and cause further delay. The companies have withdrawn their demand that the home-rule proposal should be conditional on the granting of a terminable permit to the new consolidated company.

The local transportation committee, however, is said to favor the terminable permit as the best form of contract with the company but desires the power to grant a 40-year franchise merely for the purpose of stopping opposition to the Council's program in seeking a referendum vote. In discussions on the 40-year amendment, several Aldermen argued that the twenty-year grant would not permit sound financing.

The public hearing sponsored by the local transit subcommittee was marked by a fiery denunciation of the measures by Judge John M. Harlan, representing the F. J. Lisman interests of New York. Mr. Harlan charged that under the proposed legislation the city would surrender to the new company all authority over the use of its streets in return for home rule.

As soon as the City Council passes on the bills, they will be introduced in the General Assembly at Springfield. The entire City Council membership plans to appear before Governor Emerson to ask his support of the program.

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Halt in Wage Action in Ontario

As no relief in the way of additional revenue is in sight for the London Street Railway, London, Ont., it appears that no further action will be taken by the employees to enforce the award made by the Railway Board. As a matter of fact, the city has not sufficient power to increase the fares as under the railway act for Ontario municipalities cannot increase railway fares beyond a maximum of 5 cents and the city so far has taken no action to have this clause amended or changed by the Provincial Legislature.

During 1928 many conferences were held with the employees of the company in reference to their application for an adjustment of wages filed with the company on Jan. 30, 1928. Under the wage agreement, notice may be given by the employees under a 60-day clause, asking for a revision of the wage scale, and this notice was served by the employees on Jan. 30. At all of these conferences the employees were advised that the company could not pay any increase in wages under the existing franchise with the city of London. However, during the month of November the employees threatened to go out on strike and the Ontario Railway and Municipal Board of Toronto, Ont., held a session to ascertain if anything could be done to settle the question.

Both the employees and the company agreed to refer the matter to the Ontario Railway and Municipal Board for investigation, and a further meeting was arranged by the Railway Board at Toronto on Dec. 18. The company presented statements of operating costs and information in reference to the additional operating costs on an adjustment of wages on the basis of the scale presented to the company by the employees at the previous conference.

The Ontario Railway and Municipal Board on Dec. 29, 1928, forwarded its award. Briefly, the board favored an increase of 2 cents an hour to motormen and conductors, increasing the general scale from 48 cents to 50 cents an hour and to one-man car operators an increase of 2 cents an hour which would increase the scale from 53 to 55 cents an hour. Bus operators were awarded an increase of 5 cents an hour, raising their pay from 50 to 55 cents an hour. A general increase of 2 cents an hour was awarded to all shopmen, trackmen and linemen. The award was dated from Dec. 1.

The management took the stand that, as no funds were available to pay wages on the basis of the award, it would be impossible to comply with the award. Employees were advised of this fact and at the same time informed that it would be necessary to have the matter referred to the directors of the company for their decision. The directors met on Feb. 6 and decided that it would be impossible to operate the railway and pay the award made by the board and the employees of the company were advised by letter on Feb. 8 that the directors regretted that they could not comply with the award made by the Ontario Railway and Municipal Board without creating a serious deficit in the operation of the railway.

No further action has been taken by the employees, who appear to realize that the company cannot meet the award of the board. In fact, on several occasions pay day has been deferred on account of insufficient funds to meet wages when due.

Paving to Be Done By Sioux Falls Company

The City Commission recently passed a motion requiring the Sioux Falls Traction Company, Sioux Falls, S. D., to pave between the street car rails on Sixth Street between Nesmith and Van Eps Avenues and on Van Eps Avenue from Sixth Street to Tenth Street. In the motion the city attorney was instructed to take steps to compel the company to pave, as it was instructed to do by the Supreme Court following a decision in the case of the city of Sioux Falls vs. the Sioux Falls Traction Company.

Railway Men on Baltimore Safety Council

Thomas A. Cross, a vice-president, and H. B. Potter, vice-president and general manager of the United Railways & Electric Company, Baltimore, Md., have been elected members of the executive committee of the Baltimore Safety Council.

Parking Rules in Chicago Amended

Amendments to the ordinance prohibiting week-day parking on downtown streets of Chicago were adopted recently by the City Council. These shorten the time limitation one-half hour in the late afternoon and correct certain legal errors in the original ordinance. The present no-parking hours on "loop" streets from 7 a.m. to 6.30 p.m. will be shortened to 6 p.m. upon recommendation of the committee on street traffic regulation.

The traffic committee which considered the matter of amendments also recommended that the ordinance be altered to permit trucks to park not more than 30 minutes for loading or unloading. The former ordinance, now under review by the courts, prohibits automobiles from "stopping" anywhere in the "loop," instead of prohibiting "parking." This provision was not worded in accordance with the recommendations of the traffic committee of the Chicago Association of Commerce, which sponsored the ordinance. The amended document corrects this defect and was passed with practically no organized opposition, indicating the success of the no-parking restriction after more than a year's experience.

City Directors Play Small Part in Philadelphia Deliberations

Declaring "no self-respecting citizen could continue on the Philadelphia Rapid Transit board of directors as a representative of the city unless there is change," Ernest T. Trigg caused a stir among City Councilmen on March 21 in a criticism of Philadelphia Rapid Transit business methods.

During the long discussion of the matter in which he contended city directors on the board of the railway company have been reduced to a situation of complete unimportance in formulating its plans and policies, Mr. Trigg contributed an earnest statement calling for action by City Council, but he qualified his remarks by saying he believed the Philadelphia Rapid Transit Company would act to make the city directors play the part in the affairs of the company they should.

Denial Issued on Equitable Coach Application

Transit Commissioner Leon G. Godley denied on March 28 the Equitable Coach Company's application for a certificate of convenience and necessity to operate buses in Manhattan, Brooklyn and Queens, New York, under the franchise voted by the Board of Estimate on July 28, 1927. The franchise itself would be revoked by the board shortly, it was said at City Hall. Commissioner Godley's decision was on the ground that his inspection of a financing plan submitted to him by the company recently disclosed that the Equitable was not only "a financial cripple from the start" but was "suffering from a complete financial paralysis" and was therefore in no position to supply a bus service commensurate with the public need.

Revocation of the franchise will end further investigation by the city of the "slush fund" charge raised in connection with the Equitable's unsuccessful attempt to put through a merger of its Brooklyn and Queens routes with the Brooklyn-Manhattan Transit surface lines.

New York Session Ends

The 152d session of the New York State Legislature adjourned on March 23 with many bills dying in committee, among them the transit unification bill for New York City. Measures that passed of interest to utilities were the two-cent gasoline tax effective May 1 and the investigation by commissions of practical working of the public service law. Measures that failed were the ambulance-chasing legislation and the suburban passenger traffic inquiry by Port Authority. Bills affecting New York City which failed of passage were the creation of a sanitation department and the board of control for unified city operation of subways, to which reference has been made before.

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Convention Plans Fast Maturing

Program practically completed. Unusual facilities for the exhibits, with good arrangement for rolling stock display

REPORTS of standing and special committees of the American Electric Railway Association made at a regular meeting of the executive committee held at association headquarters in New York on March 22, 1929, indicate that the association's work for the year has been advanced since the last meeting, and that plans for the annual convention are rapidly taking definite shape. At the same time, reports made by the presidents of the several affiliated associations reflect the progress being made by committees of the Accountants, Claims, Engineering and the Transportation and Traffic Associations.

T. A. Kenny, chairman of the program committee, reported that the convention program has been practically completed, and that the various speakers selected are being invited to participate. Chairman J. H. Hanna, of the exhibit committee, expressed his gratification at the progress made in completing the new exhibit hall at Atlantic City, and was quite confident that the facilities afforded by the new auditorioum would amaze and delight the entire industry.

Chairman Hanna called particular attention to the unusual facilities that will be available for a representative car exhibit. The space for showing cars will be on a decorative plaza which is being built on the ocean side of the boardwalk in front of the new auditorium, with space for fifteen city type cars on curved tracks laid on this plaza and with direct track connections from one of the streets at the side of the auditorium. In this setting, it was the consensus of opinion, this year's car exhibit will be in the finest spot for the purpose to be found anywhere in the country. It was considered important, therefore, that a really representative exhibit of modern cars be staged for the publicity value to the industry which would result from the location that is to be available this year.

Chairman Hanna reported that there have been only two affirmative replies to letters of inquiry sent to car builders regarding their plans for exhibiting modern types of cars, and he requested the co-operation of the executive committee and the special manufacturer's committee in arousing the car builders to an interest in the importance of this exhibit.

Report on Pacific Coast Conference

Reports of other standing and special committees included those on publicity, membership, finance, national relations, publications, hotel arrangements, Coffin Award, education, insurance, research, taxation and street traffic economics.

Managing Director L. S. Storrs reported on the conference of Pacific Coast executives recently held in San Francisco under the auspices of the Advisory Council. He felt that the plan of holding a series of similar conferences in various sections of the country should be pushed. J. N. Shannahan, chairman of the Advisory Council, asked for an expression of opinion from the members of the executive committee as to the value of sectional meetings of this kind. It seemed to be the consensus of opinion of the entire executive committee that such sectional meetings for principal operating executives, with no fixed program, for the frank discussion of the problems and outlook for the industry, are very much worth while. Past-president W. H. Sawyer declared that the justification and need for such meetings was so manifest as not to warrant discussion, the only question being the number of meetings of this kind which the chairman of the Advisory Council, the president of the association and the managing director could find the time to attend.

Managing Director Storrs informed the executive committee of his acceptance of the position of executive chairman of the board of directors of the United Railways & Electric Company, Baltimore, which would necessitate his resignation as managing director, to become effective April 1, 1929. Mr. Shannahan expressed the regret which the industry, the association and the Advisory Council would feel at this loss of the active services of Mr. Storrs, and suggested the appointment of a committee to draw up suitable resolutions regarding the service which Mr. Storrs has performed for the industry during the four years since he undertook the work as managing director.

CAR BUILDERS!

Action

has certainly started on the

1929 Car Exhibit

Space applications won't be mailed until

APRIL 12

But

Twin Coach Company
Perley A. Thomas Car Works

have already requested Track Space for Street Cars on the

BOARDWALK PLAZA AT ATLANTIC CITY

Splendid for a Starter!

C. D. Emmons, president United Railways & Electric Company, Baltimore, and past president of the association, expressed his gratification of the fact that the Baltimore management had chosen Mr. Storrs, with his broad view of the industry's problems and outlook, to apply this wide experience toward the solution of Baltimore's transportation problem. Mr. Emmons said that the association's loss will be Baltimore's gain and that the entire United Railways organization would welcome Mr. Storrs' leadership.

Those present at the meeting of the executive committee included the following: President J. P. Barnes, presiding; J. H. Hanna, C. E. Morgan, G. A. Richardson, L. S. Storrs, R. P. Stevens, O. H. Bernd, L. F. Wynne, W. H. Boyce, T. W. Casey, Paul E. Wilson, E. P. Waller, W. F. Cutler, J. R. Fitzpatrick, H. B. Potter, Carroll Burton, M. B. Lambert, W. M. Wampler, W. H. Sawyer, F. R. Coates, J. N. Shannahan, C. D. Emmons, F. W. Doolittle, T. A. Kenny, H. L. Geisse, C. S. Hawley, J. W. Welsh, Labert St. Clair, Leslie Vickers, E. J. Murphy, J. A. Miller, Jr., Charles Gordon, Freddie Dell, G. C. Hecker, E. E. Bodine. The tentative date selected for the next meeting is May 2, 1929, at Washington, D. C., at which time the United States Chamber of Commerce will convene in annual meeting.

Indianapolis Employees Press Wage Demand

Oral arguments were heard recently by the Indiana Public Service Commission on the motion of the Indianapolis Street Railway to postpone until next year further consideration of the request of the employees of the company for a wage increase. The case originated several weeks ago when the employees filed a formal petition for a wage boost. A company motion to dismiss the petition was overruled shortly afterward and then the company granted slight increases based on the increase in its net earnings in 1928 over those of 1927.

Attorneys for the employees insisted that the original petition should be considered at once by the commission. They suggested that the company and its employees "might get together and iron out their differences."

David E. Watson, attorney for the company, contended the company's present financial condition will warrant no wage increases. He said that compulsory payment of more than a company is able amounts to confiscation of property.

Ten-Cent Fare Sought in St. Catharines

The Canadian National Electric Railways has applied to the City Council of St. Catharines for a 10-cent fare on its local lines. Under the franchise, the railway has power to charge 8 cents. The present fare is 7 cents.

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Equipment Men Urge Early Reservations for Meeting

Selection of the Lafayette Hotel, Lexington, Ky., as headquarters for the July 24-26 meeting of the Electric Railway Association of Equipment Men, Southern Properties, has just been announced by A. Taurman, president. Rates for rooms are $2.50, $3 and $3.50 for a single room and $5 and $6 for a double room. Members are urged to make reservations early. If reservations are not available at the Lafayette, members are referred to the Phoenix Hotel, a short distance from the Lafayette.

Preparation of the program is under way and suggestions on topics for discussion are solicited.

Vancouver "Buzzer" Has New Top

The decoration or heading for the front page of "The Buzzer," official pamphlet of the British Columbia Electric Railway, Vancouver, B. C., was selected by W. G. Murrin, president, out of 158 submitted in the recent contest. A graphic representation shows Mr. Public pressing the button for service, and the trainmen, the bus driver, the mechanic, the office man and the stenographer rushing in the manner of good public utility employees to give him service. The design is the work of F. A. Wilson, who received the $25 prize.

Gas Tax Passes in Illinois

The Illinois 3-cent gasoline tax bill was signed recently by Governor Emerson, after being passed by both houses of the Legislature by a wide majority of votes. It will go into effect on Aug. 1. Provision is made for a tax of 3 cents a gallon on gasoline used in all motor vehicles operating over the public highways of the state. It provides a division of the tax money of 2 cents to the state and 1 cent to the counties. The estimated annual yield of $21,000,000 will be used for completion of the state's hard roads system. Opposition to the measure came chiefly from Chicago members who asked for an equal split of the revenue between the state and the counties and a share to be used on maintenance of city streets in Chicago.

Help in Paying for Paving Sought in Baltimore

The United Railways & Electric Company, Baltimore, Md., has asked the city to finance the company's share of paving on several streets to the amount of $210,000, the United to repay the money in five annual installments without interest. A similar agreement is said to have been entered into under a previous administration. The Board of Estimate has taken the subject under consideration.

COMING MEETINGS OF *Electric Railway and Allied Associations*

April 5 **— Metropolitan Section, American Electric Railway Association, 33 W. 39th Street, New York, N. Y.**

April 12**—Maryland Utilities Association, Annual Meeting, Hotel Emerson, Baltimore, Md.**

May 1-3**—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.**

May 13-15 **— National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.**

May 15**—Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.**

June 3-6**—National Association of Purchasing Agents, Annual Convention, Hotel Statler, Buffalo, N. Y.**

June 5-7**—Canadian Electric Railway Association, annual convention, Montreal, Quebec.**

June 21-22 **— New York Electric Railway Association, Bluff Point, N. Y.**

June 27-28**—Central Electric Railway Association, Michigan City, Ind.**

July 24-26**—Electric Railway Association of Equipment Men, Southern Properties, Lafayette Hotel, Lexington, Ky.**

Aug. 15-16 **— Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.**

Aug. 27**—National Association of Railroad and Utilities Commissioners, Glacier National Park, Mont.**

Sept. 28-Oct. 4**—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Paving Relief in Alexandria, Va.

A measure relieving the Mount Vernon, Alexandria & Washington Electric Railway of its proportionate cost of permanent improvements, along its right-of-way in Alexandria, was adopted by the City Council on March 22.

This action by the local authorities was taken by them to lighten the burden of the railway in the proposed repaving of seven blocks of King Street, which will necessitate an expenditure of approximately $25,000, of which the railway would have had to pay $11,480.

Gardner L. Boothe, president of the company, assured the Council that new rails and ties would be installed when the repaving work is started by the city. He said this would cost approximately $10,000.

Jurisdiction of Minnesota Commission Supreme

Street railway lines in Minnesota will remain under the jurisdiction of the Minnesota Railroad and Warehouse Commission. Bills introduced in both houses of the present Legislature to repeal the Brooks-Coleman act, which placed fixing of valuation, setting of reasonable rate of return on the properties and making of passenger rates, were killed in the committees, after several hearings, by means of indefinite postponements. The Senate general legislation committee acted first and the House committee took similar action March 14. The stand against the repeal of the Brooks-Coleman act was made on the theory that control of transit lines might better continue where it has rested for several years than be placed in the hands of the governing bodies of the three principal cities, Minneapolis, St. Paul and Duluth.

Public hearings on a bill to create a metropolitan zone with one rate of fare in the Twin Cities will be set. There is much opposition from Minneapolis to this bill. The cities now have the same rates, but a second fare must be paid after crossing the line from one city to the other.

Parking Laws in Effect in Baltimore

After years of effort, Baltimore has put into effect a new ordinance which prohibits parking of automobiles on two of the important downtown streets. Previous efforts to pass such an ordinance always failed when the merchants claimed such action would hurt their business. A recent fire on one of the streets, during which parked automobiles hampered the firemen, aided in passage of the ordinance. The United Railways & Electric Company favored the ordinance on the ground that it would speed up service.

Under the ordinance, parking is prohibited on Lexington Street between Charles and Liberty Streets at all times; from 7:30 a.m. to 6 p.m. between Liberty and Howard Streets and between Aisquith and Caroline Streets; on Fayette Street from 7:30 a.m. to 6 p.m. between Greene and Holliday Streets and at all times between Fallsway and Broadway.

Numbering Car Lines in Spokane

A system of numbering railway lines has been adopted by the Spokane United Railways, Spokane, Wash., and will be put into effect April 1, according to A. J. Schulthess, general superintendent. Under the plan each line will have a number, there being 27 lines in all. North and east lines will have odd numbers and south and west lines even numbers. The numbers are to be painted in black on white dash signs. The illuminated deck signs giving the name of the line will be retained.

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Recent Bus Developments

New Lines Established by Northern Ohio

The Northern Ohio Power & Light Company through its subsidiary, the Cleveland-Akron-Canton Bus Company, established two new bus lines March 24, one through line from Cleveland to Dennison and a through line from Massillon to Dennison. The two lines converge at Dover. The Masillon line will supplant the electric line as soon as the Ohio Public Utilities Commission passes upon the application of the company for abandonment. The hearing is set for April 2.

The through service between Cleveland and Dennison will be operated on a two-hour schedule from 7 a.m. until 7 p.m. The Massillon-Dennison line will also be operated on a two-hour schedule from 5 a.m. until 11 p.m. Going north, buses leave Dennison at 5 o'clock in the morning and every hour until midnight. The bus leaving at 5 o'clock goes to Massillon. The one leaving at 6 o'clock goes to Cleveland, thus alternating during the entire period covered by the schedule.

As all of its franchises for the interurban line between Massillon and Uhrichsville have expired with the exception of one in the village of Navarre, the company expects little delay in securing an order for abandonment. When the line is discontinued, a 30-minute local service will be established between Dover and New Philadelphia. Local service will also be established between Massillon and Navarre. The company announces that additional through and local service will be supplied as rapidly as the riding demands.

The company will use Yellow coaches in this service and has purchased additional new 29-passenger White buses to take the place of the Yellows which were transferred from other lines.

From Taunton to Middleboro

The East Taunton Street Railway has petitioned the Massachusetts Department of Public Utilities for permission to run a bus line from Taunton to Middleboro, Mass.

Pennsy, B.&O. and Mitten to Supply Service

Co-ordination of all bus service in the Philadelphia district is planned by the Pennsylvania Railroad, the Baltimore & Ohio Railroad and the Philadelphia Rapid Transit Company in the interest of operating economy on routes connecting Philadelphia with New York, Baltimore and New Jersey seashore points. According to Charles W. Galloway, vice-president Baltimore & Ohio, the proposal would carry a guarantee of responsible operation, submission to fair regulation, provision for bus terminal facilities and the assurance of certain revenue not obtainable under present conditions "which could be applied to public highways." He made it plain that the railroad would insist on the provision of adequate high-speed or surface-car subway facilities to the terminal location before the actual construction was authorized.

Would Prepare for Buses on Massachusetts Line

Selectmen of Wakefield, Stoneham and Winchester recently received petitions from the Eastern Massachusetts Street Railway, seeking permission to discontinue the present service by railway between Wakefield and Winchester by way of Stoneham for the purpose of substituting bus service. The petitions request the change because of the extensive plans in Winchester to widen and straighten Forest Street, through which the railway runs. It will retain the line between Arlington and Winchester.

Bus Revenues Exceed Car Revenues in New Jersey

For the first time in the history of the Public Service Corporation of New Jersey bus revenue during 1928 exceeded car revenue, although the number of car passengers still substantially exceeds the number of bus passengers. Business by bus has grown from 1,952,059 passengers in 1923 to 211,565,713 in 1928, while the number of trolley passengers in 1923 was 354,194,933 contrasted with 331,568,468 in 1928.

An analysis of the traffic statistics shows a decrease of 29,504,597 in the number of street car passengers and an increase of 45,485,765 in the number of bus passengers. This result is accounted for by the substitution, in many instances, of bus for car service and by bus lines taken over or put in service.

Concerning the transportation situation, President McCarter says:

> Substantial progress was made during the year in carrying forward the policy of co-ordinating transportation facilities. Our efforts are directed towards the creation of a transportation system in which street cars, buses and other units, as their operation may be undertaken, will be utilized so as to provide a maximum service and effect economy by the elimination of waste and duplicate service and the combination of construction, maintenance and operating activities to reduce overhead expense.

Regarding the initial experiment with the operation of taxicabs, the report of the company says:

> Operation of the Yellow and Public Service Cab Companies of Camden, with a combined fleet of 58 cabs, was taken over in May, and results under our management have been encouraging as to future possibilities.

Toronto Expands Its Bus Service

By securing the franchise for the Royal Blue Lines Company, Boston, Mass., for Toronto and all points within Ontario, the Toronto Transportation Commission has made a notable extension to its coverage for tourists and sightseeing parties. As the *Canadian Financial Post* points out, since the commission's subsidiary, Gray Coach Lines, has the franchise for the Gray Line, it enables the commission to furnish exclusive service in the province for the only two large sightseeing and tourist organizations in the United States.

According to D. W. Harvey, general manager Toronto Transportation Commission, operating the railway and bus system owned by the city of Toronto, the Royal Blue Lines agreement is for a period of two years, and is renewable at expiration. There is only a nominal cost attached to this extra service, but the Toronto commission will secure the advantage of the international advertising done by the Royal Blue Lines Company in all the large cities in the United States and Canada.

A number of the commission's coaches will be painted blue and carry the Royal Blue Lines insignia. The number will be small at first, and will be increased as business warrants.

These coaches bearing the insignias of the Gray Lines and the Royal Blue Lines are used for sightseeing purposes only, and are quite separate from the Gray Coach Lines' motor coaches which operate an interurban service from Toronto to points in Canada and the United States.

The Toronto Transportation Commission and its subsidiary, Gray Coach Lines, now have contact with practically every tourist agency on the North American continent.

Railroads Free to Organize Bus Subsidiaries

The Interstate Commerce Commission has ruled it cannot regulate or forbid organization of bus subsidiaries by railroads, or collect excess profits from such subsidiaries. The decision apparently validiates the already extensive activity of railroads in bus operation, and permits them to expand it whenever they feel it necessary to meet competition. The decision also emphasizes the absolute freedom from regulation of interstate bus and truck operation.

A. Jaloff, doing business as "Columbia Stage," operated 40 buses between Portland, Astoria and Seaside, Ore. In 1924 the Spokane, Portland & Seattle Railroad, feeling competition, incorporated the S. P. & S. Transportation Company and installed bus service between Portland and Astoria, paralleling its tracks and also Jaloff's service.

Jaloff appealed to the I. C. C., claiming that organization of the bus subsidiary was in violation of the trans-

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portation act, which says that a railroad must, before extending its lines, get a certificate of convenience and necessity from the commission. He also claimed that the articles of incorporation of the railroad did not permit it to organize the bus line.

The commission ruled against Jaloff on both points and decided that the railroad did not have to report its earnings from the bus line under the excess profits clause of the Transportation Act. It ruled, however, that where a railroad offers through rates via a train and bus combination, it must separate the train earnings so they may be reported.

Substitution Proposed in Greenville

Recommendation that the Mississippi Power & Light Company be granted permission to substitute buses for its street cars in Greenville, Miss., was made at a meeting of the street railway committee of the City Council with E. J. Lenz, district manager of the power company. The buses would be operated on the schedule of rates submitted the City Council by L. V. Sutton, vice-president and general manager Mississippi Power & Light Company, at the meeting of the Council held on March 5. That schedule called for a 10-cent cash fare. Tokens would be sold at three for 25 cents. Weekly permits would be sold for 25 cents, and the rate of fare with the permit would be 5 cents for each ride. The proposed substitution will come before the Council for action in April.

Would Extend Line in San Diego

Application made by the San Diego Electric Railway to the city for a franchise to extend its National Avenue bus line a distance of approximately one mile has been granted. Subsequently application was made the California Railroad Commission for a certificate of convenience and necessity to cover the extended operation.

To Test Reduced Bus Fare in Boston Suburb

Public trustees of the Boston Elevated Railway will establish a 6¼-cent bus fare, for a test period, from Mattapan Square to Cleary Square and from Cleary Square to Wolcott Square, Readville, in either direction. At present the unit bus fare is 10 cents for the entire distance from Mattapan Square to Wolcott Square, but the majority of the riders use part of the service either between Mattapan Square and Cleary Square or between Cleary Square and Wolcott Square, and would save the difference in fare. The 10-cent bus fare would remain in effect for those who ride beyond Cleary Square in either direction and for those who transfer.

Receivers Sought for Indiana Company

Suit asking that a receiver be appointed for the South Side Motor Coach Company, of Indianapolis, has been filed in Superior Court by Orville P. Foreman, former attorney for the company. The bus company was sold recently to the Beech Grove Traction Company. Mr. Foreman alleges that he acted as attorney for the defendant during the sale and asks judgment for $2,500 against the company. Gilbert E. McFarland and Frank Stuck, the owners of the company, sold the property to the railway for $22,500, according to the complaint. Charges are made that the bus company is insolvent.

The suit has no connection with the new owners of the coach company property, C. F. Schmidt, president of the Beech Grove Traction Company, declared. He said the coach company still was intact as a partnership and the suit was against the partnership.

Control Bill Before New York Assembly

The New York Senate on March 22 passed and sent to the Assembly the Thayer bill, bringing under control of the Public Service Commission all stages, buses or motor vehicles operating between fixed terminals or over regular routes as common carriers.

Buses Succeed Cars on Wisconsin Line

The Wisconsin Public Service Corporation has recently abandoned interurban lines from Green Bay to Kaukauna and to Duck Creek, as well as two city lines. Service is continued with buses.

No Flat-Rate Cabs in Springfield, Mass.

Flat-rate taxicab service has been practically eliminated from the realm of possibilities as far as Springfield, Mass., is concerned. The transportation board decided on March 4 that such taxicabs "would not be for the best interests of the people or other public carriers of this city." The board was aided in its decision by reports of Worcester's recent experience with flat-rate cabs and it hesitated little in pronouncing this type of service undesirable.

The subject of flat-rate taxicabs was discussed at length at a meeting of the board on Feb. 18. Representatives of concerns seeking to enter the city and establish a business of this sort were heard, as well as officials of the local taxicab companies and President Clark V. Wood, of the Springfield Street Railway.

The board also received communications from the Central Labor Union and from the local branch of the Amalgamated Association protesting against the flat-rate service. Councilman Homer E. Barton, a member of the transportation board, sent a letter to Chairman Henry A. Booth in which he described the confusion caused by flat-rate cabs in Worcester, Mass., and voiced his strong opposition to the proposal. He said:

> The taxicab situation got out of hand at Worcester on account of the flat-rate system. They were everywhere and if they were let loose in Springfield with its limited business district a serious traffic problem would be created. I am opposed to any let-down in the present regulations.

Enthusiasm for Courteous Drivers in St. Louis

In an endeavor to reduce street accidents in St. Louis the St. Louis Public Service Company, the St. Louis Bus Company and the People's Motor Bus Company are co-operating with the Courteous Drivers Club recently formed by the St. Louis Safety Council. Motormen and bus drivers are being urged to join the club and to carry its insignia upon their vehicles. Approximately 25,000 persons have joined the club, hundreds of them residing outside of St. Louis. In fact members are from sixteen states, having become interested in the movement through speeches broadcast by Colonel Courtesy from Radio Station KMOX, the "Voice of St. Louis." The two slogans of the club are: "Be Courteous and Save A Life" and "Drive Safe and Stay Alive." The code of driving promulgated by the club covers twelve rules.

Safety Work Continues on Ohio Lines

Chairmen of departmental safety committees of the Indiana, Columbus & Eastern Traction Company and the Dayton & Columbus Transportation Company were elected at the semi-annual meeting of the committees held in Springfield, Ohio, on March 15. The organization has been functioning five years, and during this period the employees of various departments have submitted 369 safety suggestions, 279 of which have been definitely acted upon. Ten inspections of the entire property have been made during this period. Since the safety organization has been in existence, railway cars have operated on an average of 20,835 miles per traffic accident, and the buses 18,500 miles per traffic accident.

Bus Service Started to Plant of American Chatillon Corporation

The Rome Coach Company, Rome, Ga., a recently organized subsidiary of the Georgia Power Company, has started a service of buses for workers and visitors to and from the plant of the American Chatillon Corporation. This service is operated in co-ordination with the railway system under the direction of T. S. Sloan, division manager.

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Financial and Corporate

Tacoma-Seattle Line Sale Continued

Action on the confirmation of the sale of the Puget Sound Electric Railway's Tacoma-Seattle interurban line has been continued for ten days by Judge J. Stanley Webster in federal court, on request of Scott Z. Henderson, receiver for the interurban, who asked a stay until Judge E. E. Cushman returned to the city. A possibility exists for a new call for bids. The court is now considering four bids, as follows: Louis Rosenthal, San Francisco, $360,000, for the entire interurban property; The Puget Sound Electric Company, Seattle, $348,208 for the right-of-way and operating property; Perry, Buxton, Doane Company, Boston, $251,873 for the entire property, and $191,878 for the operating property alone; the Hofius Steel & Equipment Company and the Hyman Micheals Company, $178,250 for the operating property.

Cessation of Massillon Service

The Northern Ohio Power & Light Company will abandon its Massillon street car system on April 26 and discontinue all service. The rails are to be taken up and streets placed in repair. The Massillon system was built more than 25 years ago. Some two years ago the City Council granted The Fidelity Transportation Company the right to operate buses over streets adjacent to the car lines. Since that time the railway has been endeavoring to discontinue service. Its franchise does not expire until 1932.

The railway has had a fare of 8 cents cash, with four tickets for 25 cents. The bus company is to receive a 10-cent flat fare. Permission to remove the lines was granted by the City Council on March 25. The property of the Massillon Street Railway System is valued at approximately $600,000. Abandonment of the Massillon line fits in with the general plan to remove the interurban from Massillon south to Uhrichsville, referred to elsewhere in this issue.

Atlantic City & Suburban Road to Liquidate

Unable to meet expenses for several years the Atlantic City & Suburban Railway, which has been operating between Atlantic City, Absecon and Somers Point, N. J., since 1902, will abandon the service, remove its tracks and sell its equipment. P. R. Goldy, receiver for the company, denied that the company was planning a bus service. Real estate holdings and equipment will be sold as speedily as possible and the receipts applied to claims of creditors. This road is paralleled throughout practically its entire length by the fast electric line of the Atlantic City & Shore Railroad.

Eastern Massachusetts Net Up

Returns for 1928 show an improvement of $220,729—situation reviewed—public control extended

Stockholders of the Eastern Massachusetts Street Railway, Boston, Mass., held their annual meeting on March 4. In the management of the road they have no other power now, under public control, than to elect a board of directors which can act merely in an advisory capacity, and keep the organization intact until the property is returned to them. At this year's annual meeting they made no change in the directorate, voting unanimously for the old board. The board will meet later to elect its own chairman.

Since the issuance of the last annual report of the public trustees, the Massachusetts Legislature has enacted a new public control act extending public control for five years more. In certain respects the present act differs from chapter 188, acts of 1918. The chief difference between the two acts is in the constitution of the respective boards of trustees. The present act provides for a board of five trustees to be appointed by the Governor, with the advice and consent of the council. The new act provides for a board of three trustees, two to be appointed by the Governor, with the advice and consent of the council, and one to be "a representative appointed by the board of directors of the company from their own number." This gives the stockholders, through the board of directors elected by them, a direct representation on the board of trustees. The new act continues the power of the trustees to fix and regulate rates and fares and to determine the character and extent of the service and the facilities to be furnished, and a similar authority to fix such rates and fares as in their judgment will produce sufficient income to meet the cost of the service, which includes all fixed charges and dividends.

The new act eliminates various provisions about the taking over of the property and franchises of the Bay State Company, which are no longer pertinent, and provisions about the initial capitalization, which was set up by the old act. It also eliminates certain provisions as to the issue of serial bonds not exceeding $4,000,000, as to which if the earnings of the company were not sufficient to pay instalments of such bonds as they matured, the trustees could call upon the treasurer and receiver general of the Commonwealth to purchase them and assess the cost upon the cities and towns in which the company operates. The new act also eliminates provisions about a reserve fund of $500,000. Under it the powers of the directors are increased in respect to contracts for the acquisition or abandonment of lines. This is made to apply to bus lines as well as street railway lines, any such contract requiring the consent of the directors.

The annual report, which came from the Board of Public Trustees, was presented by the chairman of the trustees, Arthur G. Wadleigh. It showed income of $9,248,119 for the year 1928, compared with $9,625,434 in 1927, a decrease of $377,315. Revenue from bus operation, however,

COMBINED INCOME STATEMENT OF EASTERN MASSACHUSETTS STREET RAILWAY FOR ALL DISTRICTS

	1928	1927	Increase or Decrease
Street car revenue	$8,090,020	$8,472,602	*$382,582**
Auto bus revenue	431,357	381,375	49,982
Express and other revenue	31,042	36,773	*5,731*
Rentals, advertising, etc.	188,882	190,171	*1,289*
From sale of power	264,457	262,275	2,182
Interest and other income	242,361	282,238	*39,877*
Total revenue	$9,248,119	$9,625,434	$377,315
Expenses:			
Way and structures	$1,055,021	$1,221,227	*$166,206*
Equipment	882,453	1,240,498	*358,045*
Power	1,215,992	1,270,720	*54,728*
Car operation	2,194,210	2,249,449	*55,239*
Injuries and damages	234,469	252,050	*17,581*
Insurance	75,592	73,003	2,589
Law expenses	18,708	15,217	3,491
Rent of tracks	80,622	82,382	*1,760*
General wages and expenses	246,595	241,583	5,012
Pensions	23,644	22,242	1,402
Group insurance	73,394	69,314	4,080
Stationery and printing	32,854	33,917	*1,063*
Stores and garage expenses	60,516	56,652	3,864
Miscellaneous expenses	47,083	45,307	1,776
Auto bus expenses	441,193	399,221	41,972
Survey and study of property	32,058	.....	32,058
Total operating expenses	$6,714,404	$7,272,782	*$558,378*
Total operating expenses and taxes	$7,079,163	$7,631,676	*$552,513*
Gross income	2,168,956	1,993,758	175,198
Interest and rentals	1,176,167	1,221,698	*45,531*
Net income	$992,789	$772,060	$220,729

Note—*Italics* denote decrease.

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which is included in the figures quoted, showed an increase from $381,375 for 1927 to $431,357 for 1928. There were losses during the year in railway revenue, express service, rentals and interest on income. The only items that showed gain were the auto buses and the sale of power, the latter item showing an increase from $262,275 in 1927 to $264,457 in 1928.

Expenses were reduced. They amounted to $6,714,404 in 1928 for purely operating functions, as against $7,272,782 in 1927. The items which cost less in 1928 than in 1927 were way and structures, equipment, power, car operation, injuries and damages, rent of track, and stationery and printing. The items that cost more in 1928 then in 1927 were insurance, law, general wages, pension, group insurance, storage and garage, auto bus expenses, survey and study of property.

Computing taxes and other fixed charges it is found that the net income for the year was $992,789. This is $220,729 more than the net income in 1927. The increase in the net income is due to savings.

Operating expenses include charges for depreciation amounting to $824,007 in 1928 and $848,467 in 1927. During the year 1928 $1,169,090 of the depreciation reserve was applied to reconstruction and amortization.

Change on P.R.T. Board

At the annual stockholders' meeting of the Philadelphia Rapid Transit Company, Philadelphia, Pa., N. H. Pettitt was elected a director to succeed L. W. Hackett. He is chairman of the Committee of Employes Co-operative Association.

Change in Denver Directorate

Stockholders of the Denver Tramway, Denver, Col., at their annual meeting accepted the resignation of J. C. Bullock, Providence, R. I., as a member of the board of directors. In his place they elected F. E. Kingston, Hartford, Conn. W. A. Doty, secretary, also was elected to the board and was given the additional office of treasurer, succeeding the late H. J. Alexander, of Denver.

$251,824 Available in San Diego

The San Diego Electric Railway, San Diego, Cal., reports to the Railroad Commission its 1928 operating revenue at $1,659,767, compared with $1,676,501 for 1927. Operating expenses, excluding taxes for 1928, are $1,384,800 and $1,381,324 for 1927, leaving a net operating revenue of $274,967 for 1928 and $295,176 for 1927. During 1928 taxes charged to operation amounted to $120,086, and for 1927 to $124,387. Deducting the taxes leaves operating income of $154,880 for 1928, and $170,789 for 1927. Adding the non-operating income of the company to the operating income, and deducting non-collectible revenue and rents, results in a gross corporate income of $251,824 for 1928, compared with $263,055 for 1927.

Substantial Improvement Shown by Iowa Interurban

Net earnings of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., for 1928, after operating expenses and taxes, were more than 90 per cent greater than that of 1927, and 620 per cent in excess of those of 1925, being the largest net result since 1917. Net income for 1928—$203,734—is equal to 3½ per cent on the first mortgage bonds. All this money has gone back into the property in renewals and extensions, thereby enabling it to handle with efficiency the steadily increasing business.

A condensed comparative statement of operations for the past four years follows:

Comparative Statement of Earnings at Waterloo, Cedar Falls & Northern Railway

	1928	1927	1926	1925
Gross earnings	$1,123,437	$980,910	$914,698	$827,353
Operating expenses	882,682	834,009	755,084	750,899
Net revenue	$240,755	$146,901	$159,613	$76,454
Taxes	37,021	39,881	44,064	48,166
Net operating income	$203,734	$107,020	$115,550	$28,288

The gross revenues for 1928 show an increase of $142,528; freight and switching revenues increased $156,785; passenger revenues fell off $20,471; miscellaneous earnings, including sale of power, increased approximately $7,000. The loss in passenger revenue is all chargeable to interurban lines, as earnings on motor coach and city lines increased $18,425. The loss in interurban passenger revenue is ascribed entirely to improved highways and the great increase in the number of privately-owned automobiles.

Operating and maintenance expenses increased $48,674, due to extra cost of handling a larger freight business, and more money expended in the maintenance of the property. C. M. Cheney, in his report to the protective committee, says that whatever prosperity the company might reasonably expect to enjoy must necessarily come from increased freight traffic, and every effort possible has been put forth to this end during the past five years.

With rather a thin population, improved highways practically paralleling the company's interurban lines, and the ever increasing number of privately-owned automobiles, Mr. Cheney feels there is little possibility of maintaining passenger levels.

With industrial conditions at a low ebb during the years 1923, 1924, and 1925, freight traffic continued to show some increase over the preceding years, and since 1925 there has been a decided gain each year: $87,596 in 1926; $101,504 in 1927, and $156,785 in 1928.

To liquidate overdue taxes, pay off floating indebtedness, properly maintain the property, construct new tracks and purchase additional equipment made necessary by heavier freight business, it has been necessary each year to use the net revenues. That this course has been fully justified is best evidenced by improvement in the physical condition and earning power of the property.

During the year 1928 the John Deere Tractor Company decided to spend $5,000,000 for the purpose of expanding its Waterloo plant. The interurban was fortunate in being able to grasp the opportunity to serve this plant exclusively. It was necessary, however, in order to do this to spend $135,000 to cover the purchase of additional real estate, freight equipment and the construction of 1⅛ miles of new trackage. Mr. Cheney estimates the company will enjoy an increased freight revenue of from $200,000 to $250,000 per annum from this plant. Gross revenues earned on business from the John Deere Tractor Company during 1927 were $111,983; during 1928, $238,409.

E. V. Kane, chairman of the committee representing the holders of the first mortgage bonds, in a recent statement says:

The results of the operation for the calendar year 1928 further justify the waiting policy of the protective committee. Nursed through the trying period ending with 1925, and maintained in an excellent state of efficiency, the property was in the best of condition to handle the increased traffic when the tide of prosperity turned in 1926. The full meaning of this is best shown in figures. Gross earnings for 1928 were the largest in the company's history, showing a gain over 1927 of more than 14 per cent, and of more than 35 per cent over those of 1925. The increase was entirely from freight. Passenger traffic, owing to automobile competition, continues to show a loss.

Service in Santa Barbara To Be Discontinued

Finding that it is impossible to fix a rate structure that will produce an adequate revenue to permit the operation of the Santa Barbara & Suburban Railway, the Railroad Commission has authorized that company to discontinue operation as a common carrier in the city of Santa Barbara, Cal., upon 30 days' notice to the public.

On Jan. 16, 1928, the State Railroad Commission authorized the company to increase its rates and to make certain alterations in its service with that end in view. The revenues of the utility under these rates having proved inadequate, the commission found no alternative but to grant the request of the company for permission to abandon operation.

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Legal Notes

ALABAMA—*Use of Streets. Company Responsible for All Injuries Resulting from Negligent Act.*

A street railway has no paramount right to the use of the streets occupied by its tracks as against other vehicles or pedestrians. Where a car strikes an automobile and drives it against a prospective passenger, the company was responsible, even if it was difficult to foresee the precise injury which would be occasioned by the negligent act. A motorman may assume that a vehicle on the track, or in dangerous proximity, would turn aside to avoid collision, when the danger of collision becomes imminent. [Alabama Power Company vs. Bass, 119 S., 625.]

CALIFORNIA—*Adequate Crossing Protection.*

It cannot be said, as a matter of law, that a "Railroad Crossing" sign, located within a few feet of the rails and partly behind a telephone or telegraph pole, was of any significance in affording protection to users of the highway. [Baldwin et al. vs. Pacific Electric Railway, 274 P., 72.]

NEW JERSEY—*Power of Commission to Co-ordinate Fares.*

Where a street railway and associated bus company request the Board of Public Utility Commissioners to coordinate the fare zones of the two companies in the same territory, the board has power to do so without a valuation of the used and useful property of one of the companies. [Borough of Roselle Park vs. Board of Public Utility Commissioners, 144 A., 623.]

NEW YORK—*Public Service Commission Without Jurisdiction to Issue a Certificate of Convenience and Necessity to Bus Operator Without City's Consent.*

On Dec. 11, 1925, Elliott B. Seagraves filed with the City Council of Long Beach an application for the consent of the city to the operation of a bus line. On Dec. 17, 1925, a special meeting of the Council was held, at which all the members of the Council, including the Mayor, were present. A resolution was adopted by a vote of four to one whereby the consent of the Common Council was given to the operation of the proposed bus route, the Mayor voting "no" and the others voting "aye." On Dec. 18, 1925, Seagraves assigned the consent to the Long Beach Bus Company. On Dec. 21, 1925, the Long Beach Bus Company, Inc., filed with the Public Service Commission its petition for a certificate of convenience and necessity. On Jan. 2, 1926, the City Council again met. Four of the Councilmen, having failed of election in the preceding month of November, had gone out of office and four other men had been elected to take their places. The Mayor of the city, who had been continued in office, announced his veto of the resolution previously adopted on Dec. 17, 1925, whereby consent had apparently been granted to Elliott B. Seagraves. His written veto of the prior resolution was filed with the Common Council. Thereupon the Council adopted a resolution unanimously rescinding the apparent consent given to Seagraves. It was after this meeting, in March, 1926, that the certificate of public convenience and necessity was granted by the Public Service Commission. The court ruled that the period for the exercise of the veto power had not been exhausted and that the veto filed on Jan. 2, 1926, was effective to nullify the resolution of consent. [Long Beach vs. the Public Service Commission, 164 N.E. 553.]

NEW YORK—*Use of Crossings.*

Under the Greater New York Charter, the City Police Commissioner is authorized to make rules regulating traffic and a section provided that pedestrians, where no police officer is present and no traffic light control system is in operation, shall have right-of-way on crossings, and that vehicles must slow down and stop if necessary to permit pedestrians to pass. This section was held valid, although it caused a change in the common law rule giving pedestrians and vehicles equal right on streets and highways. [Castro vs. New York Railways Corporation et al., 231 N. Y. Supp., 649.]

RHODE ISLAND—*Motormen Must See That the Overhang of Their Cars on Curves Does Not Strike Standing Automobiles.*

While travelers on the street are generally required to keep a sufficient distance from a trolley car which is in motion and changing direction on a curve to avoid the overhang of the car, the driver of an automobile, stopping for traffic alongside a trolley car, is not bound as a matter of law to move his automobile and make sufficient clearance for the overhang of the car when it is turning a corner. [Forbes vs. United Electric Railways, 144 A., 154.]

WEST VIRGINIA—*Liability for Damage by Power Plant.*

Where a public service corporation properly constructs and operates its generating plant on its own land and its operation causes a dwelling house on land nearby to vibrate to such an extent as to destroy it as a dwelling house, right of action by the owner of the dwelling may be maintained at any time within the period of limitation against such corporation; but a corporation which purchases the plant after the injury and right of action has accrued, and which properly maintains and operates the plant, is not liable for such permanent injury. [Byrne vs. Monongahela West Penn Public Service, 146 S. E. 522.]

Book Review

Practical Railway Painting and Lacquering

By H. Hengeveld, master painter Atlantic Coast Line Railroad, C. P. Disney, bridge engineer Canadian National Railway, and William J. Miskella, director Finishing Research Laboratories, Inc. Published by the Finishing Research Laboratories, Inc., Chicago, Ill. Distributed by Simmons-Boardman Publishing Company, New York, N. Y. 267 pages; 154 illustrations; price $3.50.

Much of value to electric railway paint foremen will be found in the new book "Practical Railway Painting and Lacquering." Although this treats particularly of steam railroad practice, the problems are quite similar to those encountered by electric railways. This is Volume IV of a series of books on practical finishing. It is divided into five parts. The first contains general information. The second deals with the painting and lacquering of locomotives, freight and passenger cars. The third treats of the painting of signal equipment. The fourth gives information on the painting of bridges, buildings and water service, and the fifth describes practices in the lacquering of electric railway cars. The authors evidently have had considerable experience in the use of spray equipment as the book contains much information on equipment, paints, and troubles that are encountered in spray painting.

The first part gives much information on spraying equipment, accessories, sandpapers and waterproof-coated abrasives, lacquers and other paint materials, housekeeping hazards, sand blasting equipment and its operation, the lacquer and spray gun troubles and remedies, portable cleaning equipment, modern testing methods, scaffolding and ornamentation. In the second part, dealing with painting and lacquering, a large portion is devoted to passenger car painting. This describes late coach painting equipment, spraying outfits, and special exhausting arrangements. A chapter is also devoted to the painting of buses, and gives information on the size of paint shop required and the layout of a modern spray room.

The section on bridge and building painting contains material by Mr. Disney, who is bridge engineer for the Canadian National Railways, and who has had much experience in this class of work. The part on lacquering of electric railway cars is not very complete. It treats of the change which is going forward in connection with electric railway car painting, gives some comparative specifications of paint for electric railway cars, and describes the spray painting installation of the Cincinnati Street Railway.

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Personal Items

Messrs. Snyder, Pettit and Studebaker Honored

Announcement is made from the executive offices of The North American Light & Power Company of the appointment of D. W. Snyder, Jr., as president of the Missouri Power & Light Company, with headquarters in Kansas City.

Mr. Snyder was formerly vice-president of the Illinois Terminal Railroad System with headquarters in Springfield, Ill.; prior to that he had been general manager of the utility properties of Illinois Power & Light Corporation at Bloomington, Ill.; Jefferson City, Mo.; and Clinton, Ill. He is a graduate of LaFayette College. His first business connection was as selling engineer for the Westinghouse Company.

L. A. Pettit, Jr., formerly vice-president of the Missouri Power & Light Company, has been appointed vice-president in charge of operation of the United Power & Light Corporation, an operating company serving the principal cities in central Kansas.

Clement Studebaker, Jr., has been elected president of the United Power & Light Corporation and A. M. Patten has been elected executive vice-president of the same company.

New Duties for H. G. Tulley of Philadelphia

H. G. Tulley was elected vice-president in charge of industrial relations of the Philadelphia Rapid Transit Company, Philadelphia, Pa., at the recent organization meeting of the board. This is a newly-created office. Mr. Tulley resigned as president of the International Railway, Buffalo, on Jan. 1, 1926, to become vice-president of Mitten Management, Inc., Philadelphia. Later in that year he was elected president of the Yellow Cab Company, which had been taken over by the Philadelphia Rapid Transit Company.

Sam Harris Leaves Pittsburgh Railways

After seventeen years' service with the Pittsburgh Railways, Pittsburgh, Pa., Sam Harris has resigned as special car agent. He is now associated with his three brothers, who operate a chain of Harris Stores. Sam Harris himself will conduct the store at Canonsburg.

Mr. Harris moved from New York to Pittsburgh in 1911, at the age of seventeen, and secured employment with the railway as checker. A few years later he was made secretary to the company's traffic agent, and in 1922 was appointed to the position of special car agent of the Pittsburgh Railways in which capacity he was unusually successful. During the past year, for example, he furnished approximately 3,000 special street cars to picnics, field meets, etc., in the Pittsburgh district.

The Tracto Club of the railway held a farewell dinner March 15 in the Fort Pitt Hotel in honor of Mr. Harris. As an expression of the high regard held for Mr. Harris by the employees of the railway, the club presented him a beautiful Gladstone traveling bag.

L. M. Brown Heads C.E.R.A.

Lemuel M. Brown, vice-president in charge of railway operation of the Interstate Public Service Company, Indianapolis, Ind., was recently elected president of the Central Electric Railway Association.

In 1905 Mr. Brown entered the electric railway field, beginning as a conductor on the Indianapolis, Columbus & Southern Traction Company, which later became a part of the Interstate Public Service Company. At that time Mr. Brown was associated with Joseph I. Irwin, one of the pioneers of the electric railway in Indiana. Shortly after entering the employment of Mr. Irwin, he became train dispatcher and in 1908 he was appointed train master at Indianapolis. This position he held for ten years. In 1912 the Interstate Public Service Company, at the time of its formation, took over the property of the Indianapolis, Columbus & Southern Traction Company as part of the proposed railroad system to Louisville, Ky. Mr. Brown continued in the employ of the Interstate and in 1918 was appointed superintendent of transportation. Four years later he was elected general superintendent of all the railroad property of the company.

L. M. Brown

At the annual meeting of the Interstate in March, 1927, Mr. Brown was made vice-president in charge of railway operation and in January, 1928, the Winona Railway made him vice-president in addition to his Interstate duties.

Mr. Brown was born in Jackson County, Ind., in 1883. His early training in the district schools was followed by a course at the Central Normal College at Danville, Ind., and later at Indiana University at Bloomington. Upon the completion of his college work, he taught school.

OBITUARY

Charles L. Kurtz

CHARLES L. KURTZ, former president of the Columbus Railway, Power & Light Company, Columbus, Ohio, died at his home in that city on March 24. Mr. Kurtz returned recently from Mexico, seriously ill after a month's business trip.

When in January, 1925, Mr. Kurtz stepped down as president of the Columbus Railway, Power & Light Company he ended a period in his career which will go down in railway history as one of the outstanding examples of generalship in the field of public utilities.

In January, 1919, Mr. Kurtz assumed that office. At that time the company was without credit, its bond interest was in default and dividends on stock had been suspended. Back wages, ordered to be paid during the war, presented another obstacle, and a suit had been instituted for receivership, an accounting and a judgment against the company.

The first thing Mr. Kurtz did when he assumed charge in Columbus in 1919 was to institute a program of the most rigid economy. Waste was eliminated. At the same time he worked to build up the morale and restore co-operation as the touchstone of success. But he knew that while economy was necessary, there alone was not the key to the restoration of the property to earning powers. During the period that the company was under the direction of Mr. Kurtz more than $13,000,000 was spent for construction and rehabilitation. Not only that, but he got from the Council an increase in fare to five tickets for 25 cents, a 6-cent cash fare, with a universal transfer free of charge. Furthermore, Mr. Kurtz succeeded in placing a $3,000,000 loan to pay floating debts. Subsequently he liquidated this loan.

These are merely some of the outstanding achievements of the company during the presidency of Mr. Kurtz. All of them were accomplished through his influence, skillfulness, level-headedness, perseverance, and last but not least, hard work. True, Mr. Kurtz was not a utility man in the strict sense of the word, but the rehabilitation work that he did at Columbus is an epic of its kind in the annals of the industry.

Between the time he started as a newsboy to the time he finished as a financier, Mr. Kurtz had been a bookseller, newsstand keeper, state legislator, private secretary to an Ohio Governor, a power in the Republican party and an inspector of oils for the state of Ohio. When he died he was president of several enterprises. He was 74 years old.

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Improvement Projects Announced

New York State Railways plans expenditures of approximately $736,228. Northern State Power Company to improve its system. Other construction planned. Illinois Central Railroad orders four electric locomotives. Lehigh electrification indicated

NEW YORK STATE RAILWAYS, Rochester, N. Y., plans to expend approximately $736,228 for paving and remodeling of equipment on its systems in Rochester, Syracuse and Utica. The total operating expenses for this system are estimated at $6,805,565. The budget of the Rochester line provides for an expenditure of $156,000 for fifteen new buses and $2,600 for remodeling two buses. The purchase of these buses will provide for an extension of service in Rochester.

This company also plans the reconstruction of 45 cars for one-man operation at a cost of $36,000. These cars will be used to effect economies on unprofitable lines and as a means of giving more frequent service with a lower cost of operation. The company will also spend about $175,000 this year for street repairs and construction. The operating expenses for Rochester alone are estimated at $3,635,515.

Other Projects Planned

Improvements of the street railway system of the Northern State Power Company at Eau Claire, Wis., will represent an expenditure of approximately $82,000 this year. These improvements include replacement of several blocks of track with new and heavier rail and the addition of two new cars of the double-truck type.

The Petaluma & Santa Rosa Railroad, Petaluma, Cal., has applied to the railroad commission for authority to remodel a portion of its passenger equipment to operate this equipment on its Forestville branch. It is proposed to operate cars of the one-man type equipped with safety doors and control.

Repaving work on Main Street, Memphis, Tenn., by the Memphis Street Railway will begin in the near future. This company has agreed to renew its track from Linden Avenue to Poplar and to repave the street lying between the tracks and a strip 2 ft. wide on each side of the outside rail. It is estimated that the cost of this improvement will amount to $72,000.

Four Locomotives for Chicago

The Illinois Central Railroad, Chicago, Ill., has ordered four electric locomotives for handling freight in the Chicago terminal division. The purchase represents the first step in fulfilling the city's lake front ordinance, which requires the electrification of the railroad's freight service north of Twelfth Street by February, 1930, and south of there to the city limits by February, 1935.

The new locomotives will be built by the Westinghouse Electric & Manufacturing Company, the first being scheduled for delivery early in October and the others by the end of the year. Of identical design, they will weigh 100 tons each and develop 1,200 hp. under normal conditions with an additional 250-hp. reserve rating. Power will be supplied from an overhead system.

During the initial phase of electrifying the freight service, locomotives will operate between 39th Street and Monroe Street. The installation of power distribution facilities in this zone is well along toward completion. Transfers between steam electric locomotives will be made on tracks already constructed near 31st Street.

Between Monroe Street and the terminal yard on the south bank of the Chicago River in the Loop district, conditions are unfavorable for overhead power construction, necessitating the use of some self-contained motive power equipment. Another difficulty is that the permanent location of many of these tracks is uncertain by reason of the possibility of extensive changes in connection with development of air rights.

To meet with this situation, the Illinois Central has placed in service a 100-ton oil electric locomotive of 600-hp. capacity built by Ingersoll-Rand, General Electric and American Locomotive Companies. The generator is driven by two Diesel engines. On June 1 an all-electric locomotive powered by storage batteries will be borrowed from the Commonwealth Edison Company and tested in comparison with the oil-electric unit. Results of this test will guide the railroad in making further purchases of electric locomotives of the self-contained type.

$250,000 Construction in British Columbia

The contract for construction of a new route for the Stave Falls line of the British Columbia Electric Railway, Vancouver, B. C., has been awarded to Ellis-Cotton, Ltd., Vancouver, B. C., at a cost of $134,736. This construction entails the raising of the line for 3½ miles of its length above the level of the lake, which is now being formed by the erection of a dam in connection with the power project of the railway at Ruskin, B. C. In addition to this contract ¾ mile of new railway line will be laid by the general contractor on the Ruskin power plant project. The total length of the new line when completed will be 6 miles.

Relocation of this line calls for the removal of 170,000 yd. of earth. 17,000 yd. of rock will be taken out and 40 acres of clearing is necessary. There will be 2,000 lin.ft. of trestle work and 1,800 lin.ft. of culverts.

In addition to the cost of relocation, the electrification of the line will be carried out by the crews of the British Columbia Electric Railway, bringing the total cost of the construction up to approximately $250,000. This line is a passenger and freight railway which operates from the town surrounding the Stave Falls power plants and connects with the main line of the Canadian Pacific Railway. The line is entirely electrically-operated and was built originally by the Western Power Company of Canada at a cost of $250,000. All work is to be completed by Sept. 15 of this year.

The Rockford Electric Company, Rockford, Ill., will soon extend its East State Street line four blocks from the present terminus at Hunter Avenue. A wye at the end of the line will be installed to permit operation of its larger types of cars on this route.

Lehigh Valley Electrification

Surveys are being made for the electrification of the Lehigh Valley Railroad between Mauch Chunk and Wilkes-Barre, Pa. It is said that estimates of the cost of the project are being made by the Westinghouse Electric & Manufacturing Company, the General Electric Company and the American Brown Boveri Electric Corporation. It is indicated that the cost of electrifying this 75 miles of double track will reach $7,000,000.

The Seattle Municipal Railway, Seattle, Wash., has awarded a contract for furnishing 300 33-in. rolled-steel car wheels to the Edgewater Steel Company, Seattle. The Seattle Municipal Belt Line will accept the seven used cars, recently ordered, on terms dictated by the city. The sellers have accepted the conditions and the cars will be placed in the shops of the railway for an overhaul of their electrical equipment. It is estimated that $5,752 will be spent reconditioning the bodies.

Equipment and Material Ordered

Equipment recently ordered by the Beach Grove Traction Co., Indianapolis, Ind., includes seven Reo 21-passenger buses. The Berlin Street Railway, Berlin, N. H., plans to rebuild 2,100 ft. of track and road bed. This company has recently ordered three cars of ties, six kegs of spikes, 500 ft. of guy wire, 3,600 lb. of trolley wire, 100 insulators, four overhead frogs, and 100 trolley wheels.

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The Portland Electric Power Company, Portland, Ore., is having plans drawn for a two-story equipment storage and distributing plant with repair department, to cost $40,000 with equipment.

Bids for the installation of express track on the Broad Street subway, Philadelphia, Pa., have been made. This subway is now operating on two tracks from the City Hall to the Fern Rock terminal. Express service calls for two additional tracks which will also utilize the Fairmont Avenue station now nearing completion.

Johns-Manville Elects Officers

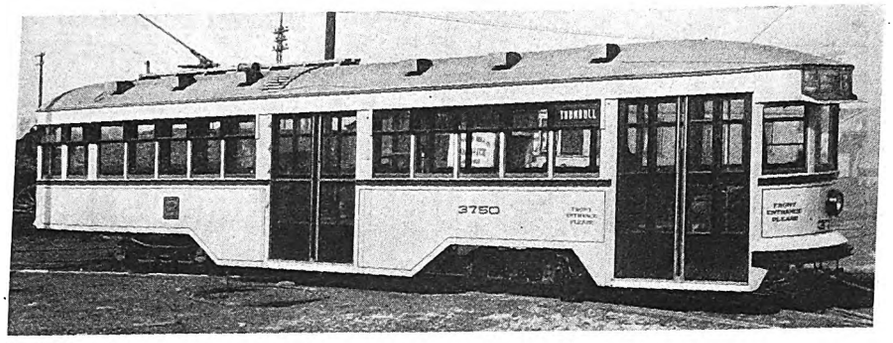
At a meeting of the board of directors of the Johns-Manville Corporation held March 15, William R. Seigle, formerly vice-president in charge of mines and factories, was elected chairman of the board of directors, and Lewis H. Brown, formerly secretary and assistant to the president, was elected president. Mr. Seigle succeeds H. E. Manville, resigned, and Mr. Brown succceeds Theodore F. Merseles, who died March 6. Mr. Seigle has been in the service of Johns-Manville since his graduation from college in 1900, at which time the corporation was known as the H. W. Johns Manufacturing Company. Under Mr. Seigle's leadership the mines and factories making up the manufacturing units of Johns-Manville have been greatly enlarged and improved by the introduction of labor- and time-saving devices.

Mr. Brown engaged in sales work early in his career for a manufacturing company in Indiana. Immediately after the war he joined Montgomery Ward & Company. From 1921 to 1927 Mr. Brown was in close personal contact with the late Theodore F. Merseles, then president, and George B. Everitt, now president of Montgomery Ward & Company, during the remarkable years of the reorganization and revitalizing of Montgomery Ward.

Servicised Products and Carey Company End Differences

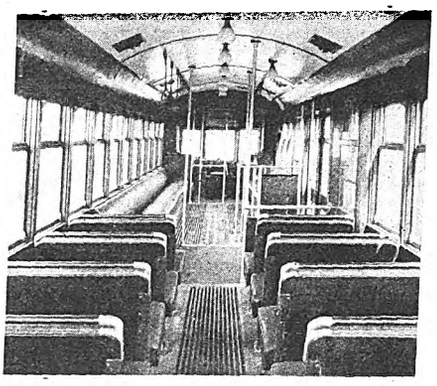
The Servicised Products Corporation, Chicago, Ill., and The Philip Carey Manufacturing Company, Lockland, Ohio, announce that they have terminated their differences including the pending litigation. The Servicised Products Corporation was granted and is now manufacturing premoulded products under a license on patents owned by The Philip Carey Manufacturing Company, including, in addition to patents formerly owned by that company, all patents heretofore owned by the Servicised Laboratories, Inc., relating to premoulded products, such as expansion joint, rail filler, track pavement, railroad crossings construction materials and other like products. It is stated, however, that otherwise the two companies are entirely distinct and independent corporations.

Detroit Car Delivery Starts



One of the Peter Witt type cars being delivered to the Department of Street Railways, Detroit, Mich.

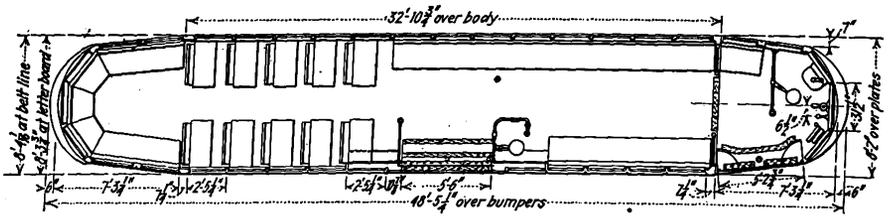
The first of 100 new passenger cars was recently delivered to the Department of Street Railways, Detroit, Mich., by the Perley A. Thomas Car Company, High Point, N. C. These cars are of the Peter Witt type and are being built to practically the same specifications as the 500 of this type now in operation on the lines of the Detroit Street Railway. The new cars are of the city, single-end, double-truck type, each seating 52 passengers. They are 48 ft. 5 in. long and have a maximum width of 8 ft. 4 in., being of the front-entrance, center-exit type. The two center-exit doors are of the sliding type with stationary steps and the two front-entrance doors are of the two-leaf folding type, arranged to swing inward, with stationary steps.



The interior trim of the Detroit cars is in natural cherry. The leather upholstered seats are equipped with horizontal grab-handles

All doors are pneumatically-operated, the center doors being selective controlled by the conductor and interlocked with the car circuit so that the car cannot be moved while the doors remain open. No signal light is used. All seats will be fully upholstered in genuine leather and will have deep spring cushions and offset horizontal grab-handles of wood. When completed each car will carry the underwriter's label, thus enabling the Department of Street Railways to secure a low fire insurance rating under its 100 per cent blanket fire insurance coverage.

The trucks have a 5-ft. 6-in. wheelbase and are spaced 23 ft. 9 in. on the bolster centers. Each truck is equipped with two 35-hp. inside-hung motors and 26-in. rolled-steel wheels. Half of the motors will be furnished by the General Electric Company and half by the Westinghouse Electric & Manufacturing Company. A survey is now being made to ascertain if the system needs 100 cars in addition to the present order.



Floor plan of one of the 100 cars being built by the Perley A. Thomas Car Company

Car body	17,130 lbs.
Trucks per pair	11,000 lbs.
Motor and control equipment	6,620 lbs.
Air brake equipment	1,250 lb.
Total	36,000 lbs.
Length over bumpers	48 ft. 5 in.
Truck center distance	23 ft. 9 in.
Truck wheelbase	5 ft. 6 in.
Height Rail to step	15 in.
Width of seat	35 in.
Width of aisle	23 in.
Axle bearing diameter	4 in.
Wheel diameter	26 in.
Height, rail to trolley base	10 ft. 9¾ in.
Air brake type	Westinghouse
Body	Semi-steel
Car signal system	Faraday high voltage Compressors Westinghouse DH-16 and GE CP-27
Control	K-35-HH
Destination signs	Hunter
Doors	Center-sliding, end-folding
Door mechanism	National Pneumatic
Hand brakes	Peacock Staffless
Heaters	Consolidated 1522-T or Gold 478
Headlight	Electric Service Supply Company, Type RRX-96
Headlining	Agasote
Interior trim	Natural cherry
Journel bearings	Plain
Lamp fixtures	Electric Service Supply Company 22010
Motors	Four—35-hp. 600-volt interpole, ventilated box frame inside-hung, General Electric 265-A and Westinghouse A-510
Painting scheme	Ivory with green trim
Roof	Arch
Sash fixtures	Curtain Supply Company
Seats	Heywood-Wakefield 8-M-5 Special
Seating material	Brown leather
Step treads	Kass type 14
Trolley base	Ohio Brass Form 1
Trolley catcher	Ohio Brass 13141
Truck type	Standard
Ventilators	Railway Utility, honeycomb
Wheels	26-in.-rolled-steel

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Russian Railway to Be Electrified

Electrification of the 63 km. (40 miles) of the Sestafoni-Chashuri section of the Baku-Batum Railway, of Russia, in which is located the Souram Pass, is now under consideration. The oil traffic is expanding at such a rate that even the doubling of the old Baku-Batum pipeline is insufficient to cope with the increasing trade. Moreover, the completion of the Maritime line from Batum northwards along the Black Sea coast has put an additional strain on the one track of the Baku-Batum line which now serves as one of the feeders of the Maritime Railway. The authorities are therefore forced either to double the track or electrify the "bottle-neck," thus increasing the scheduled speed over the Souram Pass to the average for the rest of the line. Electrification has been decided upon as being more economical, and the Russians are now in the international market for the equipment necessary.

The scheme decided upon will use direct current at 3,000 volts, with regeneration of electrical energy when descending the steep gradients instead of using brakes. Three or four substations and 24 electric locomotives will be necessary; of the latter fourteen are to be ordered abroad and the remaining ten are to be built in Russia under the supervision of the foreign contracting concern. The value of the order to be placed abroad is about $1,750,000. The electrification of the Souram Pass is the first of several electrification schemes of Russian main lines. Plans are also in hand for the electrification of other sections—viz., of the Moscow-Kazan and Moscow-Koursk Railways.

Purchasing Agents to Meet

Approximately 1,500 industrial buyers will study the latest economic changes of their profession at the fourteenth annual meeting of the National Association of Purchasing Agents to be held at the Hotel Statler, Buffalo, N. Y., from June 3 to 6 inclusive. The convention will attract the purchasing agents in practically every industry in the United States, Canada, and Mexico, whose combined buying power annually runs in the billions. These industrial buyers will study commodity trends and business conditions, up-to-the-minute purchasing practices, new sources of supply, new services, and new products.

It is realized that the downward trend in commodity prices is bringing about tremendous fundamental changes that strongly militate against the success of many companies, while at the same time working in favor of others, and that assistance in buying right, under these changing economic conditions, is the greatest need of the purchasing agent. For this reason much stress is being laid upon the development of a strong convention program which will anticipate the buyer's needs.

Exhibitograph No. 6.

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Apart from the general sessions, a great deal of time will be allotted to the various industrial groups within the association so that they may convene on their common interests. Buyers for particular industries, for instance, such as public utilities, oil companies, banks and insurance companies, mining, smelting, and refining concerns, etc., as well as those interested in major commodities, such as coal, iron and steel, textiles, etc., will have ample opportunity to thrash out their own problems and discuss and hear the latest developments of importance.

Supplementing the convention itself, there will be an exhibit of industrial equipment, services, and improved products. This is called the "Informashow" because of its informative character. The show is of unusual merit and affords each purchasing agent an opportunity to keep abreast of development. In the past it has proved very educational.

Square D & Industrial Controller Unite

Manufacturing, financial and engineering resources of the Square D Company, Detroit, Mich., and Peru, Ind., and of the Industrial Controller Company, Milwaukee, Wis., have been united. Henceforth the two companies will be conducted under one management and will be known as the Square D Company. The new company will serve the industry through three divisions, the switch and panelboard division, Detroit; the porcelain division, Peru, and the industrial controller division, Milwaukee.

The management of this new and larger Square D Company will be in the same hands that guided the two combining companies previously. T. J. Kauffman continues as president and operating head of the business. A. A. Schueler, for several years sales manager of the Square D Company, becomes general sales manager of the new organization. F. W. Magin, who was general manager of the Industrial Controller Company, will continue as general manager of the industrial controller division of the new Square D Company, in addition to becoming vice-president of the company. H. L. Van Valkenburg will be chief engineer of the industrial controller division of the new Square D Company, continuing in the same position he held with the Industrial Controller Company.

ELECTRIC RAILWAY MATERIAL PRICES—MARCH 26, 1929

Metals—New York

Copper, electrolytic, cents per lb.	23.775
Lead, cents per lb.	7.775
Nickel, cents per lb., ingot	35.
Zinc, cents per lb.	6.975
Tin, Straits, cents per lb.	48.75
Aluminum, 98 to 99 per cent, cents per lb.	23.90
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	54.00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.375
Somerset mine run, f.o.b. mines, net tons	1.875
Pittsburgh mine run, Pittsburgh, net tons	1.80
Franklin, Ill., screenings, Chicago	1.70
Central, Ill., screenings, Chicago	1.175
Kansas screenings, Kansas City	1.70

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅝ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.925
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.70
Sheet iron (24 gage), cents per lb.	2.90
Sheet iron, galvanized (24 gage), cents per lb.	3.65
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	3.15

Waste—New York

Waste, wool, cents per lb.	18.
Waste, cotton (100 lb. bale), cents per lb.:	
White	17.25
Colored	13.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	10.6
White lead in oil (100 lb. keg), cents per lb.	13.50
Turpentine (bbl. lots), per gal.	$0.60
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	25.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.95
Weatherproof wire base, cents per lb.	26.875

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	$2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.25
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, ¾-in., cu.yd., delivered	3.25
Sand, cu.yd., delivered	2.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	19.875
Light copper, cents per lb.	17.875
Heavy yellow brass, cents per lb.	12.875
Zinc, old scrap, cents per lb.	3.375
Lead, cents per lb. (heavy)	6.125
Steel car axles, Chicago, net ton	$17.75
Cast iron car wheels, Chicago, gross ton	14.75
Rails (short), Chicago, gross ton	19.25
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.75

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL, *Publishing Director*

Volume 73 — New York, May, 1929 — *Number 14*

Transportation Problems a Challenge to Economists

GRAVE questions of economics and public policy confront the entire transportation industry of the country—railroads as well as local carriers. And since their correct solution is vital to American business, and in fact to the welfare of the entire nation, there is increasing need for attention to fundamentals. The situation grows in complexity. The present era is one in which invention and the development of natural resources have carried us forward faster and faster, and have imposed constantly changing economic conditions.

As a whole the total passenger traffic on all forms of local common carriers is standing still. This is well known. During the last eight years similar traffic on the steam railroads has declined 33 per cent. This is, perhaps, not so well known by local transportation men. No close parallel is presented by the situation which confronts these two branches of transportation, but it does suggest a number of thought-provoking analogies. The loss of less-than-carload shipments by the railroads to motor trucks, their loss of passenger business to automobiles and buses, the present public pressure for the development of inland waterways and the recent order by the Interstate Commerce Commission for joint through tariffs between railroads and barge lines; the mounting costs of terminal facilities for both passengers and freight in large cities, and the probable future competition of the airplane, have their parallels in the effects of transportation over publicly-built highways upon the interurbans, the growth of street congestion in cities, the distorted view which city planners and the public take concerning the provision of facilities for private transportation as compared with public transportation, and the many expedients that are vainly being tried in the attempt to finance adequate local rapid transit with public funds. Finally, the problems of the railroads and of local transportation become very closely associated indeed, when the physical and economic questions involved in the co-ordination of railroad terminals with the local transportation facilities of large cities are encountered.

It is not easy to foresee fully the future course of transportation development and co-ordination. The physical problems do not appear insuperable. When the question is considered from the viewpoint of economics and public policy, however, it becomes complicated indeed in its many ramifications. Despite all this there is no excuse for inaction, heated partisanship, or helpless bewilderment. The difficulties that present themselves really constitute a challenge to our ability intelligently to solve them by so directing economic forces that they shall not destroy us.

Of course, mere reiteration of the issues raises more questions than it answers, but unless the questions are both raised and clearly defined, they will not be answered. Above all, there can be no compromise with progress. The public demand for more and better and faster and cheaper transportation cannot be thwarted. At the same time there must be a clearer understanding of fundamentals in the effort to achieve results. Any tendency to dally in the consideration of principles must inevitably result in collapse of the nation's transportation facilities regardless of how brilliant may be the conception of those who plan them. Upon the economists of the nation rests the responsibility for detecting present weaknesses in our economic conceptions and for laying down as well, sound principles as the foundation upon which to rear our present and future transportation structure. Not only to the men in all branches of the industry, but to the economists as well, the country's transportation problems present a grave challenge.

Skillful Management Improves Railway Position in 1928

GREATER net income secured in the face of declining traffic and lower revenues is the outstanding result of operations revealed in the returns of 182 electric railways to the American Electric Railway Association for the calendar year 1928 as compared with 1927. Improved maintenance methods, higher average car speeds, adjustment of service to meet the traffic, development of new sources of revenue, increase of income from outside investments, use of the bus to reduce the drain of non-paying railway routes, readjustment of the capital structure, reduction of capitalization or elimination of fixed charges have all been used to offset a loss in passenger traffic and to convert a decrease of about 2 per cent in gross revenue into an increase in the net corporate income.

Not all of the companies, of course, have been equally successful in accomplishing such results. The interurbans, in particular, as a class have been able to make little if any headway against the adverse conditions which menace them. On the other hand some of the lines in the smaller cities which a few years ago were believed to have little chance of survival are now found to be holding tenaciously to their traffic and by the most intensive efforts are developing economies and working out improvements in methods that give promise of enabling them to pay a fair return.

General conditions in 1928 were not particularly favorable to the electric railways, although there have been worse years. At the beginning of the year business was slightly depressed and employment somewhat under normal, a condition that held over from the fall of 1927. As the year progressed business picked up but in certain sections, notably the southeast, the northwest and parts of New England, conditions were below normal through-

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out the year. Automobile registrations increased a million over 1927, and in the fall a mild epidemic of influenza had an adverse effect on street railway traffic.

Inspection of the bus figures shows that the electric railways are making long strides forward in the development and improvement of this transportation means, although from other sources it appears that as a whole the railway-operated buses are still a long way from paying all of their carrying charges. This is due, of course, to the use made of buses by electric railways to act as stop-losses on non-paying routes and to extend transportation into lean and undeveloped territory.

Of the three groups into which the statistics are divided, city properties, interurban properties and properties comprising both city and interurban service, the third classification shows up the best. The improvement made in its net revenue was great enough to produce a similar improvement in the combined total for the properties. Furthermore, it appears from the figures that the improvement effected in this group was produced entirely by the skill of the managements without any assistance from favoring circumstances. In fact it was in this group that the reduction in operating revenue was greatest. But by intensive managerial efforts, by adapting service to the demand for it, by speeding up the cars, by more economical maintenance and by better financial management these lines were able to show a substantial improvement in the net for the year. The gains in this group, with its relatively small receipts, were sufficient to overcome in the totals the losses in the other groups. Had equal skill been possible throughout the entire industry, a still better statement would have been presented for the year's work.

Improved Maintenance Equipment Needed

EQUIPMENT for electric railway maintenance is far below the standards found in other industries. Maintenance forces are laboring under a disadvantage in this respect, and much can be done to improve equipment to lighten the labor, speed up work, reduce costs and insure more accurate workmanship. The need for improvement of maintenance tools, fixtures and machines has long been apparent, and recommendations to this effect have repeatedly been included in committee reports of various American Electric Railway Engineering Association committees. Moreover, in recent issues of ELECTRIC RAILWAY JOURNAL there have been a number of suggestions from maintenance executives regarding the need for improved maintenance equipment. Manufacturers should welcome the opportunity to enter this discussion and avail themselves of the opportunity for broadening their market for maintenance machinery.

In railway shops most of the machining operations are performed on odd-shaped pieces. As there are sometimes only a few of each class to be machined, the provision of special jigs and fixtures may not be warranted. Machine tools may, however, be improved by providing ready means of clamping the work and holding it securely. Overhead line maintenance is handicapped considerably due to the nature of the structure used. When a worn part must be renewed, it is sometimes necessary to disturb a considerable part of the supporting overhead. There is an opportunity for improvement. Likewise, there is an excellent opportunity for the development of improved tools and fixtures to eliminate hand work in the field and to speed up repairs or replacements. In the track department a large part of maintenance cost is attributable to the removal and replacement of pavement when making joint repairs. Certainly, the simplest remedy is to use the best type of joint construction available. But when bad joints do develop, attention should be directed toward ideas for cutting the cost of pavement removal.

The Clang of the Fire Bell Finally Aroused Baltimore

BALTIMORE has at least got started in the right direction on parking. It has put on the ban in certain downtown streets during business hours. The circumstances, however, are peculiar—so peculiar that they seem worthy of special attention. Traffic experts have long said that this was a step Baltimore needed to take; the railway officials have insisted that prohibition of parking on certain congested streets was necessary to prevent the convenience of a relatively small number of automobile users from interfering with the rights of all other users of the public streets; the newspapers sensed the evil of parking and the doughty Mr. Mencken, whose pen drips vitriol when he goes crusading, said in the Baltimore *Sun* recently that the use of congested public streets as free garages is a reflection on the intelligence of modern Americans. But Baltimore remained adamant; that is, the selfish had their way.

It was the clang of the fire bell that finally aroused Baltimore. Engines racing to the scene of a conflagration were able to get through the streets only after the usual traffic difficulties, but when they reached the fire the way of the crews to the fire plugs was obstructed with parked cars. The firemen had of course long recognized the parked car as an incipient menace. Now it became a real one. As Grover Cleveland used to say, it was a condition not a theory that confronted them. They put out the fire, and then they let out a roar that quickly brought action in Baltimore. It is too bad that nothing short of a threat of public catastrophe could arouse the city to exercise its common sense. The menace of the parked car is not Baltimore's alone. It exists in every city of any size.

Detroit's Subway Vote Disturbing

DETROIT voters went on record on April 1 against the $91,000,000 subway proposal submitted to them at that time. This provided for a plan of assessment that would have affected the owners of the property adjacent to the new lines. Whether or not that was the real cause for rejection does not appear, but fear of assessment does seem to have played a large part in the adverse vote. The assumption is that those vitally interested in defeating the proposition voted, while those who favored it remained at home.

As the *Free Press* sees it, men prominent in the political life of the city believe that the public will never approve a subway plan unless it is to be financed by the issue of general bonds of the community. Others are said to believe that bonds of this kind should be issued, but that the revenues of the system against which the bonds are issued should be sufficient to meet the interest and the sinking fund charges. Of course, full accord on the method to be used is hardly to be expected, but the assessment plan is the only sound one, despite the fact that it is difficult for the layman to understand.

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As for the future, added means of transportation are vital to the well-being of Detroit. In fact, the city's future is inextricably bound up in what is done about it. As matters stand now the Mayor has memorialized the Street Railway Commission and the Rapid Transit Commission to draw up plans for a series of short subway routes for the downtown district to be used by the street car lines. This plan on its face would appear to throw into the discard much of the work of the Rapid Transit Commission, finally joined by the Street Railway Commission in the proposal recently rejected. Presumably the plan which the Mayor now has in mind will be completed in time for its submission to the voters in the fall, since he is irrevocably committed to securing some kind of transit relief for the city. It is to be hoped that, to accomplish his objective, the assessment plan of financing—the most important single feature of the proposal of April 1—will not be eliminated.

Under the Detroit plan it was recommended that 17 per cent of the total cost be raised by an ad valorem tax on the city at large; 51 per cent on the benefited property adjacent to the subway, and 32 per cent to pay for tracks and other equipment, raised by a 10-cent fare. The Council was to fix the exact proportions, and the assessors were to determine the enhancement in property values due to the subway during the five-year construction period. At the end of the five years, the assessments were to be levied to retire the bonds. Of course, the 13-mile subway included in the plan before the voters was only part of the larger scheme upon which the Rapid Transit Commission has been at work. Despite the need to start at once on transit improvements in Detroit, this equitable proposal was defeated at the polls. The conclusion seems inescapable that the majority of voters had little understanding of the fundamentals of the question before them.

Humanitarian Impulse Grows in Modern Business

CONCRETE evidence that large enterprises in the United States are run along humanitarian as well as utilitarian lines is furnished by the annual reports of many companies, but no more convincingly, perhaps, than in the annual statement of the General Electric Company. There one finds tangible instances of the practical application of the precepts which on occasion Owen D. Young, chairman of the company, has reiterated.

The General Electric Company is prosperous. It has been prosperous over a long period of years. And in its accounting policies the company is conservative almost to a fault. Its patents are carried at a dollar and its furniture and appliances, other than in the factories, are carried at a similar figure. In addition, a general plant reserve in excess of normal depreciation is set aside to permit buildings or equipment to be replaced whenever it is found that new facilities would permit increased efficiency or economy.

But concern is here not so much with the business acumen that has produced consistent profits, as with the forward-looking policy that has been followed with respect to employee relations and the degree to which the management of this vast industrial organization has recognized that even its lowliest worker is entitled to recognition as a factor in its success. This has been put into tangible form by encouraging stock ownership by employees; through the provision of old age retirement funds, and directly through increases in the average annual earnings of employees of 126 per cent since 1914—a period in which the cost of living increased only 62 per cent.

New York State Courts to Decide

EVENTS incident to the remanding of the Interborough Rapid Transit fare case by the United States Supreme Court to the lower court will take their course again during May after the lower court has been formally apprised of the ruling of the upper court. Just what these events will be it is difficult to say. Spokesmen for the city have been voluble, but the company has kept its peace. It is to be expected that the city will enter a plea for the dismissal of the federal court injunctions that prevent the prosecution of the city's fight in the state courts to enforce the 5-cent fare clause. City officers, as might be expected, hold that the Supreme Court's decision banning the 7-cent fare petition makes a dismissal of the injunction virtually mandatory. Even in the state court the issue may, of course, be lost, but that is by no means certain. The verdict of the Supreme Court was not unanimous.

On the probable course of events it is idle to speculate, but it is not idle to reiterate, as was pointed out in the ELECTRIC RAILWAY JOURNAL NEWS for April 13, that issues bound up in the case would appear to differentiate it from other rate actions that on their face may seem to be similar to the one in New York. The company advanced the issue that inadequate returns were shown on the combined subway and elevated properties which it operates—the former being leased from privately-owned companies, and the latter having been built largely with city funds—but the court held that the subway and the elevated systems must be treated separately. It did not, however, elaborate on the reasons for this finding.

That the Supreme Court did more than merely remand the issue to the lower courts for decision without an opinion, as sometimes is customary, is ascribed to the nature of the pleading. In so doing it did say some things that appear to offer surcease to the representatives of the city, but that is by no means certain, even though the officers of the city were quick to accept them as such. The court's rejection of the plea of the company that the fare should be adjusted to provide an 8 per cent return upon both the company and the city investment in the subways—to be divided according to the terms of the contract—was tempered with the statement that while the claim was unprecedented it "ought not to be accepted without more cogent support than the present record discloses."

As brought out previously in the ELECTRIC RAILWAY JOURNAL, matters as they now stand are best stated in the words of Justice McReynolds to the effect that the Transit Commission of the state of New York has long held to the view that it lacks power to change the 5-cent rate established by contract between the city and the company, but that "it is intended to test this point of law by an immediate, orderly appeal to the courts of the state." This purpose, the United States Supreme Court ruled, should not be thwarted by an injunction secured by the company to prevent the city from interfering with an increase in fares.

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Signals Should MOVE *Traffic* —*Not* STOP *It*

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Observations of the performance of typical signal installations indicate in a striking way the serious delay to traffic movement that results from makeshift signalling. The authors develop a series of traffic flow profiles that illustrate exactly what happens at a crossing, under variable conditions, after the "Go" indication flashes

"VANITY FAIR" recently printed a forceful story of "The City That Died of Greatness." "We are on our way; nothing can stop us," warbled the 42nd Street realtor. "Yes, but where?" exclaimed the long-suffering one. "Truly on your way, but at the dizzying rate of 1 m.p.h." Thus we of the provinces are constrained to exclaim, "So *this* is New York." All of which is merely by way of observing that our dynamic metropolis has thus far contented itself with the most obsolete traffic-signal system of any large city.

The harassed traffic head of another large city echoes: "We must immediately spend $1,000,000 for signals." But this city apparently has made no adequate engineering study to determine the right design, the exact needs, or the probable result of signaling perhaps 1,000 street intersections. Many other communities are nervously spending and experimenting, with no clearly defined objective in mind and with little intensive study of the problem before making heavy expenditures for what, in the last analysis, are strictly engineering projects.

There are 30,000,000 people today dwelling in a total metropolitan area of 10,000 square miles (cities over 200,000 population). Roughly speaking, the total riding habit within these communities has steadily increased. But the demand for speed and comfort has diverted perhaps one-third of the present total volume of riding from public transportation agencies to private automobiles. The public is moving into the suburbs and demanding faster transportation. Time rather than distance has become the measure of transportation, and the 30-minute time zone still measures, in a general way, the limit of convenient residence and maximum population density. Beyond the 30-minute zone the tendency to use automobiles increases except in unusual cases like Manhattan, where "necessity riding" and lack of cheap auto storage encourage people to use the rails.

Thus speeding up the mass carriers, upon which most people have to depend, at the same time decreasing downtown motor congestion by removing some of the causes, has become an outstanding problem of public interest. Express buses appear most hopeful where rapid transit cannot be financed by reasonable fares or benefit subsidies. But even buses are subject to defective street planning and much the same delays as street cars. To make matters worse, inadequate signaling and traffic controls have become almost epidemic throughout the country, distinctly menacing speedier transportation and efficiency which the industry is struggling to achieve through its modernization programs.

But this situation can be met if approached as a problem of engineering analysis and design rather than of politics or "safety" policing alone. In the accompanying Table I, there is shown a definite example of the results which may be accomplished by proper signal control in comparison with present obsolete methods. By timing signals for proper sequence traffic moved one-third faster, there was an increase in street capacity for non-stop traffic amounting to more than twice the number of automobiles that could get through formerly without stopping, and transportation speeds were increased 20 per cent.

Signals Should Move Traffic—Not Stop It

So long as both public transportation vehicles and automobiles occupy the same streets, any adequate system of control should have for its purpose both safety and time-saving for the greatest number of people. Unfortunately, almost the entire consideration in signal installation has generally been concentrated upon expediting automobile traffic with little regard to the relative number of people carried by various agencies. Contrary to this practice, the requirements of mass transportation should be the starting point. To handle rush-hour loads of our 22 largest cities, registering nearly 4,000,000 automobiles, about 2,500,000 of these, carrying an average of 1.7 persons, would be required (assuming a riding habit as low as 250 rides per capita

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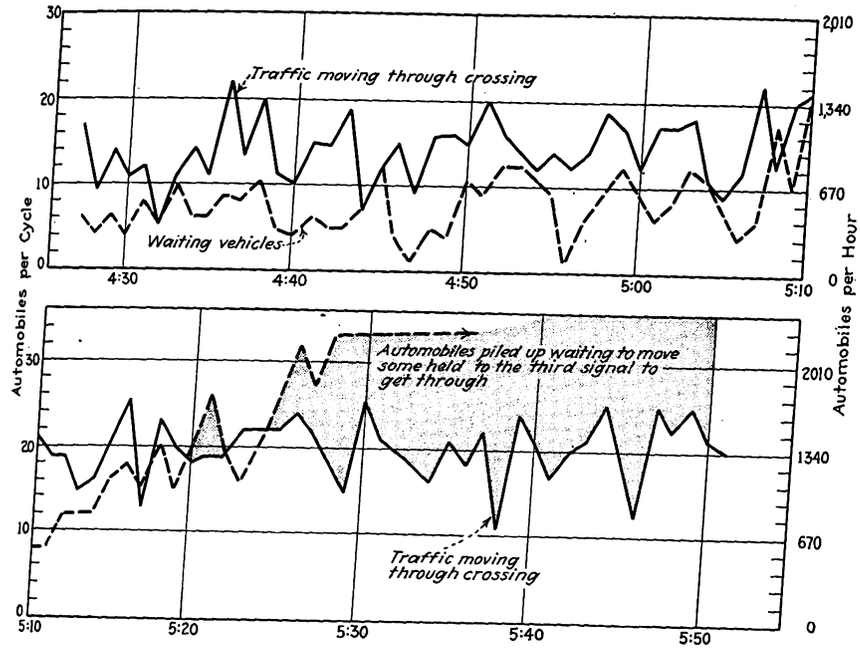
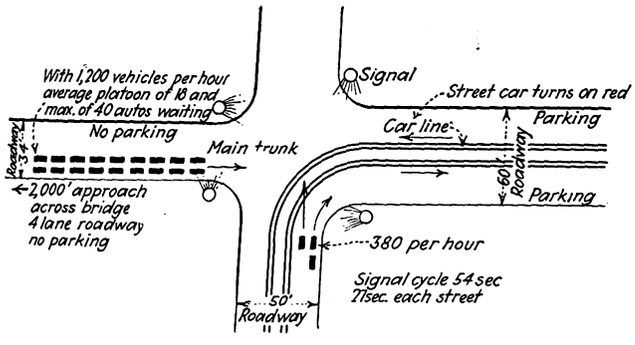


Fig. 1—Log of vehicular movement (two-lane) through first signal of alternate-group, synchronous system on heavy traffic artery, based upon observations taken at five-second intervals and showing pile-up of delayed vehicles during rush-hour peak



Observations for Fig. 1 were taken at this intersection

per year). In comparison, modern railway equipment, designed for handling city surface transportation and operating either as single cars or articulated units, has the equivalent actual passenger-carrying capacity of from 40 to 100 automobiles.

The starting point, therefore, in designing a signal system for a public street carrying passengers in both public and private vehicles, is to obtain the highest average speed, including passenger stops, that it is possible to make by cars or buses through a signal district during rush hours. To expedite the movement of automobiles as well as that of public transportation vehicles, a two-speed wave system can generally be discovered which will accommodate *both* public vehicles and automobiles most efficiently, so that the "set-back" of cars or buses due to loading stops can be best fitted into successive signal "wave bands" to avoid the present time loss waiting for signals, which is so seriously slowing down public transportation rather than speeding it up. For non-rush hours, a short signal cycle permits advantage to be taken of the shorter loading time and decreased traffic interference during these hours. The commendable increased speed of all traffic through the Chicago Loop district, following the installation of a scientifically-designed, progressive signal system, illustrates what can be accomplished by proper skillful design. When the requirements of mass transportation are thus adequately considered, the advantages accrue not alone to public transportation riders, but to all traffic using the streets.

Need for Faster Schedules Imperative

Surface transportation in public vehicles needs to be speeded up during rush hours along main trunk line streets to 12 m.p.h. average running speed, and even faster during non-rush hours. Express buses, with minimum stop time, should approximate average automobile speeds. As street car headways are seldom closer than 30 seconds, and buses 60 seconds, even on heavy traffic arteries, it rarely becomes necessary to pass more than one or two mass transportation units across an intersection during each signal cycle. Consequently, while other traffic may accommodate itself to quite a wide range in cycle time, mass transportation vehicles need the shortest possible cycle to minimize waiting time for stop signals. But rarely indeed are these transit needs adequately considered in present signal installations. Yet it is entirely practicable when signal cycles are kept short to accommodate two classes of traffic moving on the same street at different speeds, with minimum stoppage and delay to either class of vehicles.

On the usual transit system of a circular city, an increase in speed of 1 m.p.h. will expand the 30-minute rush-hour time-zone more than 25 per cent in area. But if then a system of signals is installed, for example, along a 5-mile transit artery of ten blocks per mile, which is improperly timed so that street cars are held up by a red light for 30 seconds every five blocks, this would result in ten delays, adding 16 per cent to the running time of the line, thus absorbing all of the assumed speed increase. The cost of providing transportation service is also materially increased to no good purpose, to say nothing of the delay experienced by the public during the 300 or 400 rides per year required by the average citizen. It is idle to figure money losses, but it is very important to recognize that a large part of this economic loss can be avoided through proper signal design timing.

Signal Engineering Involves Many Factors

The technical problem of properly designing and timing signals so as to co-ordinate the effects of many shifting variables, differing in proportion for every city, street and intersection and changing for various times in the day, involves proper recognition of the following factors:

Complexities and defects of the street plan itself.
Number of blocks per mile and variable block lengths.
Width of streets, number of roadway lanes available.
Effectiveness of regulations with respect to parking.
Reasonable wave speeds safe for traffic and transit in particular districts.
Length of cycle best suited to these block lengths and speeds.
Split of cycle best suited to cross traffic and turns.
Type of traffic (classes of vehicles and density) for various periods of the day.
Volume of through traffic, cross traffic and turns at various intersections.
Pedestrian movement at critical points.
Operating characteristics of car and bus lines as to acceleration

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rates, running speeds and time of passenger stops to accommodate the passenger interchange at various points and periods of the day.

Car-bus density or headways required at various periods.

It is no exaggeration to say that any comprehensive signal installation which overlooks these considerations will tend to slow down traffic movement instead of expediting it and will constitute a serious economic burden on the community.

Further, we must challenge the viewpoint too often expressed or implied that if the movement and speeds of traffic and transit are not reduced by a new signal system below what they were before the installation, satisfactory results have been secured. The time has now come to demand positive rather than passive or negative results or else change the system.

Average street speeds are now too slow. The result of properly designed signals should be to increase the average speed rather than the maximum or crest speed of moving traffic. There is a certain moderate average speed which passes the maximum volume of traffic; above and below this, less traffic gets through a given artery in a given length of time. When speeds are very high, this situation is obviously due to the physical necessity for "stringing out" of the line of traffic for increased safe braking distance. Within the limits of permissible city traffic speeds, the factor of greatest importance in determining the volume of traffic that will get through a given artery is signal efficiency and not high crest speeds.

This efficiency may best be measured in terms of either the ratio of the width of the through "time band," during which traffic moves through a signal system without stopping, to the total "Go" time at the controlled intersection, or else by a percentage of the hour given to through movement. In other words, those signal installations are most efficient which permit the largest proportion of traffic to get through without stopping. Every signal stoppage of traffic represents a "pile-up" and "set-back" to succeeding "Go" signals.

In the first column of Table I under the "alternate-group, synchronous" signal system, the time band for through, non-stop traffic at present amounts to only thirteen seconds, due to the fixed equal timing at each intersection, and the inherent characteristics of the system, although the "Go" time for the artery under observation was 40 seconds. Thus the efficiency of the system from the viewpoint of through, non-stop traffic is 32.5 per cent. The proportion of total time devoted to non-stop through traffic is only 16.3 per cent. In the same table under the "progressive non-stop wave" signal system, the efficiency of the through traffic band may be raised to 83.5 per cent and the proportion of the total hour, available for non-stop through traffic movement, is 41.7 per cent.

Inefficient Signals Cut Traffic Capacity

Signal installations group themselves roughly into five classes: (1) Isolated signals; (2) simple synchronous; (3) alternate-group synchronous (2 or more blocks); (4) alternate-synchronous (single blocks); and (5) full progressive wave systems.

Except in very special cases all of the first four are inadequate to the requirements of a heavy main line artery carrying both automobile and public transportation vehicles. The simple, isolated, automatic "go-stop" signal, with no timing relation to other signal installations on the traffic artery, is entirely unsuited to expedite traffic movement. It merely stops the traffic stream periodically for the purpose of allowing cross traffic to move through. The simple synchronous or "hit and run" system encourages over-speeding. In this system all signals on a master time circuit show "Stop" or "Go" simultaneously. When electric cars are controlled by such a system, a serious power problem is developed by the simultaneous starting of all cars along the street.

The alternate-group synchronous or "stagger" system requires a rigid 50 per cent split of the signal cycle. This is usually arranged to show successively "Stop-Stop-Stop," and "Go-Go-Go," etc., along a given street. Obviously there must be an excessive wastage in street time and capacity and the signals permit only a very low percentage of time for non-stop through-traffic movement. The alternate (one block) synchronous installation is best adapted for *uniform* block lengths of six to eight blocks per mile. But this also requires a rigid 50 per cent split of the cycle time, and there is no way to avoid wastage of time and street capacity due to lack of individual signal timing.

TABLE I—COMPARISON OF ALTERNATE-SYNCHRONOUS AND PROGRESSIVE SYSTEMS

Two-Mile Main Trunk—Skip Signalled (30 per cent—9 minor crossings omitted)

	Alternate-Group Synchronous	Progressive Non-Stop Wave
Length of cycle, seconds	80	60
Cycle split along the street, seconds	Fixed 40-40	variable
Width of through-traffic band, seconds	13	25
Efficiency of through-traffic band, per cent	32.5	83.5
Proportion of hour available for through traffic, per cent.	16.3	41.7
Bus operations northbound:		
Speed through lights, m.p.h.	11	12.8
Total running time, seconds	680	586
Running time, including passenger stops but excluding light delays, seconds	565	565
Delays due to lights only, seconds	115	21
Proportion of time held by lights, per cent	20.4	3.7
Bus operations southbound:		
Speed through lights, m.p.h.	9.2	11.3
Total running time, seconds	854	694
Running time, including passenger stops but excluding light delays, seconds	643*	643*
Delays due to lights only, seconds	211	51
Proportion of time held by lights, per cent	33	8
Automobile speeds (moderate traffic flow):		
Northbound, first car, entering signals, m.p.h.	18.6	22.8
last car, entering signals, m.p.h.	14.1	20.7
Southbound, first car, entering signals, m.p.h.	18.6	23.6
last car, entering signals, m.p.h.	14.1	21.5

Advantages of progressive system—Bus speed increased 20 per cent; running time reduced four minutes (round trip). Useful street capacity for non-stop traffic increased three times. Average traffic speeds increased one-third.

*Due to more loading and fare collections southbound.

Non-Stop Progressive Wave System Most Efficient

The full progressive wave system represents the most efficient plan for the control of heavy traffic movement and provides the most uniform speed, maximum capacity and non-stop traffic flow. Such installations operate from a four-wire master control circuit with adjustable timers at each intersection and local power supply. Here the green "Go" signal moves along a street at predetermined speeds just ahead of the moving vehicles, which have been separated into moving platoons. For traffic arteries outside heavily congested districts, this system may be installed with signals only at main intersections and with "Stop-Enter" boulevard signs to protect all intervening points where only light cross-traffic occurs. This might be called the "skip-signal progressive system." It is especially adapted to meet the conditions of very irregular block lengths which would otherwise make impossible a true progressive system at a reasonable wave speed. If put into effect with reasonable signal spacing so that each successive signal ahead is easily visible, it is usually adequate for all practical needs.

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Observations made of typical signal installations indicate in a striking way the difference between good and bad signaling in its effect upon traffic movement. This effect is shown by breaking down the signal performance into five-second intervals. Only then is the full situation at a signal really revealed. Data covering full rush-hour periods, or an entire day, are totally inadequate for such an analysis in that they obscure the direct effect of the signals themselves upon vehicular movement. It is important to bear in mind that the time-unit of one second is the basic unit for studying signal performance, because a few seconds added to the timing here or taken off there may mean the difference between blockades and free movement. Wasted time through improper signaling is always cumulative. This is brought out clearly in the accompanying charts showing the serious pile-up that may occur.

The data plotted in Fig. 1 were taken at the first signal of an alternate-synchronous system on a heavy traffic artery with a clear approach of 2,000 ft. The observations were made for a two-lane, outbound, rush-hour movement with a signal cycle of 54 seconds split equally for stop-go, 27-27 seconds. The vehicular traffic approaching the signal had been broken into platoons by previous isolated signals located 2,000 and 4,000 ft. ahead of the signal under observation. The chart represents, by the solid line, a log of the number of automobiles passing through the signal in each cycle from 4:30 p.m. to 5:50 p.m. The scale at the right indicates the rate per hour of vehicular flow per hour represented by this movement through each signal cycle.

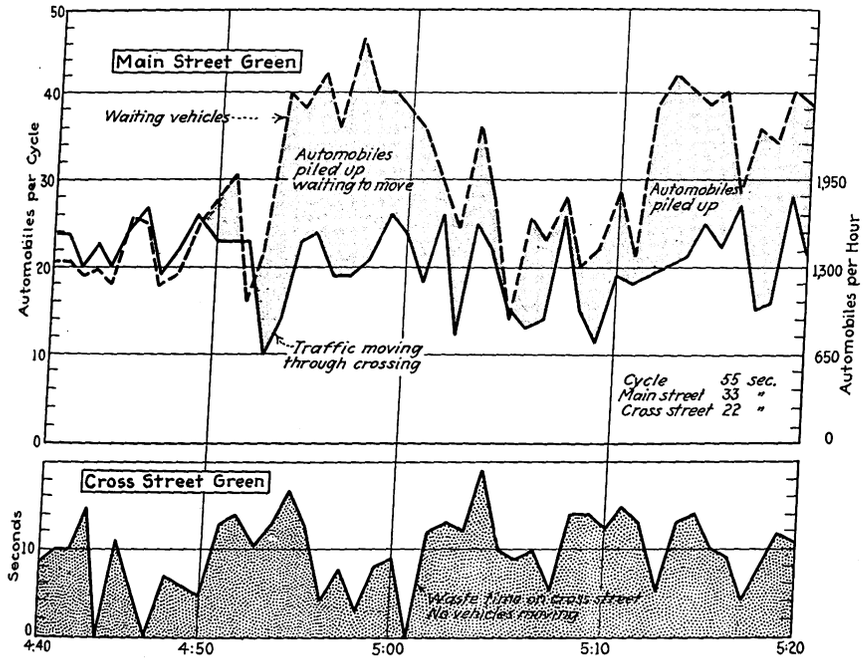
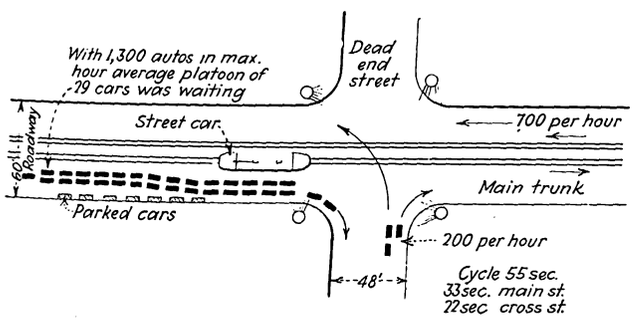


Fig. 2—Log showing effect of improper timing of isolated signal at a "T" crossing on a heavy traffic artery. The delay to through traffic and waste time on the cross street was subsequently eliminated by re-timing the signal



Observations for Fig. 2 were taken at this intersection

Stopped Vehicles Represent Delay

The dotted line on the chart represents the number of automobiles stopped at each signal cycle, waiting to proceed through the crossing. The relatively fixed capacity of the signal, regardless of the pile-up of waiting vehicles, is of particular interest. This occurred to an extent which represented serious congestion after 5:25 p.m. Before 5:20 about one-third to one-half of the automobiles on the street were held up by this signal. But during the period of maximum congestion one-third more were held up than were put through in each signal interval. The fixed capacity limit of the signal, regardless of the number of automobiles waiting to pass the crossing, shows the effect of the cumulative delay resulting from the necessity of accelerating a stopped platoon of automobiles. In other words, the efficiency of a signal is automatically reduced when the system is such that the majority of vehicles is required to stop before proceeding through the crossing. For the signal under observation during the normal maximum movement, the automobiles already waiting for the "Go" signal just cleared the crossing. Consequently, practically every motor on the street was required to stop at this signal during this period.

The normal maximum movement was about 20 cars per "Go" signal of 27 seconds (two-lane). This represents a limiting rate of traffic flow amounting to about 1,340 cars per hour of elapsed time. Obviously, the main street needed more "Go" time, which it was impossible to provide in the alternate-synchronous system with equal divisions of the cycle time. The cross-time wastage of this installation amounted to at least 15 per cent of the cycle or 30 per cent of the total time given to the cross street. This, of course, could have been largely eliminated with a progressive system and the time then used effectively to clear the congestion on the main thoroughfare.

Isolated Signal Improperly Timed Delayed Two-Thirds of Vehicles

In Fig. 2 are shown the effects of improper timing of an isolated signal on a similar heavy rush-hour traffic movement at a T street intersection. In this instance the cycle time was 55 seconds, split 33-22 seconds. A street car line stop on the heavy traffic artery interfered somewhat with the movement of traffic in two lanes. At the upper part of the chart, the solid line indicates the number of automobiles that passed the intersection per signal cycle. The scale at the right indicates the hourly rate of traffic flow per cycle and the dotted line the number of motors left waiting at the crossing when the main artery signal changed from green to red; i.e., the number stopped and "piled-up" beneath each "Go" signal. During two 10-minute periods, the waiting cars piled up

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to more than twice the number passing the signal at each "Go" period.

The highest points on the solid line in the upper part of the chart measure the limit of capacity for this signal; i. e., about 25 automobiles per cycle of 55 seconds (33 seconds of "go" indication), or about 1,640 automobiles per hour. Prior to the location of the automatic signal at this point, a manual semaphore operated by a skilled officer passed as high as 400 autos in fifteen minutes or at a rate of 1,600 vehicles per hour, because he was able to vary the length of the signals with the traffic flow. The cumulative congestion indicated in Fig. 2 was thus avoided.

The waste time on the cross street is observed by the lower curve in Fig. 2. Here the solid line shows the number of seconds in each cycle, with the cross street light showing green, but during which "Go" time was no cross-traffic moving. Most of the time allotted to this cross street was for left turn movements; necessary, but relatively small in number. This wastage averaged more than one-half of the total cross street "Go" time of 22 seconds per cycle. Since the observations in Fig. 2 were made, the hold-over to succeeding cycles at this point has been practically eliminated by changing the main artery "Go" period from 60 per cent of the total cycle to 70 per cent, illustrating the sensitiveness of signal timing.

Comparative Analysis of Three Types of Signals

An illuminating analysis of the volume of traffic which is actually passed by various types of signal installations for varying conditions of traffic movement, is given in Fig. 3, which shows graphically a series of profiles of the traffic flow by five-second intervals. Curves A, B, and C, are plotted for the same signal and crossing as the traffic log in Fig. 1. These observations were taken at the entrance throat of an alternate-synchronous system. Curve A represents the normal rush-hour profile. After ten seconds of "Go," the traffic tapers off to the "straggler" movement at the end. Curve B shows the condition at the same point after 5:25 p.m. (see Fig. 1), when saturation had been reached and more automobiles arrived at the signal per cycle than could be passed. It will be noted here that the delay resulting from the need for waiting automobiles to accelerate, after the signal flashed green, had the effect of retarding the movement so that it was not until six seconds after the "Go" signal flashed that those motors were able to clear the intersetcion. As the traffic stream got under way, the rate of flow rose to four cars per five-second interval at the end of fifteen seconds. Then, the delay again resulting from the "stringing out" of motors farther back in the platoon of waiting vehicles, caused the rate of flow past the signal to drop again to about $3\frac{1}{2}$ cars per five-second interval at the end of 25 seconds. Finally, as the traffic got well under way, cars crowded through fast enough by "running the amber" to raise the five-second rate of flow sharply to about $4\frac{3}{4}$ cars in the last interval, whereupon the signal flashed "Stop" and those unable to get through were forced to pile up waiting for the next green signal.

Curve C is for selected large platoons averaging sixteen waiting autos during the period of observation. This represents the rate of flow when cars were moving freely through the crossing without congestion, and nevertheless in sufficient volume so that there was less waste of "Go" signal time. It will be noted that the curve here is fairly flat topped, but there will always be some delay in flow at the beginning of the cycle because of the slow acceleration of stopped vehicles. The rate of flow after ten seconds, however, holds fairly uniform at four to 4.5 cars per five seconds.

Similar studies were made for the isolated signal of Fig. 2. Curve D shows the rate of flow of selected maximum platoons for this signal, which is also a flat-topped curve. Here, the average rate of flow was 27 autos in 40 seconds, or about 1.5 seconds per vehicle. With 70 per cent of the time given to the main street, this signal has an output of 1,700 autos per hour, for two-lane movement and an average pile-up of twenty autos.

Alternate-Synchronous System Inefficient for Heavy Flows

Curve E is the profile of traffic flow in the middle of an alternate-group, synchronous system and at the second signal of a two-block group timed in unison. Here the platoon peak, moving up from the first signal of the group, arrives late, and practically one-half of the "Go" time and street use is wasted, only stragglers or the turns from cross streets appearing in the first fifteen seconds. There is no help for this wastage in this group staggered arrangement. It is likewise obvious from the profile that the cycle is too long for the traffic.

These studies indicate the capacity of signaled intersections where traffic flow is stopped. This "throttling" effect occurs at the first signal of any signaled zone and at every isolated signal and is the cause of the slow average speed and low capacity of the synchronous and alternate-synchronous systems in which the flow of traffic is interrupted many times during its passage through the signaled section. Only when signals are progressively timed so that traffic can flow through at a predetermined rate of speed without stopping, can this wastage of time and street capacity be largely eliminated. On account of the throttling effect shown here, the first or entering signal should always be at a fairly light traffic intersection, at least a block or so preceeding the first heavy point. Thus there will be a smooth flow in uniform moving platoons instead of the usual hit-and-run or caterpillar-like action of the traffic streams.

When the signal cycle time and split are fixed and inflexible, it is quite clear that the volume of traffic that can pass is automatically limited and is not increased by increased pile-up or pressure of vehicles. In fact, the congestion thus caused actually tends to cut down the volume that can pass in a given time, due to the delays resulting from the need of accelerating waiting groups of cars that have been stopped. Any signal system, to be most effective on heavily traveled arteries, should be capable of timing adjustment for the heavy traffic of rush-hour conditions and speeded up during non-rush.

Long Cycles a Common Evil

Since any type of signal system has the effect of cutting the traffic stream into groups of cars or platoons, so that cross traffic can pass during the intervals, it is quite evident that the groups or platoons and the tendency to pile up and delay these platoons will be decreased in size as the signal cycle is shortened. Disregarding the delay to cross traffic from long cycles, it is the confusion of the pile-up and the extra acceleration time required, when a large number of cars is held up, that slows down the main line movement. Short cycles are also a distinct aid to street cars and buses in making time.

Stragglers are the bane of efficient street usage. The

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chief cause of unnecessary delay of traffic under manual regulation by police is the holding of a crossing open for stragglers. In general, the shorter the cycle, the less this wastage, but it can be entirely eliminated only by intensive training of traffic men.

Possibly an entirely new system of combined automatic, manual-progressive wave will have to be developed; that is, a wave system with superimposed manual controls to vary the cycle division slightly at any time

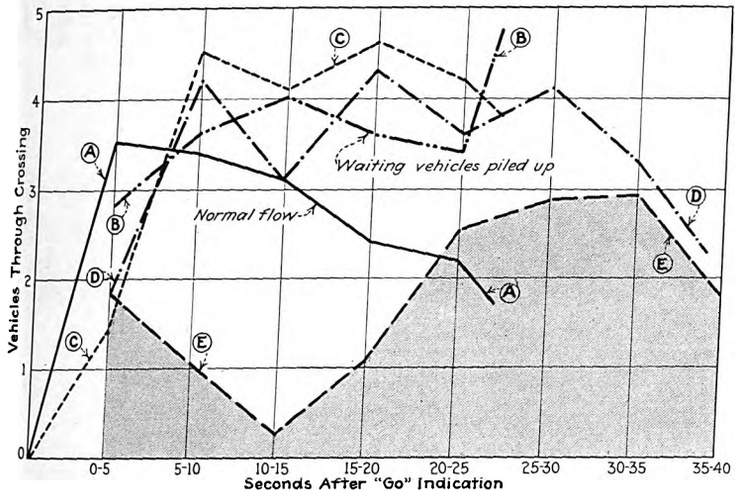
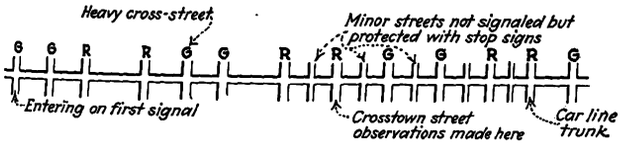


Fig. 3—Profiles of traffic flow by five-second intervals for various types of signals and traffic conditions

Curves A, B, C are based upon observations at the first signal of an alternate-synchronous system, timed 27-27 seconds (54-second cycle). "A" is the traffic flow during normal rush from 4:27 to 5:22 p.m. "B" represents the flow through the crossing when waiting platoons were larger than the signal could pass. Curve C is plotted from selected maximum observations under conditions where all waiting vehicles cleared the crossing. Curve D represents selected maximum results at an isolated signal on a heavy trunk street, timed 39-18 seconds (57-second cycle). Curve E illustrates the situation at the second intersection of an alternate-synchronous system on a heavy traffic street, with the signal timed 40-40 seconds (80-second cycle).



Alternate-group, synchronous light system

that this becomes necessary to relieve impending jams. It is quite probable that in central district traffic control, a combination of both wave signals and highly trained officers will continue to be needed, particularly when a great number of pedestrians require control. This seems both logical and necessary under certain conditions of traffic.

Separate Pedestrian Signals Unnecessary

It is quite common, particularly in small cities, to provide separate periods on the signal system for pedestrian movement. In the great cities there is constant conflict between the consideration of safety on the one hand and the pressure of traffic on the other.

From the time analysis presented here, however, it seems quite clear that street time is too valuable, and the necessity of expediting the movement of mass transportation vehicles is too great, generally, to justify the reservation of a separate period for pedestrian movement. This would need to be at least fifteen seconds or 25 per cent of a normal 60-second cycle. With twelve seconds of green signal, pedestrians walking at the rate of 4.5 ft. per second should clear comfortably the widest six-lane street—54 ft. roadway—and have three seconds green-amber for additional safety. With wider roadways, center safety zones should be provided. From a practical point of view this separate period is usually out of the question. Pedestrians must be educated and, if necessary, constrained to move with the "Go" traffic. But their patience should not be overtaxed by long cycles compelling them to wait—in exaggerated cases well illustrated in New York—three or four minutes at a single crossing. A considerable proportion will not obey any signal.

When to Begin Signaling

While much depends upon the traffic characteristics, volume and hazard at each intersection, it appears that today many signals have been installed long before they are really needed, except perhaps in rush hours. Once installed, they are continued in operation, usually without change in timing, from dawn to late evening. The maximum hour or half-hour traffic should control signal operation, measured in terms of the heaviest traffic in *any* given direction, as well as the *total* traffic of the intersection. The analysis of the time-unit data herein presented and street conditions observed seems to point to a minimum limit in very round numbers of 500 to 1,000 vehicles in one direction per hour, two lanes, at normal intersections. This is a much higher density than observed in many new signal installations, even during rush hours.

The sensible plan, in starting a signal installation, would appear to be to signal a heavy traffic street only at critical crossings where vehicles or pedestrians find difficulty in crossing the main traffic, i.e., the skip signal plan. The street should be so waved with a signal ahead always in sight so that additional intersections could later be "cut in" upon the same control circuit.

It appears entirely indefensible to install signals merely to save policemen, especially signals of an obsolete or inefficient type which must inevitably react upon and depress city transportation speed. The full-wave system or none seems imperative today for heavy arteries.

Do High Buildings Cause Traffic Congestion?

One hundred and fifteen years ago the traffic problem was troubling London!

An outstanding English jurist, in a now famous decision, said:

"The King's highway is not to be used as a stable yard."

One of the industry's outstanding transportation engineers and traffic experts presents amazing new facts on the traffic problem.

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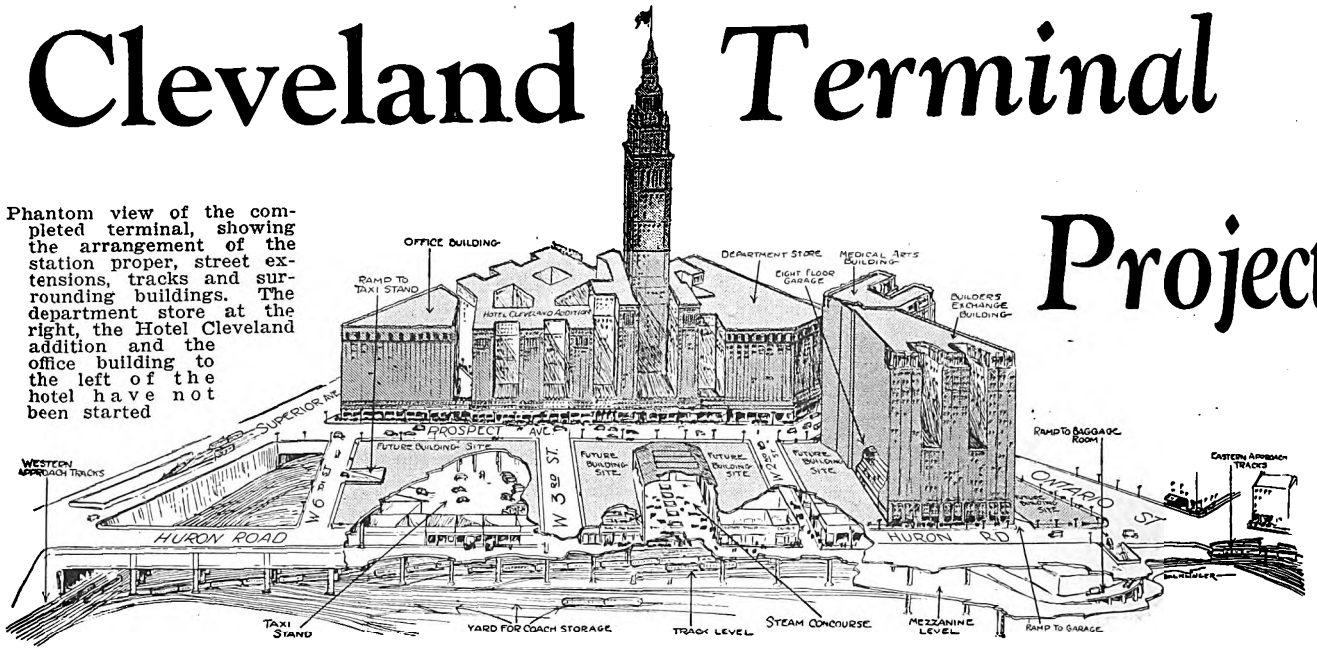
Cleveland Terminal Project



Phantom view of the completed terminal, showing the arrangement of the station proper, street extensions, tracks and surrounding buildings. The department store at the right, the Hotel Cleveland addition and the office building to the left of the hotel have not been started

Development includes union station, designed for rapid transit lines as well as steam roads, 17-mile electrified right-of-way and 52-story building. Co-ordination of all transportation facilities in metropolitan area through new holding company proposed

LONG handicapped by its inaccessible, ill-appearing railroad stations and by the lack of rapid transit facilities, the city of Cleveland soon will be able to boast of one of the largest and finest railroad terminals in the country. It may also have, in the metropolitan area, a completely co-ordinated transportation system, including steam railroads, rapid transit lines, interurban railways, street cars and motor buses. The Cleveland Union Terminal and 17-mile electrified right-of-way are rapidly nearing completion and will be in service at the beginning of next year. The co-ordinated transportation system, however, is still very uncertain. A number of proposals have been made and one, the proposal of the Van Sweringen interests, is before the Cleveland Railway stockholders for their approval and the deposit of stock.

Although the Terminals Company has designed the station to accommodate commuter trains and has allowed for extra tracks along the electrified line, they have made no definite announcement of an extensive rapid transit plan. It is known that they will operate into the terminal the line to Shaker Heights, which at present reaches the Public Square over city streets, and that another line is being projected along the Nickel Plate right-of-way, but even the details of these two lines relative to stations, service, etc., have been withheld. The Van Sweringen proposal now before the Cleveland Railway calls for the co-ordinated ownership and operation of the Cleveland Railway's property and the rapid transit facilities, existing and proposed. This would be effected through the formation of a holding company, known as the Metropolitan Utilities, Inc., which would acquire ownership of the Cleveland Railway, the Cleveland Traction Terminals Company, the Traction Stores Company, the Cleveland Interurban Railroad and the Cleveland & Youngstown Railroad. The Cleveland Traction Terminals Company holds a lease from the Cleveland Union Terminals Company, giving it exclusive rights in the electrified terminal zone and also in the concession area in the terminal. The plan, which would give the Van Sweringen interests complete control of all the local transportation services in greater Cleveland, has been approved by the directors of the Cleveland Railway, but will not become effective unless 50 per cent of the stock of the railway is deposited with the Cleveland Trust Company.

Should the plan go through Cleveland will have a completely co-ordinated system of transportation facilities, including street cars, motor buses and rapid transit lines. The advantages of such a system to both the citizens of the city and the transportation company cannot be fully estimated. It would enable the combined interests to serve the public in the most economical and efficient manner and would give the public a maximum of service. It has been clearly demonstrated in the transportation field that competition is extremely destructive of the operating companies and that eventually the public suffers from poor service.

Before the Van Sweringen proposal was made to the Cleveland Railway, the railway engaged the services of Parsons, Klapp, Brinckerhoff & Douglas to make an intensive study of transportation requirements in the metropolitan area of Cleveland. The firm recommended a comprehensive system of rapid transit embracing the entire area, and in addition recommended that the street railway cars in the congested areas of the city be placed beneath the surface and operated into an underground terminal in the Public Square, appropriately connected to the rapid transit terminal in the Union Station. The routes, all of which terminate at Public Square Terminal, are as follows: (1) The Nickel Plate right-of-way from Dille Road; (2) The Nickel Plate right-of-way from Rocky River; (3) The Shaker Heights line from Brainard Road; (4) Euclid Avenue from East 120th Street, or as an optional route, Euclid Boulevard from its intersection with the Nickel Plate right-of-way

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By CLIFFORD A. FAUST
Assistant Editor
Electric Railway Journal

Nearing Completion

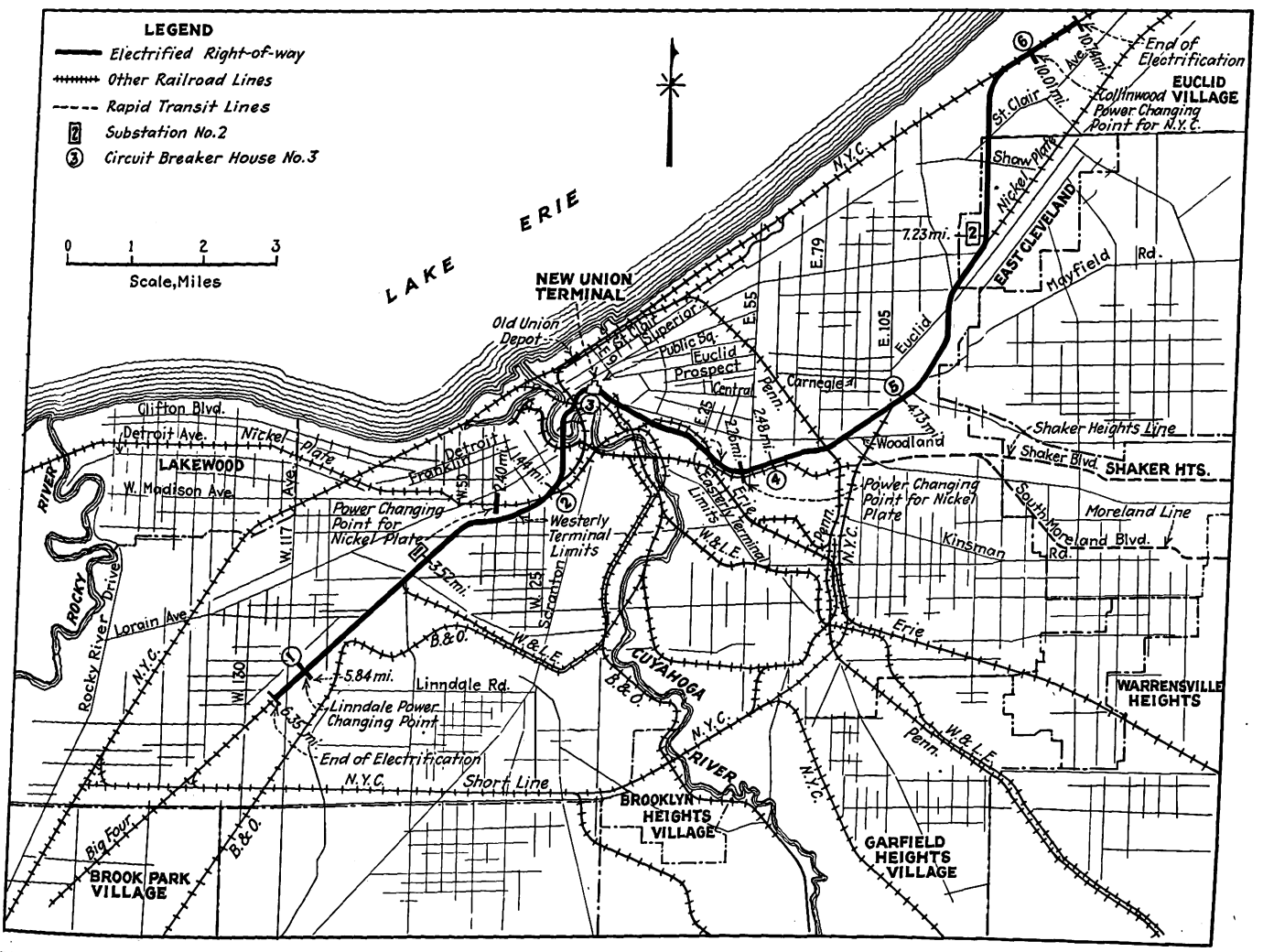
to Euclid Avenue, and thence via Euclid Avenue; (5) St. Clair Avenue, from Woodworth Avenue and the Nickel Plate right-of-way along Woodworth Avenue to St. Clair Avenue and thence via this avenue; (6) Big Four Railroad right-of-way from Linndale; (7) West 25th Street from Brook Park Road, and (8) Erie Railroad right-of-way from Warrensville Center Road.

The Brinckerhoff report recommended that the costs of subways or elevated structures, along the routes similar to those indicated by items 4, 5 and 7 in the schedule of rapid transit routes, should be borne approximately as follows: one-half by a special assessment upon the property benefited, one-fourth by general taxation and one-fourth by the riders using the facilities. The cost of the other routes should be borne by the Van Sweringen interests, according to the report. The cost of equipment necessary to operate, including track structures, electrical conductors, power facilities, etc., should be borne by the operating company, it states. The report recommended that the Nickel Plate right-of-way to the east, which is about ready for the operation of rapid transit, be selected as the first route and that the Nickel Plate route from the west to the east be made the backbone of the system. The plan described in the report was developed for a single unified system of rapid transit, surface cars and buses, with convenient interchange of passengers at transfer points.

No action will be taken on the proposed routes in this report until the Cleveland Railway stockholders indicate whether or not they wish to accept the Van Sweringen proposal. Van Sweringen executives have declined for the present to comment on the proposed routes.

Another Company Offers Subway Plan

Opposition to the formation of the Metropolitan Utilities, Inc., has been offered by the Cleveland Subway Company, backed by the Equitable Trust Company of New York. Raymond T. Cragin, spokesman for the company, has offered to build subways to be owned by the city of Cleveland and operated by the Cleveland



The electrified zone extends from Collinwood on the east to Linndale on the southwest, a distance of 17 miles. The present routes of the New York Central, Nickel Plate, Big Four, Baltimore & Ohio, Erie and Wheeling & Lake Erie and how these roads will or will be able to tie into the new right-of-way are shown

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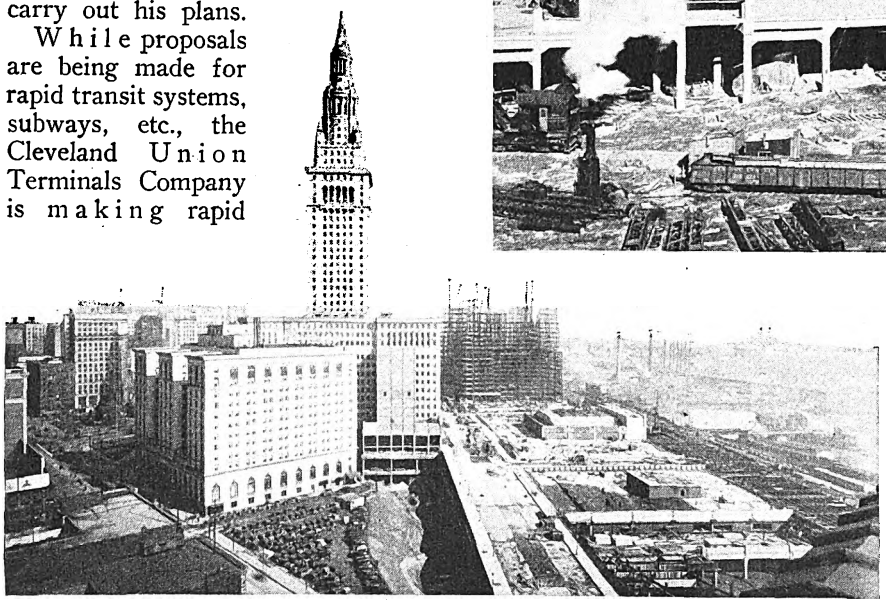
Railway. He advised Cleveland banks to delay the deposit of trusteed Cleveland Railway stock under the Metropolitan Utilities offer, claiming that terms more favorable to the stockholders may be made by the Cleveland Subway Company. The proposal of Mr. Cragin has been ignored by the City Council, and probably will not gain much favor over the other proposals, even though he is backed by powerful monied interests to carry out his plans.

While proposals are being made for rapid transit systems, subways, etc., the Cleveland Union Terminals Company is making rapid progress on its terminal project and electrified right-of-way. The New York Central Railroad, the New York, Chicago & St. Louis Railway (the Nickel Plate) and the Cleveland, Cincinnati, Chicago & St. Louis Railroad (the Big Four) will be the guarantor users of the station, while three others are likely to come in as rental users.

Work is progressing rapidly on the Union Station proper. This view shows a portion of the station construction with its two levels below the street



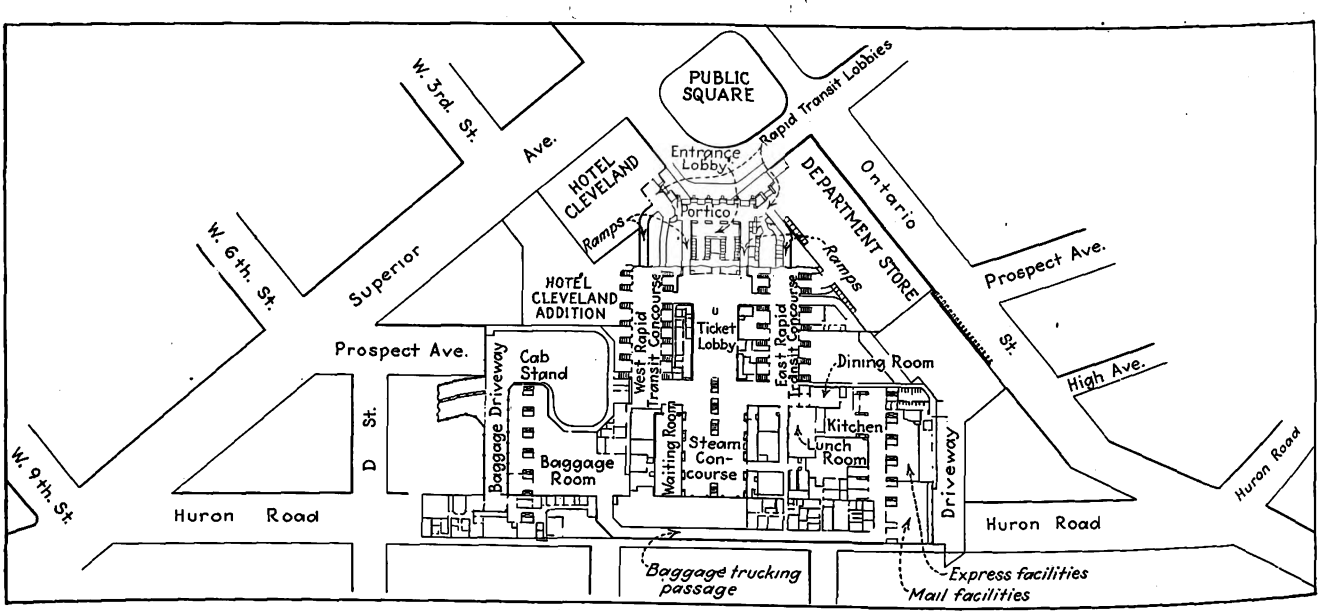
View of the terminal area from the west

This view shows the Public Square at the left, the Cleveland Hotel, the Terminal Tower Building, the 100-ft. Prospect Avenue extension, the roof of the station proper and the steel work for the Huron Road extension on the right. The raised part of the station is the roof of the main steam concourse.

It has been reported that both the Baltimore & Ohio Railroad and the Erie Railroad will come in, and though no official announcement has been made it is almost a certainty that they will enter the new station.

The Wheeling & Lake Erie is the third railroad which no doubt will use the terminal. It has petitioned the Interstate Commerce Commission for the right to abandon its station and if successful will come in. With these six railroads using the Union Station, only one other passenger steam railroad in the city would not be in—the Pennsylvania.

The importance of having these six railroads using the station adjacent to the Public Square of Cleveland is



Floor plan of the station, showing how the steam railroad and rapid transit passengers are to be segregated

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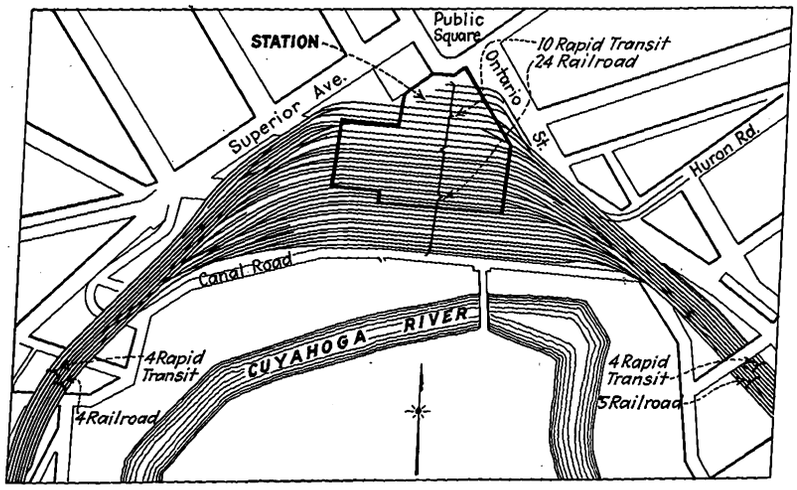
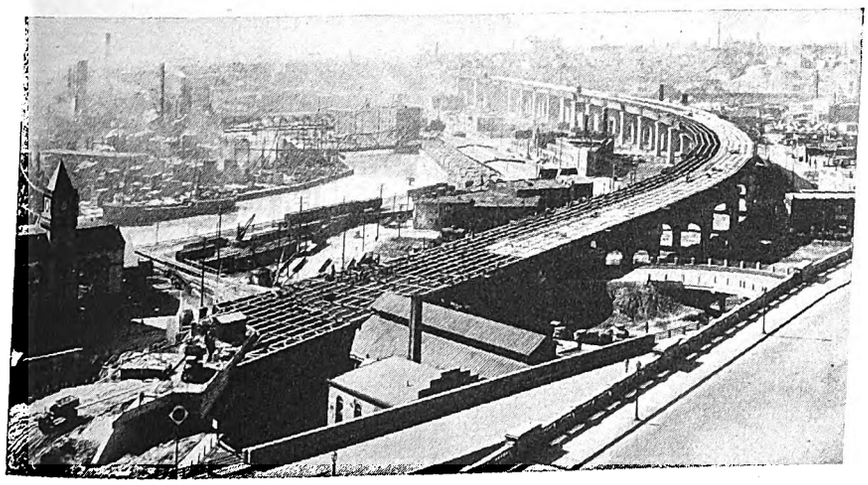
difficult to estimate in its true proportion. The city has long been compelled to use inadequate stations, located at inaccessible points and not convenient to the business section of the city. The new development is certain to create a new industrial growth in Cleveland and will help to establish its prestige as one of the foremost cities in the country.



The initial track layout at the station calls for six rapid transit tracks and 22 steam railroad tracks, twelve of which will be used for the station, one for a by-pass and nine for a yard. The final layout will have ten rapid transit tracks and 24 steam road tracks

Present Routes

Passenger trains of the New York Central now operate over the Lake route from the eastern part of the city to the Union Station, continue for a short distance along the lake after leaving the station and then go in a southwesterly direction through the city. The freight trains, however, are shunted over the Short Line, which joins the main line in the southwest part of the city and at Collinwood on the east. Under the new plan passenger trains from the East will change locomotives at Collinwood, and then proceed over the new electrified right-of-way to the union terminal. They will then continue to Linndale, where they will change to a steam locomotive again. Trains in both directions will use one locomotive between the easterly limits of the electrified zone and the westerly limits.



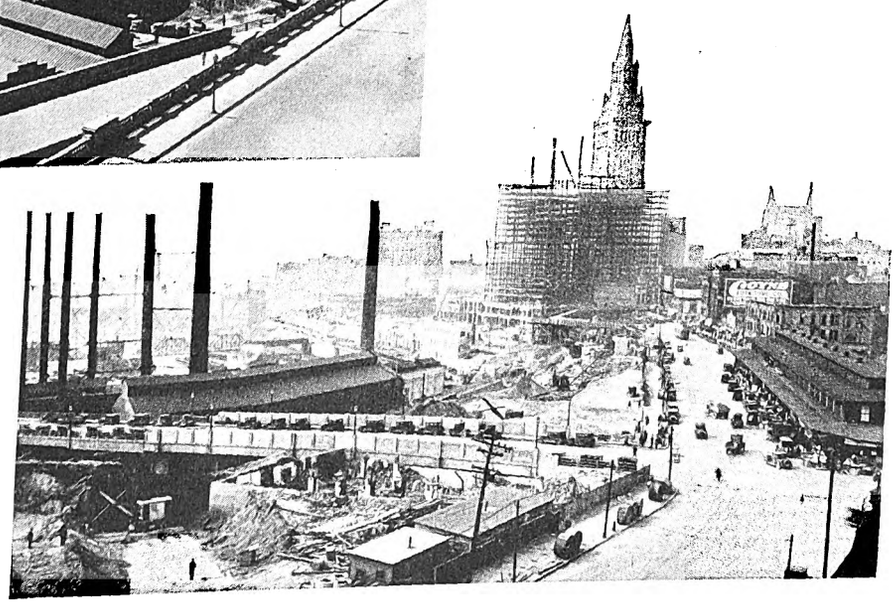
The station is approached from the west by a viaduct two-thirds of a mile long, extending completely over the Cuyahoga flats

The Nickel Plate route at present leaves the lake east of Cleveland, goes inland approximately 2 miles and then follows the Cuyahoga River to its station. Going west the route approaches the lake front again. When the new terminal is in use, the Nickel Plate westbound trains will change locomotives at a point 2.26 miles east of the station. The steam locomotive for each train will pass over the present line of the railway and wait for its train at the westerly power changing point, 2.40 miles from the station.

The Big Four, which terminates its line at Cleveland, will continue over the same route as at present and will change from steam to electric power at Linndale, 5.84 miles southwest of the station. Should the other three railroads come in to the terminal, the Baltimore & Ohio, the Erie and the Wheeling & Lake Erie, the physical connections can be made quite easily. All three roads come into Cleveland from the south and pass near the easterly approach of the electrified right-of-way.

The electrified zone is 16.58 miles long, extending 10.74 miles on the east to Collinwood and 5.84 miles on the southwest to Linndale. It uses the tracks of the New York Central and the Cleveland Short Line, the freight line of the New York Central, from Collinwood to the juncture with the Nickel Plate at East 105th St. It then uses the Nickel Plate right-of-way to the easterly terminal limits near East 40th Street. The easterly approach to the station of the terminal zone proper passes to the southwest of Pittsburgh Avenue, Broadway, Orange Avenue and Ontario Street. The terminal zone extends on the west to West 37th Street, making a total distance between the limits of approximately 4 miles. The westerly approach is made through a cut in the

The easterly approach to the station is located at the immediate left of the street shown in this view. This required a deep cut and the construction of high retaining walls



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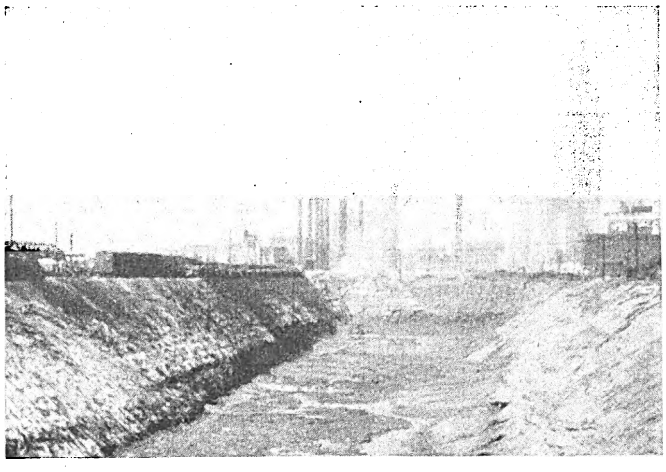
bluff overlooking the Cuyahoga flats and over a viaduct two-thirds of a mile long, passing over the Cuyahoga River and flats. The Big Four right-of-way is used from the westerly terminal limits to Linndale on the south. Additional tracks are being added on the Short Line, Nickel Plate and Big Four rights-of-way to handle the increase in number of trains over the new route. This work required a number of cuts and fills and also the widening of several bridges. The elimination of all grade crossings along the Nickel Plate between Kinsman Road and East 93rd Street required the construction of eight bridges.

Overhead Catenary to Be Used

Power will be purchased from the Cleveland Electric Illuminating Company and delivered from two independent sources to two semi-automatically controlled substations, one located 3½ miles west of the terminal and the other 7¼ miles east of the terminal. These substations



Portion of the Culberson cut, part of the easterly approach to the station. It was necessary to make several large cuts and fills for the electrified right-of-way

will supply 3,000-volt direct current to an overhead catenary construction. In order to equalize potential, circuit-breaker houses are provided at six points.

Substation No. 1, located west of the terminal, will contain three 3,000-kw. synchronous motor-generator sets. Each set is driven by a 3,600-kva., 11,000-volt, 60-cycle synchronous motor, running at 360 r.p.m. On either side is a ten-pole, 1,500-kw., 1,500/3,000-volt generator, the two generators being connected in series to supply 3,000 volts to the outgoing feeders. Six 11,000-volt, three-phase, incoming lines are provided for this station and six 3,000-volt, 2,000-amp. direct-current feeders for the outgoing lines.

Substation No. 2 will contain two motor-generator sets, with provision for installing a third later. It will have four incoming lines and six outgoing 2,000-amp. direct-current feeders. Both substations will be of the unattended type and will be equipped with complete automatic control for the motor-generator sets and all of the auxiliary apparatus. The supervisory control system will be centered in the power dispatcher's office. The electrical equipment for the substations and circuit-breaker houses will be supplied by the General Electric Company.

The locomotives selected for handling trains in and out of the terminal have a total weight of 204 tons with 150 tons on the driving wheels. They are 80 ft. long, inside the knuckles, and 13 ft. 2 in. high, from rail to cab roof. The rigid wheelbase is 15 ft. and the total wheelbase 69 ft. A total of 22 locomotives of this type are to be built for the initial operation. The electrical equipment will be supplied by the General Electric Company and the mechanical parts by the American Locomotive Company. Commonwealth Steel castings will be used for the running gear and cab underframe.

The service calls for the handling of Pullman trains weighing as much as 1,275 tons trailing, the equivalent of seventeen 75-ton cars. The six twin-geared driving motors using 3,000-volt direct current will have a total rating of 2,900 hp. at the one-hour rating and 2,465 hp. continuously. The tractive effort at the one-hour rating will be 29,200 lb., and 23,600 lb. continuously. The locomotive will have a maximum speed of 70 m.p.h.

Although no details of the rapid transit equipment have been made known as yet, it is almost certain that multiple-unit motor cars will be used. Third rail probably will be used for supplying the current to the trains.

The standard A.R.A. signal system will be installed in the terminal area. The signals will be controlled from a building near the station, which will house the control relays, the interlocking system and other equipment.

Advantageous Site Selected for Station

Aside from the great advantage of being near the center of the city and adjacent to the business district, the new station site holds other distinct advantages. The principal one is the securing of a station on high ground, approximately at the level of the main business section. This is not only more convenient for steam railroad passengers but almost necessary for rapid transit use. Locating the station on high ground required the building of a long viaduct over the Cuyahoga flats, but this gave a more direct route to the Big Four right-of-way and also provided a bridge over the river high enough to permit passage of all boats. The station area, which comprises 35 acres, is bounded by Public Square, Ontario Street, Superior Avenue, Columbus Road and Canal Road.

The station is so designed that rapid transit passengers and steam railroad passengers are completely segregated. The steam passengers enter the central part of the station, by way of two ramps from the portico of the Terminal Tower Building, while the rapid transit passengers use a concourse on either side of the central section, each concourse being reached by a ramp from a separate lobby in the front of the building. By this arrangement there is no confusion between the two classes of passengers, and each section can be reached from the outside without passing through the other. The two rapid transit concourses are 59 ft. wide and approximately 320 ft. long.

The central section for steam road passengers is 450 ft. long and varies in width from 91 to 175 ft. It is divided into three principal sections: a lobby at the foot of the ramps, 154 ft. wide and 75 ft. long, a ticket lobby, 91 ft. wide and 103 ft. long, and a concourse, 120 ft. wide and 235 ft. long. Adjacent to the concourse is a large waiting room, 163 ft. long and 55½ ft. wide.

On the west side of the main part of the station are the cab stand and baggage room, both having ramps to the street. On the east side are facilities for handling express and mail, with suitable passages and drives to the street. A number of service shops, including a barber shop, lunch room, dining room and parcel room, are located on this side also. The entire station is designed to give a maximum of shop space, so that a large number of stores will be located in the terminal.

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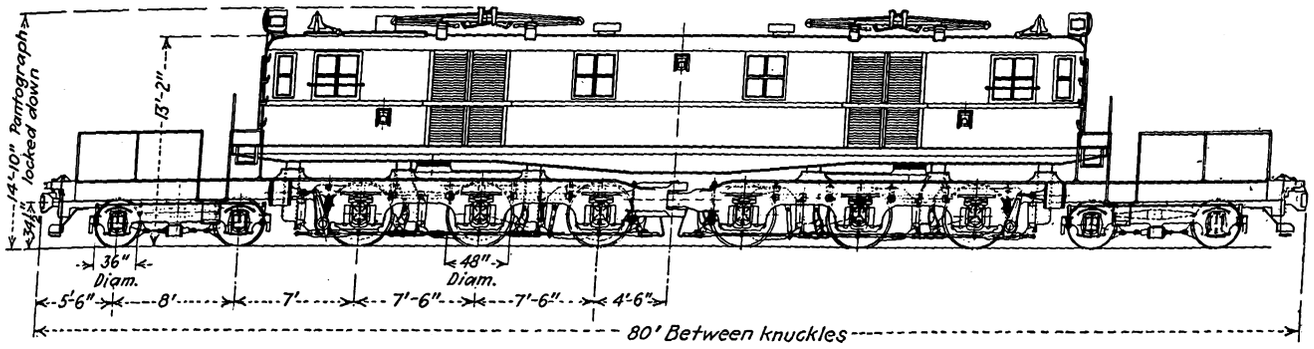
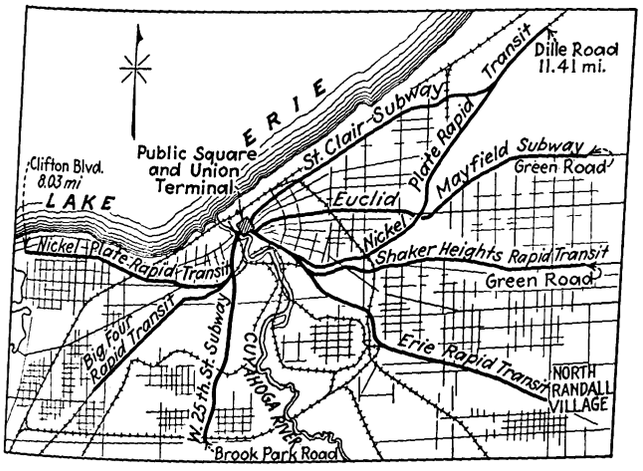


A total of 22 electric locomotives of this type are to be built for the initial operation

The platforms for steam trains are reached by stairways in the center of the main concourse, while those for the rapid transit trains are reached by stairways from the side concourses. The final track layout at the station will include ten tracks for rapid transit, four of which will terminate at the station, and 24 for steam trains. However, for the initial layout only six rapid transit tracks will be laid, and of the 24 steam tracks, only twelve will be in the station. One of the other tracks will be used as a by-pass track, while the others will be used as a coach yard. As the station is expanded the tracks in the coach yard will be pressed into service. On the rapid transit side only one track will be laid between adjacent platforms, giving a platform for each track. On the steam side two tracks will be laid between adjacent platforms.

Initially there will be two rapid transit and two railroad tracks on the east approach and two rapid transit and two railroad tracks on the west approach. The final layout, however, will have four rapid transit tracks and five steam railroad tracks on the east approach and four rapid transit tracks and four steam railroad tracks on the west approach.

The district surrounding the terminal is rapidly becoming a busy commercial and business center. The Terminal Tower Building, which is constructed over the station proper, is an imposing 52-story structure, with a total rentable floor space of 560,000 sq.ft. Adjacent to it is the Cleveland Hotel with its 1,000 rooms. An addition to this hotel to give 700 more rooms is being planned, and another site is available at the intersection of Superior Avenue and Prospect Avenue Extension for another building. On the east side of the Terminal Tower Building another large site is available, for which a department store is being planned. The terminal is so designed that two 100-ft. boulevards will pass over the station. One of these, Prospect Avenue Extension, joins Superior Avenue with Prospect Avenue. The other, Huron Road Extension, joins Superior Avenue at West Ninth Street to Huron Road. Three streets, West Second, West Third and West Sixth, will join the two extensions. By this arrangement maximum use can be made of air rights over the terminal.



An extensive rapid transit system was proposed in the Brinckerhoff report to the Cleveland Railway, the lines reaching in several directions from the Public Square and new Union Terminal

Two buildings are nearing completion between the two extensions and a third will be started soon. The two that have been started are the Medical Arts Building of eighteen stories, for those engaged in the medical or allied professions, and the Builders Exchange Building, also an eighteen-story structure. The lower nine floors of this building are a garage with suitable floor sections to the Medical Arts Building which adjoins it. The building to be started soon is the Midland Bank Building, also to be eighteen stories high.

First Train to Use Terminal in January

The work has advanced to a point that it is expected to operate the first train through the terminal in January, 1930. At the present time all retaining walls between Collinwood and East 105th Street are completed, work is well underway on the bridges being built, and the work of widening the right-of-way is progressing rapidly. From East 105th Street to East 40th Street the work on the bridges is being hurried, while the grading is practically all completed The east approach, between East 40th Street and the station, is almost finished. In this section will be three bridges, to span Broadway, Central Avenue and Eagle Avenue.

The west approach also is practically finished. All the steel has been erected on the Cuyahoga viaduct, and the work of laying the concrete deck to support the track ballast is well along. The station proper is largely completed, all the framework having been erected and the actual finishing being well under way. All major contracts have been let, including those for the tracks, the platforms, etc. Prospect Avenue Extension is actually completed, and practically all of the steel for Huron Road extension has been erected. The Terminal Tower Building has been in use for some time, and all excavation has been completed for the department store to adjoin it. The steel has been finished on the Medical Arts Building and the stone is rising. The steel for the Builder's Exchange Building also is almost all in place. By the end of 1929, practically every part of the terminal development, including the electrification system, will be completed.

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Industry Fundamentals Discussed by Mid-West Executives

Electric railway executives of properties in Mid-Western and Southwestern states participated in two-day conference at St. Louis, during which the value to the entire industry of these new group conferences under the auspices of the Advisory Council was clearly demonstrated

DURING two days of spirited discussion, executives of properties in the Mid-Western and Southwestern sections of the country, meeting in the second group conference held under the auspices of the Advisory Council at St. Louis, Mo., on April 22 and 23 addressed themselves earnestly to the broad and basic economic, technical, political and operating problems with which the local transportation industry of the country is confronted.

In utmost good humor and in the spirit of interchanging frankly ideas regarding the industry's general situation and outlook, but nevertheless with an apparent determination to dig to the bottom of some of the fundamental questions presented, debate at times waxed warm as those in attendance entered fully into the purposes and spirit of the conference. Practically all of those in attendance participated in the discussion of subjects under consideration, or asked questions of speakers presenting their several points of view. The topics of primary interest which were thus covered spontaneously, with no prepared program or addresses arranged in advance, included competition in local transportation with particular reference to various forms of taxicab operation; rates of fare and the general problem of developing a scientific rate structure for local transportation service; fundamentals of local transportation franchises and the principles which should govern the relations between a local transportation company and the community it serves; relation of transportation to other forms of utility service; taxation, paving charges and other forms of imposts levied upon local transportation companies; and the importance of speed and frequency as elements determining the character of service and its attractiveness to the public; skip stops; express operation and combination services with cars and buses as means of improving service to the community; one-man operation of cars with respect to its effect upon the cost and quality of service; advantages of new cars in attracting patronage and decreasing operating costs.

Chairman Cited Need for Study of Fundamentals

"If nothing more comes out of this meeting than the crystallization of thought upon the need for serious study of many fundamental phases of local transportation economics and the industry's relation to the communities which it serves, the St. Louis conference will go down in the history of the industry as one of the great milestones in its rehabilitation." In these words J. N. Shannahan, chairman of the Advisory Council, who presided, summarized and characterized the breadth and significance of the views presented during the meeting. Those who participated in the discussion included J. P. Barnes, president of the American Electric Railway Association; Chairman Shannahan; Jeff Alexander, Houston; W. W. Holden, San Antonio; R. F. Kelker, Jr., Chicago; M. B. Lambert, New York; F. G. Buffe, Kansas City; G. W. Welsh, East St. Louis; Leo Bozell, Omaha; Samuel Riddle, Louisville; Charles Gordon, New York; R. J. Lockwood, St. Louis; C. D. Porter, Omaha; P. C. Groner, Kansas City; Stanley Clark, St. Louis; Leslie Vickers, New York; A. J. Fink, St. Louis; S. W. Greenland, St. Louis; E. B. Meissner, St. Louis; C. O. Birney, St. Louis.

"Pessimism among electric railway executives is justified only," said President Barnes, "if it leads to closer analysis of our business. The primary concern of the entire industry," he explained, "and the focal point toward which all discussion of other problems leads, is the disturbing trend of gross receipts of local transportation properties. Toward overcoming this primary threat to the future as well as the present financial status of the industry, all effort should be concentrated." President Barnes outlined the development of zone-fare taxicab service in Louisville, and urged the need for a close study of this development by electric railway men.

Scientific Rate Structure Needed

Mr. Alexander discussed the development and experience with the fare structure in Houston and other Texas cities, consisting of a 10-cent cash fare, three tokens for 25 cents, and 5-cent weekly passes sold for a small sum per week to permit wholesale users of transportation service to obtain an attractive rate. To the discussion on this question, Mr. Holden added a description of the zone system in effect in San Antonio which is superimposed upon a similar fare structure to provide for a special combination of street car and bus service designed to appeal to the public desire for speedy transportation service of high quality. Mr. Holden called attention to the advantages of small units for rendering this character of service.

Need for concentrated study and more general agreement upon the fundamental principles of transportation franchises, and particularly upon the proper division between the community and the operating company of responsibility as to the financial results of operation, was advanced by Mr. Kelker. Ensuing discussion brought out many phases of the relation between operating companies and the communities they serve, and of the relation between transportation service and the development of cities. A note of caution was sounded regarding the evidence in the industry of a tendency to lean toward the idea of subsidy as a solution of the industry's economic problems. There was general agreement, however, upon the justification for demanding relief from those forms of special taxes which impose a severe burden on transportation operation, and from burdensome taxation out of all proportion to that imposed on other industries. It was suggested that the industry has shown some evidence of an inferiority complex in approaching the admittedly difficult task of obtaining relief from these unjust economic burdens. Discussion of one-man operation brought out several divergent points of view, but again there seemed to be general agreement that one-man operation, skip stops and all other similar measures should be adopted with a primary view toward the improvement of service rather than as measures of economy in operation.

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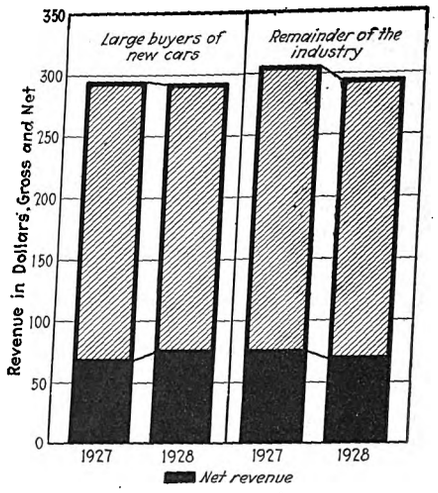
New Car Survey

Shows Increased Net

on Many Properties



The combined returns of 41 companies which have been consistent buyers of new cars over a period of years show an increased net for 1928 while the balance of all companies reporting to the A.E.R.A. show a decrease in net.

This is the first of three articles giving results of an industry-wide survey of electric railways which have been outstanding purchasers of new rolling stock during the past seven years. The financial status of 41 properties has been improved materially with the purchase of 5,514 cars, or less than one-third the total operated on them

By
MORRIS BUCK
Engineering Editor
Electric Railway Journal

EVIDENCE continues to accumulate that new cars are not only paying their way, but are of immense benefit to those electric railways that have installed them. To many systems they have been the means of turning a deficit into a surplus and keeping the road in operation. To determine just what has been accomplished and what may be expected a survey has been completed by this paper. Where new cars have been on the properties a sufficient time, results of operation show a definite improvement in comparison with other roads and with the period immediately preceding the introduction of new cars on the same roads.

The survey has been conducted in two ways. An analysis of the returns to the American Electric Railway Association for the years 1927-28 was made to determine if there was any difference in financial results between those roads that are known to have bought a considerable number of new cars in recent years and other properties which have few new cars. A discussion of the figures is given in the present article. Then inquiries were sent to a number of representative roads that have shown marked progress in modernization. From them detailed results have been obtained, giving the comparison of old with new cars wherever it was possible to segregate the records. Some of the replies are included in this article and the results will be analyzed in a future article.

Actual results obtained in both studies indicate that the new cars are a good investment. With reduced industrial employment in many sections, shorter working hours and elimination of much Saturday and Sunday work, there has been a downward trend in riding in some communities. Though this has masked the gain in revenue, the traffic in many cities has been materially greater than it would have been without the new cars to attract passengers.

As to the cost of operation, there is complete agreement that the use of new, light-weight rolling stock reduces expenses. Since the new cars are almost invariably lighter than those they replaced, and the new motors are more efficient, the power costs are reduced correspondingly. Effects on track are less directly apparent, although there is no question that a well-constructed, light-weight car causes less damage to a track than a heavy, old one. When one operator replaces two men there is also a material saving in the cost of transportation.

There also is complete agreement that the effect on public relations obtained by new, modern and attractive rolling stock has been most advantageous. Even though there may not be any immediate gain in changing franchise conditions or making fare adjustments, the new cars give visible evidence that the company is doing its best to provide good service. Practically the only difficulty experienced is that all the districts in a community desire the new cars, and if they are scattered all over the system most of the advantages obtainable with segregation on separate routes are lost.

The analysis made of the companies included in the annual statistics of the American Electric Railway Association for 1928 was based on the purchases of cars over

Comparison of Operating Results, With New and Old Cars

I—Companies Which Made Substantial Purchases of New Cars

	Year 1928	Year 1927	Difference
Railway operating revenue	*$282,850,910*	*$284,169,950*	*$1,319,040*
Railway operating expense	*208,087,100*	*211,372,270*	*3,285,170*
Net operating revenue	*$74,763,810*	*$72,797,680*	*$1,966,130*
Operating ratio, per cent	*73.57*	*74.38*	*0.81*

II—Companies Which Have Purchased Few New Cars

	Year 1928	Year 1927	Difference
Railway operating revenue	*$294,503,969*	*$304,869,986*	*$10,366,017*
Railway operating expense	*225,028,553*	*231,368,989*	*6,340,436*
Net operating revenue	*$69,475,416*	*$73,500,997*	*$4,025,581*
Operating ratio, per cent	*76.49*	*75.85*	*0.64*

Italics denote decrease.

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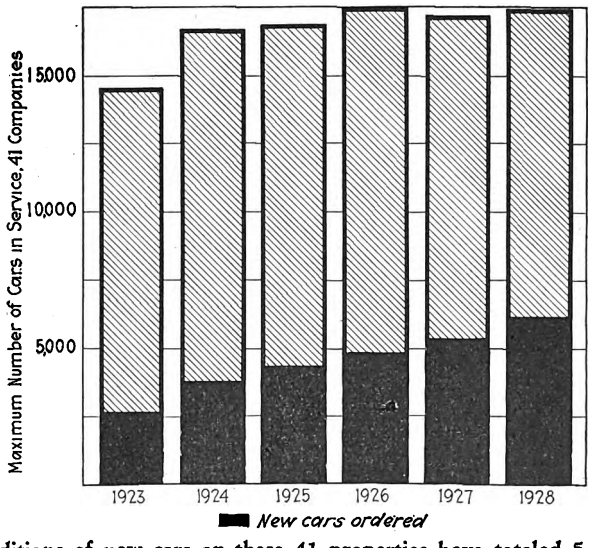
a period of seven years, 1922-1928 inclusive. A total of 41 companies whose complete returns were available for five consecutive years, were selected because they were known to have purchased a considerable number of cars within this time. This gave a chance to determine the effect of the cars on operations over an extended period. Of course, a considerable number of the companies thus included have been consistent purchasers of cars for many years, so that even in the earlier years of the survey the operating records are better than for some of the other roads. These 41 companies, however, purchased 5,514 cars from 1922 to 1928, the orders being as indicated in the chart and table. The largest purchases made by this group were in the first three years under consideration, 3,707 having been ordered by the end of 1924.

The total number of active cars on these 41 properties



Additions of new cars on these 41 properties have totaled 5,641 from 1922 to 1928, as cumulated in black. The total cars in service have changed correspondingly less on account of destruction of the old cars which the new ones replaced

is approximately 17,000. On nearly every property there are additional cars owned which are practically out of commission but are carried on the books. These, however, are not included. It will be noted that this figure varies from year to year, reaching a maximum in 1926. The principal reason for this is that the more progressive companies have written off the oldest cars on the receipt of the new ones, some even going to the extent of celebrating the advent of the new cars with public bonfires in which the obsolete and worn-out cars were entirely destroyed.

Good Results Shown on 41 Properties

It is significant that while the 41 companies included in the survey as purchasers of new cars kept the revenues in 1928 practically up to the level of 1927, the remaining companies which made returns to the American Electric Railway Association suffered a decrease of more than $10,000,000 in railway operating revenue for the year. The 41 companies were able to reduce operating expenses an amount more than twice the reduction in revenue, while the remaining companies were not able to make up for the loss in revenue by more than $4,000,000. As a result, while the combined operating ratio for the 41 companies fell from 74.38 per cent to 73.57 per cent, a decrease of 0.81 points, the operating ratio of the other companies rose from 75.85 to 76.49 per cent, an increase of 0.64 points. For 1928 the operating ratio of the 41 companies was 2.92 per cent lower than that for the other companies. These figures are given in the accompanying table.

The difference in operating ratio, 73.57 per cent for the group of modernized properties against 76.49 per cent for the others, or 2.92 per cent, is equivalent in total value to $8,260,000. This represents the advantage for the year 1928 of the better operating conditions. While not all of the gain is due to the use of the new cars, they are one of the major factors in the difference. These companies purchased 5,514 new cars in the years 1922-28, which can be considered as having a major influence on the reduction of operating ratio. At an average cost of $12,000 the total investment in these cars was approximately $78,600,000. Hence the saving is equivalent to 10.5 per cent on the cost, without allowing anything for the salvage value of the old cars nor the accrued depreciation on the old cars which permitted their retirement during the period.

Consistent Purchases of Cars Shown

The companies included in the survey have been consistent purchasers of cars. The record has been carried back to 1922. It is seen from the table that up to the end of 1928 a total of 5,514 cars in use, or on order, out of a total of 17,488 active cars needed to fill out the maximum schedules were ordered subsequent to 1921, or within the past seven years. This is 31.5 per cent of the total. Naturally many of the cars ordered in this length of time were not of the type that today can be considered modern. In fact, few of them conform to the standards that have been set up within the past few years as constituting up-to-date equipment. Developments that have been made in the past two years are not reflected to any extent in these cars. The showing made is thus the more remarkable in that the results have been attained with less than one-third of the rolling stock modernized even to this limited extent. Where a greater proportion of the rolling stock has been bought in recent years even more striking results can be seen. This is apparent from a study of individual properties.

Individual Properties Make Good Records

Replies to inquiries sent out by this paper to individual companies have shown that managements are all enthusiastic as to the value of new rolling stock. Some of the replies are condensed and are included in the following paragraphs. The remainder will appear in future articles.

NUMBER OF CARS PURCHASED BY THE 41 COMPANIES INCLUDED IN THE SURVEY, 1922-1928, INCLUSIVE

Year	Maximum Number of Cars in Active Service	Number of Cars Ordered During Year	Cumulative Total of Purchases 1922-1928
1922	.....	1,364	1,364
1923	.....	1,242	2,606
1924	16,611	1,103	3,709
1925	16,856	482	4,191
1926	17,500	537	4,728
1927	17,236	537	5,265
1928	17,488	249	5,514

Georgia Power Company, Atlanta, Ga.—When the present management took charge in 1921 it immediately began the purchase of new cars. A total of 243 cars was bought over a period of seven years. In the same period 218 old cars were retired, so that on Dec. 31, 1927, 46¾ per cent of the cars were less than five years old.

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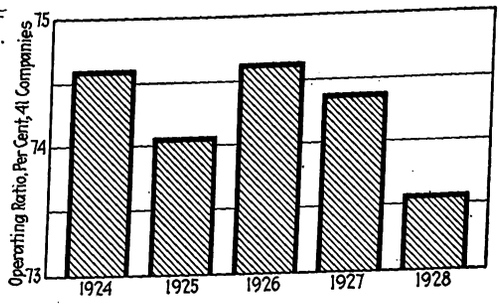
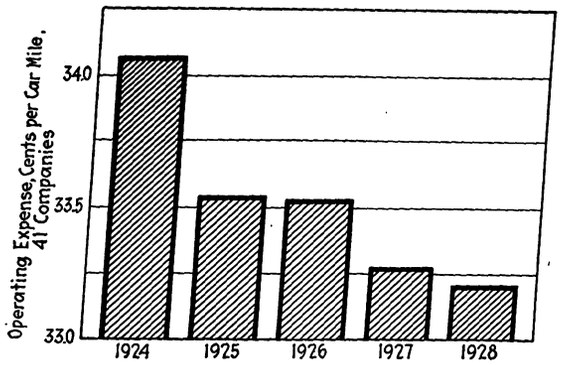
EFFECT OF NEW CARS ON LINE EARNINGS, GEORGIA POWER COMPANY, ATLANTA, GA.

Route	Date New Cars Installed	Earnings of Route: First Six Months New Cars	Earnings of Route: Same Six Months Previous Year	Earnings of Route: Per Cent Increase	Car-Miles on Route: First Six Months New Cars	Car-Miles on Route: Same Six Months Previous Year	Car-Miles on Route: Per Cent Increase	Per Cent Increase System Earnings First Six Month
3	Oct. 1, 1926	$114,536	$101,228	11.61	186,440	168,856	10.40	1.41
5	Mar. 1, 1925	200,772	179,129	10.78	419,865	407,871	2.93	2.63
7	Jan. 1, 1926	87,555	88,160	0.68*d*	211,424	208,699	1.31	1.13
11	Jan. 1, 1926	89,250	83,769	6.14	240,105	260,063	7.68*d*	0.89
12	Jan. 1, 1926	43,798	46,537	5.88*d*	118,526	150,407	21.20*d*	1.19
13	Oct. 1, 1926	33,705	29,705	11.86	71,066	60,573	1.73	1.74
14	Apr. 1, 1926	52,834	51,180	13.47	106,407	105,828	0.55	1.33
15	Dec. 1, 1926	77,899	79,585	2.12*d*	263,911	238,307	10.73	1.52
19	Jan. 1, 1927	32,593	28,000	16.40	169,888	131,477	29.25	1.13
21	Dec. 1, 1925	61,326	50,511	17.66	176,462	170,031	3.76	2.06
22	Jan. 1, 1927	47,424	51,390	7.72*d*	149,585	155,139	3.58*d*	1.51
23	Nov. 1, 1926	87,659	83,803	4.60	309,217	261,988	18.05	1.68
Total and average		$929,357	$872,997	6.45	2,422,896	2,319,239	4.46	....

d Indicates decrease.



Operating ratios have shown a reduction on the properties using large numbers of new cars



Operating expenses per car mile have had a steady trend downward for the past five years where new cars have been employed.

Revenues showed a downward trend from 1922 to 1925, but there has been a sharp upward trend in the return on the investment since then. On twelve lines in Atlanta where obsolete cars have been replaced by new cars there was an average increase in patronage of 6.45 per cent within six months following the installation, with an average increase of 4.46 per cent in car-miles. On two of the lines where service was reduced when new cars were installed, the loss in revenue was very much less than in proportion to the cut in service, and on one line where service was reduced there was an actual gain in riding with the new cars. Headways on all lines have been changed constantly to meet the actual riding requirements. Schedule speed has been increased from 9.21 m.p.h. in 1921 to 9.85 m.p.h. in 1927. Due to the construction of two viaducts in the center of the city the schedule speed dropped in 1928 to 9.7 m.p.h., but when these viaducts are opened this spring the schedule speed will become equal to or higher than it was.

Maintenance of equipment costs for the system have decreased in the past three years, being 2.153 cents per car-mile in 1925, 1.999 in 1926, 1.845 in 1927 and 1.7905 in 1928. This decrease is attributable in large measure to the new cars. At the same time the pull-ins were reduced to 1.39 per day in 1926 compared with 13.2 in 1921.

Without question the use of new cars in Atlanta improved relations with the public and enabled the company to get increases in fares in December, 1927, with practically no opposition.

PURCHASES OF NEW CARS BY YEARS, GEORGIA POWER COMPANY

Year	Total Cars in Service	New Cars Purchased	Cost of New Cars
1923	432	20	$263,840
1924	441	20	261,911
1925	441	60	853,090
1926	425	60	870,000
1927	446	40	590,000
1928	446	..	.....

Chicago & Joliet Electric Railway, Joliet, Ill.—This railway, operating an interurban between Chicago and Joliet, placed ten new cars in service in September, 1926. They weigh 39,000 lb. as compared with 62,000 lb. for the old cars, being equipped with four 35-hp. motors as against four 100-hp. motors. The new cars have been able to maintain schedules with increased loads and with more stops per mile.

Before the cars were ordered it was estimated that they would bring in $10,000 additional revenue and cut operating expenses $30,000 a year, a total annual advantage of $40,000 on an investment in the new equipment of $168,000. An increase in wages on Jan.1, 1927, absorbed a considerable part of the saving, leaving $17,327, not including any reduction in the accounts of way and structures. The increase in revenue, however, was $18,966, so that the total gain for the first year the new cars were in service was $36,293. In 1928 there were additional savings in way and structures, power, and equipment, so that while there was a reduction in the gross passenger revenue the net is above that for 1927.

Eastern Massachusetts Street Railway, Boston, Mass.—When this company, which serves a number of cities in the eastern section of the state, as well as running interurban lines between them, was placed under public control about ten years ago, the service had almost broken down and the equipment and track were in deplorable condition. Following the change in control, the company purchased 75 double-truck, light-weight, low-level modern cars. Some of these were fitted for de luxe service, having Spanish leather seats with deep individual cushions, floor covering of linoleum, enclosed piping in the vestibules, and improved trim. Cars of this type proved so satisfactory that the company purchased 50 more in 1926 and remodeled 50 older cars along similar lines.

The purchase of the new cars was predicated on studies that showed annual savings of $1,527 per car per year, based on reduced car maintenance and energy saving only. The method of calculation is shown in the accompanying table.

SAVINGS WITH NEW CARS, EASTERN MASSACHUSETTS STREET RAILWAY

Annual saving in maintenance per car over old equipment	....	$1,072
Annual saving in energy per car	....	455
Total	....	1,527
Interest at 6 per cent on $15,000	$900	
Depreciation at 5 per cent compounded	405	
Amortization of 20 per cent of original value of old car over eight years	150	1,455
Net annual saving for each new car	....	$72

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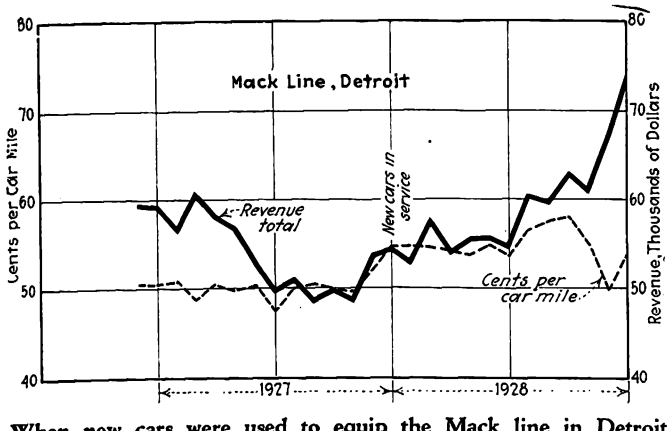
COMBINED OPERATING FIGURES FOR 41 COMPANIES BUYING NEW CARS DURING THE YEARS 1922-1928

	1928	1927	1926	1925	1924
Railway operating revenue	$282,850,910	$284,169,950	$288,222,930	$285,273,910	$285,946,740
Railway operating expense	208,087,100	211,372,270	215,054,250	211,183,820	213,327,200
Net operating revenue	$74,763,810	$72,797,680	$73,168,680	$74,090,090	$72,618,540
Operating ratio, per cent	73.57	74.38	74.62	74.03	74.60
Car-miles operated	626,641,880	535,228,290	641,211,010	629,710,370	625,968,150
Per car-mile:					
Railway operating revenue, cents	45.14	44.75	44.95	45.30	45.68
Railway operating expense, cents	33.20	33.27	33.53	33.54	34.07
Net operating revenue, cents	11.94	11.48	11.42	11.76	11.61

On this basis alone the savings are more than paying for the change, even though sufficient depreciation was not written off previously to retire the old car. No allowance has been made for other important economies, such as reduction in cost of general carhouse labor and material, including brakeshoes, lubrication, armature maintenance, etc., and in the maintenance of track; nor has an allowance been made for reduced costs in the transportation department due to elimination of many pull-ins due to defects. That this policy has been justified is seen from the annual report of the company for 1928. Expenditures for equipment maintenance were smaller than in any previous year. Including expenditures for automotive equipment and also depreciation and retirement it represents 2.92 cents per car-mile, as compared with 3.23 cents per car-mile in 1927. During 1928 the passenger cars operated 38,071 miles per failure, as compared with 1,550 miles per failure in 1920 before the modernization program was begun. Derailments from all causes are now only 17 per cent of the number in 1922.

The effects of the new equipment on revenue are quite difficult to evaluate. The industrial depression in the entire district due to closing of many cotton and woolen mills has caused a reduction in riding. There is evidence, however, that the new cars have been instrumental in preventing further reductions in revenue.

Department of Street Railways, Detroit, Mich.—This system has purchased a number of new cars within the past few years, the most recent order being for 125, placed in 1927. Two lines have been completely equipped with new cars, the Hamilton line, which was changed over in August, 1925, and the Mack line, which was changed over in January, 1927. The results before and after the new cars were put on these lines show that while the earnings did not go up immediately, the revenue per car-mile did increase while the revenue per car-mile on the entire system was going down. In other words it was possible to make the gain in revenue with less increase in service than the average for the city. Furthermore, the lines have held this proportion of the business during the period since the new cars were put on. The gain is not due to increasing the service, as the revenue per car-mile has also gone up.



When new cars were used to equip the Mack line in Detroit there was a steady gain in revenue. That this was not due to excess service is shown by the increase in revenue per car-mile which took place when the new cars were installed

According to the management, it is rather difficult to evaluate the degree of good will obtained by the new cars, but many favorable comments have been received from patrons of the lines on which they have been placed and numerous requests have been received from the public expressing a desire to have some of the new cars serve particular sections of the city.

As to the cost of maintaining cars in Detroit, figures compiled by the Department of Street Railways give the following comparison:

Type of Car	Number of Seats	Average Age, Years	Cost of Car Maintenance Per Car-Mile, Cents	Cost of Car Maintenance Per Seat-Mile, Cents
Birney	32	7	1.53	0.0478
Peter Witt	52	4½	2.62	0.0504
Double-truck	40	10	3.41	0.0711

In this comparison it should be noted that the Birney cars weigh 16,000 lb., or 500 lb. per seat; the Peter Witt cars 36,500 lb., or 721 lb. per seat; and the miscellaneous double-truck cars average 37,800 lb., or 945 lb. per seat. The lower cost of maintenance may thus be seen to come from two elements, comparative newness and lower weight.

Cincinnati, Hamilton & Dayton Railway, Dayton, Ohio.—The annual financial statement of this road for 1927, the first year the new management was in full control, showed good results despite a general recession in business activity in the entire Miami Valley and employment only 81.5 per cent of 1926. Despite this the passenger revenues of the interurban lines in 1927 were 2.1 per cent more than in 1926, while the total tons of freight in 1927 were 26.2 per cent in excess of the tonnage in 1926.

On May 6, 1927, the company introduced new modern, de luxe, suburban type equipment on its Dayton city lines and increased the frequency of service approximately 25 per cent. As a result there was a very substantial and immediate increase of traffic on these lines and a marked reduction in operating expense. Similar cars were introduced between Dayton and Miamisburg. The total revenue passengers carried on the Dayton city-Dayton-Miamisburg lines were 14.6 per cent greater in 1927 than in the preceding year.

Casual Observations of Transportation Systems in European Cities, outlined interestingly— in the June Number

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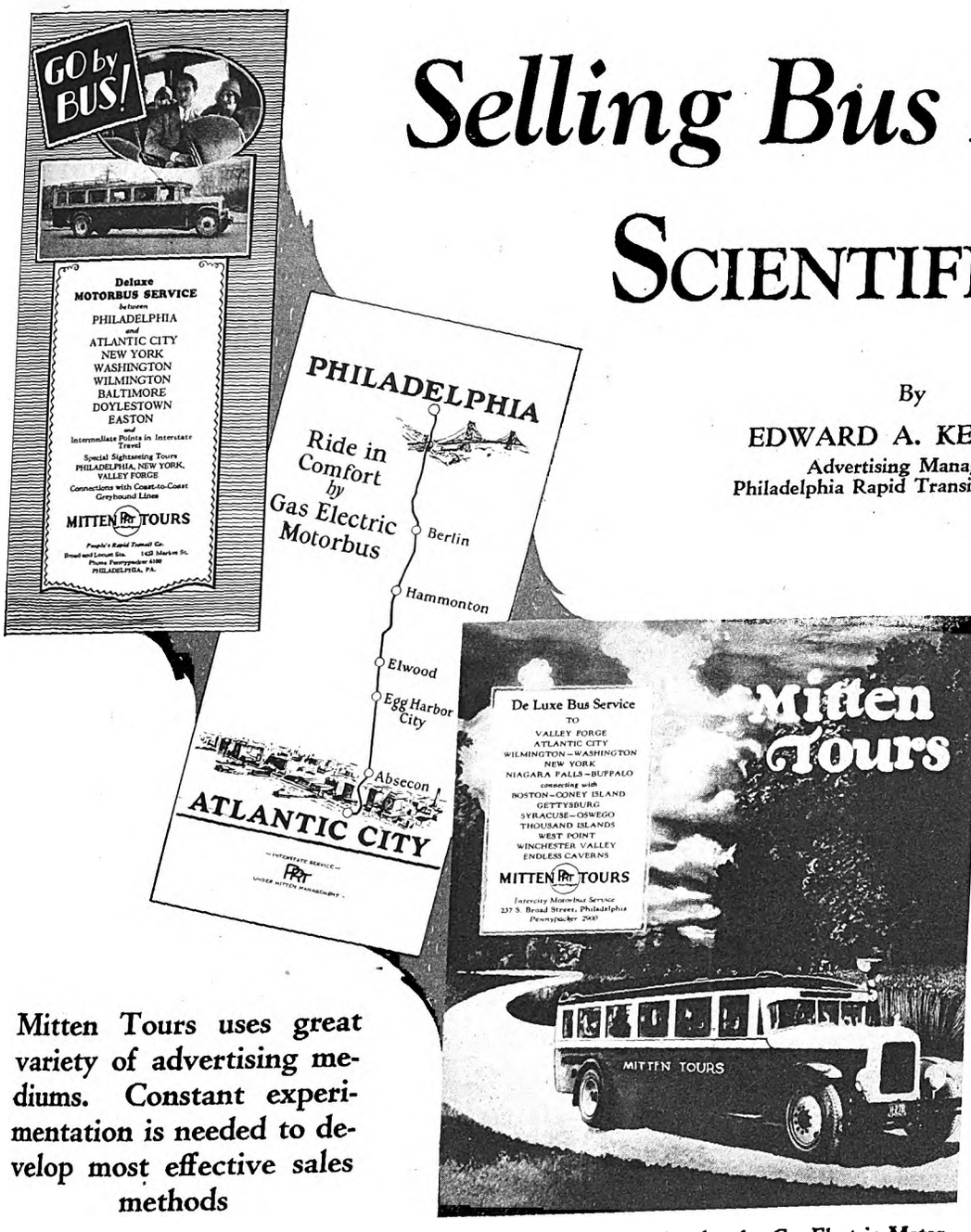
Selling Bus Rides Scientifically

By

EDWARD A. KEENAN

Advertising Manager
Philadelphia Rapid Transit Company



Mitten Tours uses great variety of advertising mediums. Constant experimentation is needed to develop most effective sales methods

"Go by Bus," "Ride in Comfort by Gas-Electric Motor Bus" and similar ride-selling slogans are very effective when carried on attractive folders like these

COMPETITION from other kinds of transportation, particularly the private automobile, is too keen for any bus operator to believe that business will come to him without effort. There is no chance today for the operator who frowns on advertising. Being aware of this need to sell rides, how should the bus operator proceed to organize his selling campaign? Of course, the same basic principles of salesmanship which make a successful clothing, paint or drug business can be applied to the transportation field, but the elaboration of the selling details can only come by experience. The selling of bus rides is a science all its own and only through years of experimenting can it be brought to a high point of efficiency.

Advertising has been linked so inseparably with the history of bus-ride selling that little attention has been paid to any other means of merchandising. However, in the next few years, personal solicitation and the telephone call, guided by a systematic prospect file system, will unquestionably become advertising's greatest allies. Advertising is the life blood of the business in its present state, and since it is not being supplemented to any great extent by personal selling of rides, it must be developed to the highest degree.

Several fundamental questions must first be solved before advertising can begin:

1. What shall be the size of the budget?
2. What mediums shall be used and how shall they be used?
3. How can the results of the mediums used be checked?

The problem of a budget, its size and disposition, is the chief worry of any bus advertiser. Mitten Management has separated its intercity bus business from its city business by the incorporation of two subsidiaries of the Philadelphia Rapid Transit Company, the Philadelphia Rural Transit Company, which has the city lines, and the Peoples Rapid Transit Company, known under the trade name of "Mitten Tours," which handles the interstate travel. Most of the bus advertising efforts are confined to the latter, as this type of business best adapts itself to merchandising. The Mitten Tours advertising budget is based on anticipated gross receipts, a plan which has proved to be entirely satisfactory. The estimated gross for 1928, for example, was $762,000, and the advertising budget called for 3.9 per cent of this

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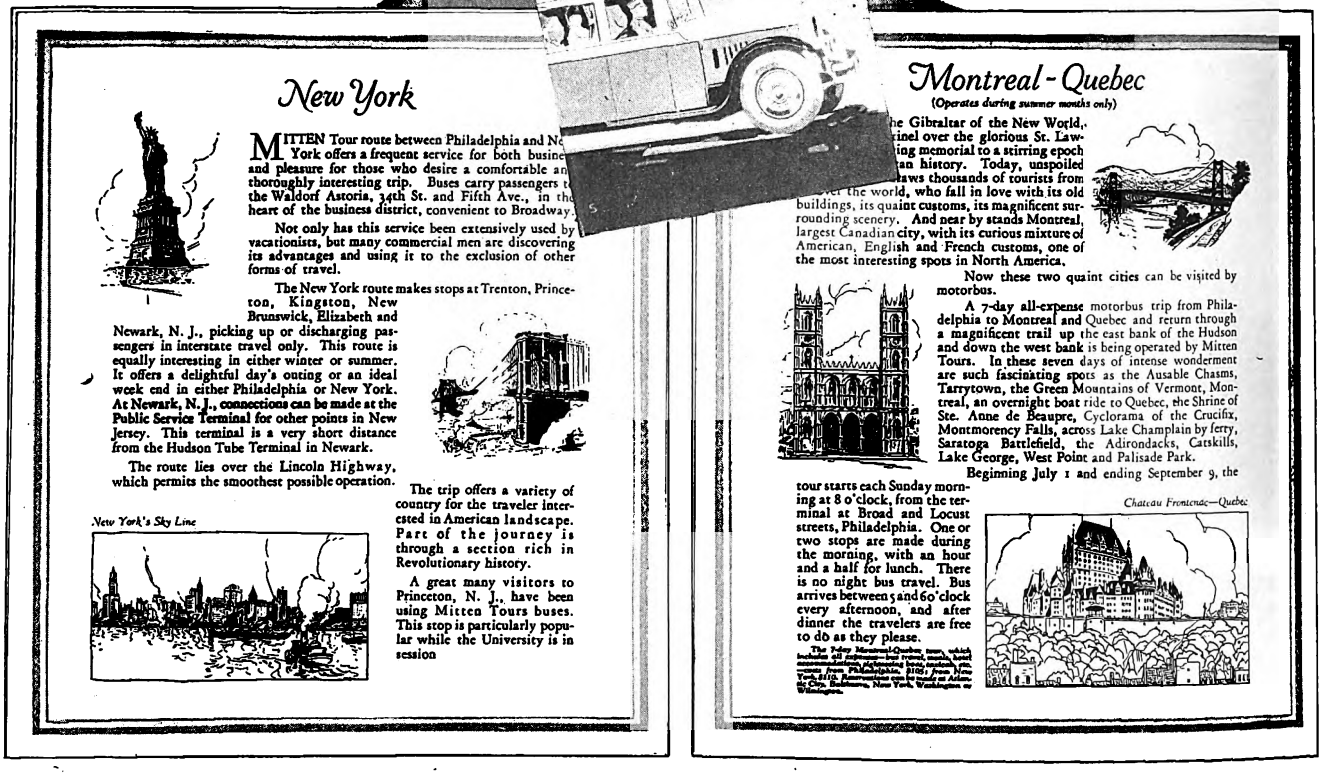
amount, or $30,000. This amount was divided as follows:

1. Newspaper advertising	$14,000
2. Folders and literature	4,500
3. Signs in street cars	4,000
4. Magazines and telephone books	3,500
5. Billboards	600
6. Window displays	400
7. Miscellaneous	3,000
Total	$30,000

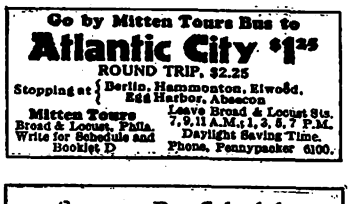
Although the advertising is concentrated on the six above-named mediums, occasional experiments are made in new fields where a special appeal is needed, such as the radio, movies, exhibits, etc.

The largest part of the appropriation is expended on the newspaper appropriation in this period. During the spring and summer months the advertising is concentrated in other mediums.

In Philadelphia there are six daily newspapers, with a combined circulation of almost 1,500,000. The combined cost in these papers is about $2.40 a line per day, or 40 cents a line per paper per day, or $5.60 per paper per day per column inch. Each paper is given an equal amount of advertising a year, scheduled so there is an ad in one or more papers each day. It has been found necessary to advertise also in all towns in which stops are made. Casting about for the



High-grade folders are prepared to advertise the special tours. The examples above illustrate the excellent character of the make-up in these folders



At the left are samples of newspaper advertising carried. They give the destination, the schedule and the fares, serving principally as reminders

newspapers. Here no effort is made to tell the story of the joys of riding buses, or of the efficiency of the gas-electric, but rather to furnish a constant reminder and a ready reference for those who desire to go from one place to another. Out of the appropriation of $30,000 for 1928, $14,000 was allowed for newspaper advertising. Of this amount, $550 was set aside for type composition, drawings and engravings. The remaining $13,450 for space was divided into monthly allotments of $1,100 and $1,000, the smaller amount being used in the summer months. Statistics show that the circulation of Philadelphia newspapers increases slightly during the winter months, hence the placing of the greater part of very best way to spend the appropriation in both large cities and small towns, it was decided to confine the advertisements to frequent, small insertions, attempting to have the ads placed in the motor-bus section, the amusement section or the sport page.

The bus-riding public wants to know the following facts about the service:

1. Destination.
2. Fares, both one-way and round trip.
3. Name of the company, its address and telephone number.
4. The schedule.
5. The fact that the trip is by bus.

Feeling that destination and fares are of the greatest importance, this matter is set in heavy black type. By careful

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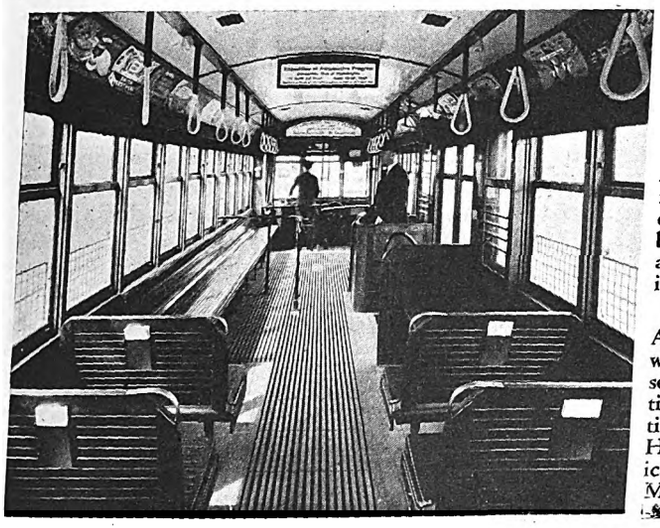
planning a space only 1 column wide by 14 lines, or 1 in. in height, has been found sufficient for the city papers. In the small-town papers, where the cost per line is not so high, 52-line ads, 2 columns wide by 2 in. high, are run. Many of the towns have weekly papers only. There the ads are inserted every week.

With the opening of new routes, larger copy and considerably more art work are used. Good drawings or photographs, where space permits, are very effective. In some of the 52-line ads, therefore, a photograph of a bus is inserted. In the smaller ads it is impossible to include illustrations, so that extra space is used around the type to avoid the appearance of crowding.

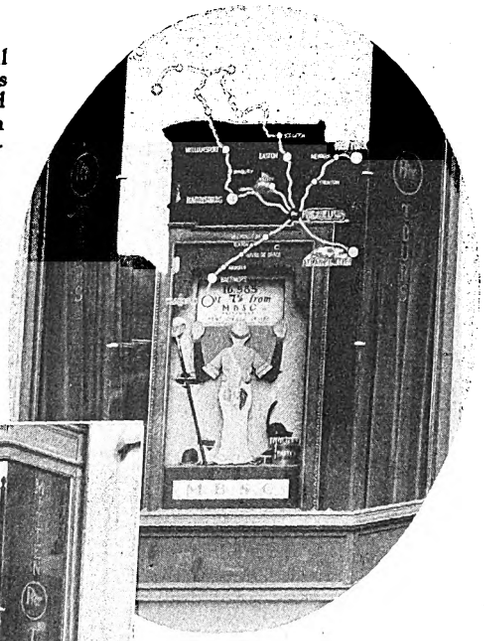
Folders An Effective Medium

The Philadelphia Rapid Transit Company has at its disposal 40,000 metal boxes or racks for holding folders.



At left — Metal racks on the backs of street car and bus seats are an aid in distributing folders

At right—Clever window displays secure the attention of prospective customers. Here are two typical displays of Mitten Tours



These racks are screwed to the backs of all seats in the trolley cars, and are located also in the elevated trains, the buses and on the subway-elevated platforms. In the buses the boxes are fastened to the wall between the seats, directly under the window. The folders also are placed in waiting rooms, in hotels, and on agency counters and racks, and are sent out as direct mail inclosures. The effectiveness of this method of giving out literature was demonstrated last year when 250,000 four-page folders, advertising special tours, were distributed in about 3½ days.

Folders for this distribution are 3⅞x7½ in., have either two or four pages, and are printed in one-color ink. An attractive art head with an interesting title is employed to induce the rider to take the folder from the box. For a folder of more lasting value, the conventional highly-colored tourist folder, so beautifully done today by the steamship companies, is used. Two mistakes which should be avoided are the use of crowded text matter and the use of small photographs. Folders should be laid out with all the skill of a good typographer, using plenty of white space. No typographer will crowd his pages. Drawings are used in the folders instead of photographs, because no scenic photograph is worth while unless it is 8x10 in. in size, or more, and because interesting photographs are difficult to secure. A good artist's sketch of a building or a scene adds a dignity to copy that cannot be obtained by a photograph.

Recently the problem presented itself of publishing a high-grade folder to cover both summer and winter business. It was solved by preparing a basic eight-page folder containing the permanent tours, and printing a four-page insert containing the summer tours and schedules, the inserts being stitched in as many basic copies as needed during the summer months. The chartered bus business is a distinct activity and is treated, therefore, in a separate folder.

Metal frames to hold a card 25½x28 in. are installed on the front of all P.R.T. street cars, on the sides of the buses and on the elevated stations. These signs are an excellent advertising medium for carrying a short message to the public. Visualize 4,000 signs on white cardboard printed in red, blue, green or brown ink, moving up and down the streets of a city all hours of the day and night for an entire week. The signs are of twelve-ply cardboard, printed with waterproof ink. The size of the frame and the distance from which the cards must be read limit the wording. If all the frames on the system are used, the cost of printing and installing these signs is from $300 to $500.

There are two racks within the cars for signs, one in the bulkhead and one hanging from the ceiling. The buses contain a rack in the bulkhead at the front for a card 6½x28 in. About $4,000 a year is spent on these cards with excellent results.

Given a fine location and excellent, well-painted copy, a billboard can be of great value to the bus operator, but to buy a number of boards in an attempt to cover the city, disregarding the all-important factor of loca-

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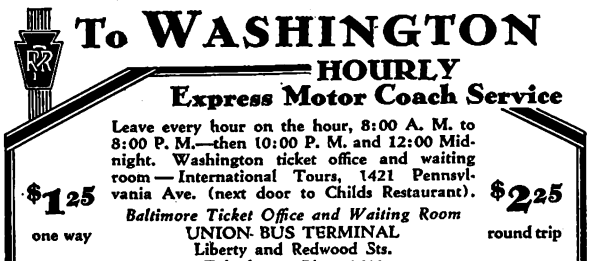
tion, is an expensive proposition. Outdoor advertising is a good medium to supplement the other mediums like newspapers and folders, but it should not be used for an entire program. The best use for outdoor copy is in converting automobile owners and riders to bus riders. The P.R.T. has a number of small boards, the 4x6-ft. size, along a well-traveled motor bus route for this purpose. Once or twice a year the company uses fifty or sixty 24-sheet paper billboards.



Newspaper ad, telling of the hourly service between Baltimore and Washington. The ad is given character by the symbols of the two companies

Mitten Tours is a firm believer in the value of window display and its art department spends much of its time in developing attractive signs for the waiting room and ticket agent windows. Wooden frames, finished with a mahogany stain, have been built to hold 25½x28-in. cardboard posters. Attractive show cards can be inserted in these frames and the copy changed at frequent intervals. Local copy is developed for certain ticket agents and when it is completed it is sent to them by bus. The card and frame are sent together, the card being already inserted. The agents keep these signs in their windows for several weeks while new ones are being developed for them. They then send the old ones back by bus in exchange for the new posters and frames. This is an excellent good-will builder among the agents and it is about the cheapest form of publicity that the company has been able to develop.

Novel Attention-Getter Constructed

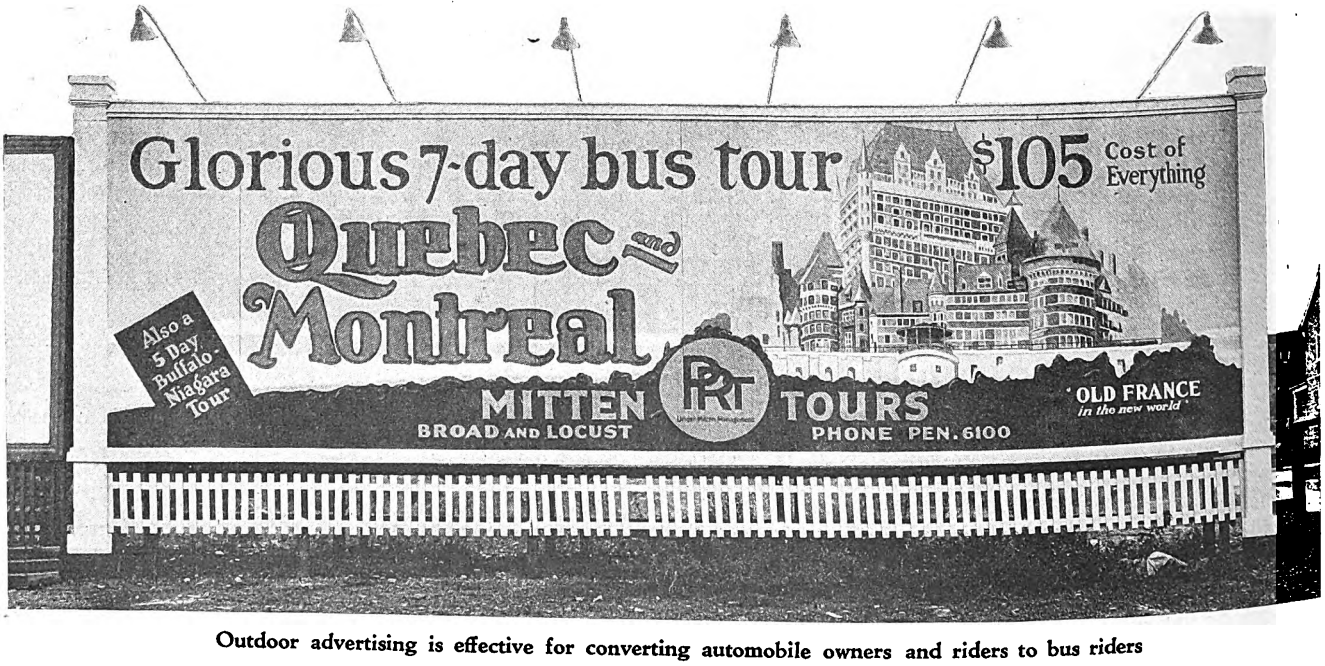
While experimenting with a window card idea, a novel way to make an inexpensive imitation of a stained-glass window was discovered. A 25x25-in. wooden box was built and wired for two electric lights. A cut-all saw then was secured and the design for the window sign laid out on heavy compo board. A pattern was cut in the cardboard with the saw, and colored paper was pasted back of the holes. The finished product gave a startling effect and proved to be a real attention-arrester for passers-by.

Another Good-Will Builder Developed

Within a circle of 50-mile radius around Philadelphia there is a population of more than 5,000,000. Many of these people come to Philadelphia at frequent intervals to shop or visit, or to attend some amusement. In an effort to reach these potential customers, the company publishes a miniature house organ, *Phillybound,* which is mailed weekly to a selected list, free of charge. The aim of this organ is to interest out-of-towners in Philadelphia, by giving them a weekly review of the best show in town, a calendar of theatrical events and movies, a series of suggestions on what to visit such as the art galleries, historical shrines, exhibits, picnics, conventions, parades, sports, etc., and a page of advertising matter for Mitten Management and its subsidiaries, written in light vein.

The cost of this pamphlet, which is approximately 4 cents per person per week, is carried jointly by the electric railway, the bus companies, the taxicab company and the bank, as all the units profit. Every time a sporting event, a show, or an exhibit is mentioned, full directions are given on how to get there by bus, street car or taxicab.

A list of subscribers was developed by sending to each prospect with the first issue a small application card with the question: "What means of transportation do you use in coming to Philadelphia?" and also a blank for questions that they might desire to ask. The medium has proved a big aid in selling trolley rides, chartered bus service, tours and bank stock, and has brought in



Outdoor advertising is effective for converting automobile owners and riders to bus riders

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a flood of questions to be answered. The medium has been particularly effective in interesting prospective customers in bus tours, and many inquiries regarding trips are stimulated by the copy contained in the *Phillybounds*. Special effort is made in the late spring and summer months to develop this type of business.

Department for Developing New Business Instituted

Bus merchandising has been developed very rapidly under the direction of the P.R.T. new business department. Working in conjunction with the advertising department, this department has followed up by personal solicitation, telephone calls and direct mail, the leads secured by advertising. So far, the greatest effort has been in the chartered bus field, but gradually the organization is spreading to include the intercity service. Men are always available for conventions. Booths are installed in the convention headquarters and an information man, with a knowledge of the system and having a supply of all types of the company's literature, is kept on duty at all times.

Part of the work of the new business department is to develop a prospect file. An effort is made to obtain the names of people purchasing tickets, as well as those who make inquiries by mail. Every person taking the Niagara Falls tour last year is a prospect for the Montreal-Quebec tour this year, and before the season for tours opens they are solicited.

Contact with the ticket agencies is maintained through the new business department also. One man is kept busy supplying agencies with literature and calling on them at frequent intervals to impart enthusiasm, to hear their complaints and commendations and to watch the effect of the advertising in that locality.

Measuring the Results of Advertising Is Possible

The bus advertising man's problem is becoming increasingly difficult. No longer can he say "This campaign should produce such and such a result, if properly applied." The bus operator is demanding to be shown more and more just what advertising can do. This is a healthy condition and should be encouraged. Advertising can be measured and there is no reason why an advertiser should not know how much money he should spend to obtain a certain result.

One method of checking the results is by keying the ads, such as "Write for Booklet A," "Write for Booklet B," etc. Although the response does not accurately measure the complete effectiveness of the ad, for many decide to ride and never write in, it does give a relative measurement, which, when compared with other results, shows the selling ability of this particular ad. It is an excellent thing never to announce a new service, a new price, or a new schedule until it can be advertised. After the first ad appears it is a good idea to check the telephone calls, personal calls and letters. Several companies use reservation blanks attached to their folders, a plan which is effective also.

The history of bus advertising runs parallel with automobile advertising. In the beginning, the automobile was looked upon as an experiment and somewhat of a toy. It required many years to convince the public that the motor car was a necessity. It will be recalled that several years ago the industry set out to eliminate the phrase "pleasure car" and to encourage the use of "passenger car" instead. Many bus companies are still back in this first stage of advertising. It is a mistake to give the public the impression that the industry is still an experiment, and advertising now should tend toward establishing the bus as a proven means of travel.

Bus companies must advocate the use of clean, truthful copy, carefully and attractively prepared; they must continue their experiments with every type of advertising medium, collecting data on results and checking these results by keying the advertising; and, finally, they must supplement the advertising with sound, systematic merchandising.

The Readers' Forum

Advantages Cited for Railroad-Owned Power Plants

The New York, New Haven and Hartford Railroad Company

New Haven, Conn., March 23, 1929.

To the Editor:

I should like to take exception to certain statements appearing in an editorial on electrification of railroads in the March 16 issue of Electric Railway Journal, in which the statement is made that

"When purchased power is used it is possible . . . to adjust schedules so that train movements, particularly of freight and certain long-distance passenger trains, are made at such times that the additional power does not add in full value to the industrial and lighting peak."

This statement is contrary to the operating requirements of most railroads, which must handle the traffic when and as offered, without regard to the requirements of neighboring power and lighting loads. While certain traffic must be delayed to suit the occupancy of track and terminal facilities by other preferred traffic, most railroad operating officials would not tolerate a further delay because of lack of power to move the business. In fact, a normal surplus of motive power is one of the best arguments used in the solicitation of traffic, and to have such a surplus reduced by electrification would be to prejudice the minds of railway operating officials against electrification.

Indeed, this is one of the strongest reasons in favor of railroad-owned power plants, since, in general, the tendency in making power contracts has been to penalize the consumer for unusual and abnormally high demands, which would be required to handle certain periodic peak business. While it is true that purchased power reduces initial investment and fixed charges of electrification, it is equally true that railroad-owned plants may and, in the few cases where they have been built, do reduce operating expenses by eliminating the penalty of a higher rate caused by the occasional peak business, as well as furnishing the "surplus motive power" equivalent of steam locomotives.

This is a factor which is of great importance in the negotiation of power contracts for electrification; and one which has been largely responsible for the initial investment in railroad-owned power plants, as well as for their continued maintenance in an up-to-date operating condition by their owners, in spite of the growth in the same territory of large power producing companies.

H. F. Brown,
Assistant Electrical Engineer.

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Electric Railway Statistics for 1928

Show Continued Stability

Returns to American Electric Railway Association indicate that both the gross revenues and expenses have been reduced. Combined city and interurban properties make best showing, while city systems hold their own and interurbans suffer a loss. Controlled bus lines make material gains

WHILE little change was experienced by the electric railways in the United States in their operations during 1928 from those in 1927, they made an excellent showing in the face of adverse conditions. This is evident from a study of the returns of the companies made to the American Electric Railway Association and compiled in its statistical department under the leadership of Edmund J. Murphy, chief statistician. In all, 244 electric railways and 160 bus undertakings controlled by them rendered comparative reports for the two years. The railway lines alone showed total operating revenues of $577,354,879 for the past year as compared with $589,039,936 for 1927, a decrease of 1.98 per cent, in a year of unsettled industrial employment. When bus operations are included the revenue is seen to have held up even better. For the entire group of companies and their subsidiary bus lines the total operating revenue was $613,570,305 as compared with $620,626,243 in 1927, or only 1.14 per cent off, indicating that in a number of instances bus extensions and substitutions have been made to serve the railway patrons and hold the revenue.

In the matter of expenses the companies also made a good record. Total operating expenses were $433,115,653 for the rail lines, a decrease of $9,625,606 from the preceding year. Including the bus lines, the expenses were $467,653,613 against $473,860,512 in 1927, a reduction of 1.31 per cent. The operating ratio fell accordingly for the rail lines from 75.16 per cent to 75.02 per cent. Including the bus lines, the operating ratio fell from 76.35 to 76.22 per cent.

The figures cited above, contained in the first two tables in this article, give a comparison of the operations of the railway lines alone with the total rail and bus business conducted by the industry. It will be seen that the bus revenue, amounting to $36,215,426, was $4,629,119 higher than in 1927. This was an increase of 14.66 per cent. Bus operating expenses were $34,537,960, an increase of $3,418,707, or 10.96 per cent. The net operating income of the controlled bus lines accordingly showed an increase from $467,054 in 1927 to $1,677,466 in 1928, an increase of 159.16 per cent. In order to gain this revenue, the bus lines carried 365,465,316 revenue passengers, an increase of 15.61 per cent, and ran 145,944,800 bus-miles, an increase of 12.24 per cent over 1927. Railway-controlled bus lines now cover 6,989.9 miles of road.

Not all of the companies furnishing returns were able to give complete figures covering the details necessary for thorough analysis. Many of them are combined with electric light, gas or other utilities, and the capital structure is not separated for each branch of the business. However, 182 companies furnished information from which a study could be made in detail. The results are given in Tables I to X, inclusive. In general they follow the same trends as those for the 244 companies. Railway operating revenues were $442,303,214, or 2.07 per cent less than in 1927, while operating expenses were $332,622,058, or 2.38 per cent less than in 1927. This was reflected in the net, which was $109,681,156, or only 1.15 per cent below 1927.

In Table I the disposition of net operating revenue is shown. There was an increase in net revenue from auxiliary operations of $78,255 and in non-operating income of $1,051,439, along with a reduction in taxes of $766,326. These changes resulted in an increase in gross income from $91,964,266 to $92,582,768. Dividends were increased slightly in the total, although

COMBINED OPERATIONS OF 244 ELECTRIC RAILWAYS AND 160 CONTROLLED BUS UNDERTAKINGS
Compiled by American Electric Railway Association

	1928	1927 [2]	Increase or Decrease (d) Total	Per Cent
Railway operating revenue	$613,570,305	$620,626,243	(d) $7,055,938	(d) 1.14
Railway operating expenses	467,653,613	473,860,512	(d) 6,206,899	(d) 1.31
Net operating revenue	$145,916,692	$146,765,731	(d) $849,039	(d) 0.58
Operating ratio (per cent)	76.22	76.35	(d) 0.13	(d) 0.17
Miles of track and bus route [1]	[2] 32,146.44	[3] 31,228.57	917.87	2.94
Revenue passengers	[4] 7,369,559,334	7,509,508,327	(d) 139,948,993	(d) 1.86
Total passengers	[4] 9,796,416,185	9,927,364,292	(d) 130,948,107	(d) 1.32
Car and bus-miles	1,493,068,587	1,419,241,969	1,826,618	0.12

[1] Miles of road. [2] 154 bus undertakings. [3] 148 bus undertakings. [4] 159 bus undertakings.

COMBINED OPERATIONS OF 244 ELECTRIC RAILWAYS
Compiled by American Electric Railway Association

	1928	1927	Increase or Decrease (d) Total	Per Cent
Railway operating revenue	$577,354,879	$589,039,936	(d) $11,685,057	(d) 1.98
Railway operating expense	433,115,653	442,741,259	(d) 9,625,606	(d) 2.17
Net operating revenue	$144,239,226	$146,298,677	(d) $2,059,451	(d) 1.41
Operating ratio (per cent)	75.02	75.16	(d) 0.14	(d) 0.19
Miles of track	25,159.54	25,187.38	(d) 27.84	(d) 0.11
Revenue passengers	7,004,094,018	7,193,394,381	(d) 189,300,363	(d) 2.63
Total passengers	9,358,810,297	9,553,504,164	(d) 194,693,867	(d) 2.04
Car-miles (revenue)	1,347,123,787	1,361,210,095	(d) 14,086,308	(d) 1.03

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COMBINED OPERATIONS OF 160 BUS UNDERTAKINGS CONTROLLED BY 244 ELECTRIC RAILWAYS

Reporting to American Electric Railway Association

	1928	1927	Increase or Decrease (d) Total	Per Cent
Bus operating revenue.	$36,215,426	$31,586,307	$4,629,119	14.66
Bus operating expense.	34,537,960	31,119,253	3,418,707	10.96
Net operating revenue	$1,677,466	$467,054	$1,210,412	159.16
Operating revenue (per cent)	95.37	98.52	(d) 3.15	(d) 3.19
Miles of bus route(1)	(2) 6,989.90	(3) 6,041.19	945.71	15.65
Revenue passengers	(4) 365,465,316	316,113,946	49,351,370	15.61
Total passengers	(4) 437,605,888	373,860,128	63,745,760	16.19
Bus-miles	145,944,800	130,031,874	15,912,926	12.24

(1) Bus-mileage is miles of road.
(2) 154 bus undertakings.
(3) 148 bus undertakings.
(4) 159 bus undertakings.

only 38 companies paid dividends last year as compared with 42 companies the year before.

On a car-mile basis the changes from 1927 have been minor. While there was a slight reduction in the number of car-miles run, the operating revenue per car-mile was slightly lower, being 44.06 cents against 44.49 cents in 1927.

Operating expenses are analyzed by primary accounts in Table II. There was a saving in each of the departments except traffic. The largest saving, $1,985,937, or 4.5 per cent, occurred in the maintenance of equipment, while power showed a saving of $1,280,768, or 2.83 per cent. These figures reflect greater attention to these accounts and also the increased number of new, lightweight cars in service. The amount spent on track was almost as great as in 1927, being 0.65 per cent less in the total and 0.43 per cent more on a car-mile basis.

That there has been an increase in average fares during the year is seen by reference to Table IV, in which derived ratios are presented. The passenger revenue per revenue passenger was 7.76 cents in 1928 against 7.62 cents in 1927, or 1.84 per cent more. Revenue per passenger car-mile and per car operated were almost identical in the two years. On account of an increase in the average speed as measured in car-miles per car-hour from 9.44 to 9.54 the revenue per passenger car-hour shows an increase from $4.05 to $4.09. Besides the higher speed in the latter year more service was rendered per car, the annual mileage going up from 37,917 in 1927 to 37,963 in 1928.

City-Suburban Lines Make Best Showing

Comparative figures on the city, interurban and combined city and interurban lines are given in Tables V-X. It is interesting to note how the companies succeeded in effecting an increase in net income despite the decline in traffic. Reference to Table V shows that the increase was confined to the group of combination lines. While this group suffered the greatest loss in traffic and gross revenue, this loss was more than offset by a reduction in operating expenses. While revenues declined 4.0 per cent the reduction in expense was 5.07 per cent, so that the net operating revenue was slightly higher.

Actually the service given by this group of properties was greater in proportion last year than previously, as the reduction in passenger car-miles, 2.06 per cent, is much less than the reduction in traffic, 5.49 per cent. The greater relative amount of service given was probably due in part to the difficulty of gaging the

TABLE III—OPERATING STATISTICS

	1928	1927	Increase or Decrease (d) Total	Per Cent
Passenger car-miles	969,791,204	982,127,973	(d) 12,736,769	(d) 1.30
Total revenue car-miles	1,003,962,072	1,015,128,401	(d) 11,166,329	(d) 1.10
Revenue passengers(1)	5,209,538,966	5,370,599,141	(d) 161,060,175	(d) 3.00
Transfer passengers(2)	1,357,461,681	1,392,313,863	(d) 34,852,182	(d) 2.50
Total passengers(1)	6,604,126,041	6,796,430,980	(d) 192,304,939	(d) 2.83
Passenger revenue	$412,377,746	$417,703,938	(d) $5,326,192	(d) 1.28
Revenue car-hours(3)	87,872,452	89,684,254	(d) 1,811,802	(d) 2.02
Passenger car-hours(3)	86,757,181	88,455,212	(d) 1,698,031	(d) 1.92
Miles of single track	19,165.05	19,247.90	(d) 82.85	(d) 0.43
Passenger cars operated(4)	23,674	23,949	(d) 275	(d) 1.15

(1) Reported by 181 companies. (2) Reported by 131 companies. (3) Reported by 165 companies. (4) Average maximum number of passenger cars in service daily; reported by 162 companies.

Part I — Combined Operating Reports of 182 Electric Railways for the Calendar Year 1928 Compared with 1927

Compiled by American Electric Railway Association

TABLE I—COMBINED INCOME STATEMENT

	1928	1927	Increase or Decrease (d) Total	Per Cent	Cents per Car-Mile 1928	1927	Increase or Decrease (d) Total	Per Cent
Railway operating revenue	$442,303,214	$451,674,670	(d) $9,371,456	(d) 2.07	44.06	44.49	(d) 0.43	(d) 0.97
Railway operating expense	332,622,058	340,715,996	(d) 8,093,938	(d) 2.38	33.13	33.56	(d) 0.43	(d) 1.28
Net operating revenue	$109,681,156	$110,958,674	(d) $1,277,518	(d) 1.15	10.93	10.93	....	....
Net revenue, auxiliary operations	1,606,860	1,528,605	78,255	5.12	0.16	0.15	0.01	6.67
Taxes	27,688,473	28,454,799	(d) 766,326	(d) 2.69	2.76	2.80	(d) 0.04	(d) 1.43
Operating income	$83,599,543	$84,032,480	(d) $432,937	(d) 0.52	8.33	8.28	0.05	0.60
Non-operating income	8,983,225	7,931,786	1,051,439	13.26	0.89	0.78	0.11	14.10
Gross income	$92,582,768	$91,964,266	$618,502	0.67	9.22	9.06	0.16	1.77
Deductions from gross income	70,011,747	69,477,433	534,314	0.77	6.97	6.84	0.13	1.90
Net income	$22,571,021	$22,486,833	$84,188	0.37	2.25	2.22	0.03	1.35
Dividends	(3) $15,693,680	(4) $15,681,665	12,015	0.08	.....	.....	....	.....
Operating ratio (per cent)	75.20	75.43	(d) 0.23	(d) 0.31	.....	.....	....	.....
Ratio: net income to operating revenue (per cent)	3.55	3.47	0.08	2.31	.....	.....	....	.....

(3) Reported by 38 companies. (4) Reported by 42 companies.

TABLE II—OPERATING EXPENSES BY PRIMARY ACCOUNTS

	1928	1927	Increase or Decrease (d) Total	Per Cent	Cents per Car-Mile 1928	1927	Increase or Decrease (d) Total	Per Cent
Way and structures	$46,582,718	$46,889,062	(d) $306,344	(d) 0.65	4.64	4.62	0.02	0.43
Equipment	42,098,442	44,084,379	(d) 1,985,937	(d) 4.50	4.19	4.34	(d) 0.15	(d) 3.46
Power	44,012,941	45,293,709	(d) 1,280,768	(d) 2.83	4.38	4.46	(d) 0.08	(d) 1.79
Conducting transportation	144,342,477	148,347,519	(d) 4,005,042	(d) 2.70	14.38	14.61	(d) 0.23	(d) 1.57
Traffic	2,011,704	1,899,392	112,312	5.91	0.20	0.19	0.01	5.26
General and miscellaneous	51,047,119	51,574,329	(d) 527,210	(d) 1.02	5.09	5.08	0.01	0.20
Transportation for investment-credit	—172,806	—233,190	(d) —60,384	(d) 25.49	—0.02	—0.02	....	.....
Total operating expense	(1) $332,622,058	(2) $340,715,996	(d) $8,093,938	(d) 2.38	(3) 33.13	(4) 33.56	(d) 0.43	(d) 1.28

(1) Includes $2,699,463 undistributed expense.
(2) Includes $2,860,796 undistributed expense.
(3) Includes 0.27 cent undistributed expense.
(4) Includes 0.28 cent undistributed expense.

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demands from day to day, but in greater degree was dictated by the conviction that good service is needed to prevent further loss in riding.

The decrease in operating expenses in this city-interurban group was distributed over all the primary accounts except traffic. This is seen in Table VI. The reductions ranged all the way from 1.95 per cent for power to 10.16 per cent for maintenance of equipment. The second largest reduction in expense was 7.24 per cent in maintenance of way and structures. On a car-mile basis, as given in Table X, the relative changes are similar, although the per cent savings per car-mile are slightly less on account of the relatively small reduction in car-miles operated for the year.

When this group of combined city and interurban properties is compared with the city properties and the interurbans the showing is all the more remarkable. The city companies, of course, have the greatest revenue and have shown the least loss in traffic. They were not, however, able to reduce expenses enough to prevent a reduction in net operating revenue. They did save enough to reduce the operating ratio slightly. Operating revenue decreased only 1.34 per cent, al-

TABLE IV—SIGNIFICANT RATIOS DERIVED FROM TABLES I-III

	1928	1927	Increase or (d) Decrease Per Cent
Railway operating revenue	$442,303,214	$451,674,670	(d) 2.07
Per mile of single track	23,079	23,461	(d) 1.63
Gross income	92,582,768	91,964,266	0.67
Per mile of single track	4,831	4,777	1.13
Passenger revenue	412,377,746	417,703,938	(d) 1.28
Per revenue passenger	(1) 7.76c.	(1) 7.62c.	1.84
Per total passenger	(1) 6.12c.	(1) 6.08c.	0.66
Per mile of single track	$21,517	$21,701	(d) 0.85
Per passenger car-mile	(2) 42.54c.	(2) 42.53c.	0.02
Per car operated	(3) $15,733	$15,725	0.05
Per passenger car-hour	(4) $4.09	(4) $4.05	0.99
Revenue passengers	(2) 5,209,538,966	(2) 5,370,599,141	(d) 3.00
Per mile of single track	(2) 281,164	(2) 288,886	(d) 2.57
Per passenger car-mile	(1) 5.47	5.57	(d) 1.80
Per car operated	(5) 199,596	(5) 202,968	(d) 1.66
Per passenger car-hour	(6) 58	(6) 58	.....
Total passengers	(2) 6,604,126,041	(2) 6,796,430,980	(d) 2.83
Per mile of single track	(2) 356,432	(2) 365,582	(d) 2.50
Per passenger car-mile	(1) 6.94	(1) 7.01	(d) 1.00
Ratio: transfer passengers to revenue passengers (per cent)	(7) 28.59	(7) 28.52	0.25
Revenue car-miles	1,003,962,072	1,015,128,401	(d) 1.10
Per mile of single track	52,385	52,740	(d) 0.67
Per car operated	(3) 37,963	(3) 37,917	0.12
Per car-hour	(4) 9.54	(4) 9.44	1.06
Car-hours	(7) 87,872,452	(8) 89,684,254	(d) 2.02
Per car operated	(9) 3,911	(9) 3,952	(d) 1.04

(1) Reported by 180 companies.
(2) Reported by 181 companies.
(3) Reported by 161 companies.
(4) Reported by 164 companies.
(5) Reported by 160 companies.
(6) Reported by 163 companies.
(7) Reported by 131 companies.
(8) Reported by 165 companies.
(9) Reported by 147 companies.

Part II — Division of Statistics of the 182 Electric Railways into Separate Statements for City, Interurban and Combination City and Interurban Companies

TABLE V—INCOME STATEMENT

	City Lines, 101 Companies 1928	City Lines, 101 Companies 1927	Increase or (d) Decrease, Per Cent	Interurban Lines, 37 Companies 1928	Interurban Lines, 37 Companies 1927	Increase or (d) Decrease, Per Cent	Combination Lines, 44 Companies 1928	Combination Lines, 44 Companies 1927	Increase or (d) Decrease, Per Cent
Railway operating revenue	$318,953,403	$323,285,916	(d) 1.34	$21,362,469	$22,147,952	(d) 3.55	$101,987,342	$106,240,802	(d) 4.00
Railway operating expenses	234,165,128	237,481,018	(d) 1.40	18,539,999	19,053,338	(d) 2.69	79,916,931	84,181,640	(d) 5.07
Net operating revenue	84,788,275	85,804,898	(d) 1.18	2,822,470	3,094,614	(d) 8.79	22,070,411	22,059,162	0.05
Net revenue; auxiliary operations	626,894	728,088	(d) 13.90	153,915	151,431	1.64	826,051	649,086	27.26
Taxes	20,972,031	21,623,509	(d) 3.01	1,169,525	1,160,193	0.80	5,546,917	5,671,097	(d) 2.19
Operating income	64,443,138	64,909,477	(d) 0.71	1,806,860	2,085,852	(d) 13.38	17,349,545	17,037,151	1.83
Non-operating income	1,199,094	5,620,143	10.30	613,145	701,898	(d) 12.64	2,170,986	1,609,745	34.87
Gross income	70,642,232	70,529,620	0.16	2,420,005	2,787,750	(d) 13.19	19,520,531	18,646,896	4.69
Deductions from gross income	47,454,398	46,643,482	1.74	6,382,448	6,286,391	1.53	16,174,901	16,547,560	(d) 2.25
Net income	23,187,834	23,886,138	(d) 2.92	*3,962,443	*3,498,641	.....	3,345,630	2,099,336	59.37
Dividends	(1) 12,778,350	(2) 12,903,692	(d) 0.97	(3) 197,373	(4) 271,795	(d) 27.38	(5) 2,717,957	(6) 2,506,178	8.45
Operating ratio (per cent)	73.42	73.46	(d) 0.05	86.79	86.03	0.88	78.36	79.24	(d) 1.11
Ratio; net income to operating revenue (per cent)	7.27	7.39	(d) 1.62	.....	.....	.....	3.28	2.36	38.98

* Deficit. (1) Reported by 28 companies. (2) Reported by 30 companies. (3) Reported by 3 companies. (4) Reported by 4 companies. (5) Reported by 7 companies. (6) Reported by 8 companies.

TABLE VI—OPERATING EXPENSES BY PRIMARY ACCOUNTS

	City Lines, 101 Companies 1928	City Lines, 101 Companies 1927	Increase or (d) Decrease, Per Cent	Interurban Lines, 37 Companies 1928	Interurban Lines, 37 Companies 1927	Increase or (d) Decrease, Per Cent	Combination Lines, 44 Companies 1928	Combination Lines, 44 Companies 1927	Increase or (d) Decrease, Per Cent
Way and structures	$30,132,001	$29,368,627	2.60	$3,166,642	$3,199,146	(d) 1.02	$13,284,075	$14,321,289	(d) 7.24
Equipment	29,890,865	30,599,681	(d) 2.32	2,204,006	2,349,375	(d) 6.19	10,003,571	11,135,323	(d) 10.16
Power	29,276,393	30,155,257	(d) 2.91	3,107,511	3,278,019	(d) 5.20	11,629,037	11,860,433	(d) 1.95
Conducting transportation	107,784,107	110,315,349	(d) 2.29	5,968,893	6,133,966	(d) 2.69	30,589,477	31,898,204	(d) 4.10
Traffic	789,016	677,206	16.51	324,961	365,139	(d) 11.00	897,727	857,047	4.75
General and miscellaneous	33,688,663	33,646,326	0.13	3,771,178	3,749,373	0.58	13,587,278	14,178,628	(d) 4.17
Transportation for investment-credit	—87,205	—140,962	(d) 38.14	—11,368	—22,944	(d) 50.45	—74,232	—69,284	—7.14
Total operating expense	(1) 234,165,127	(2) 237,481,016	(d) 1.40	(3) 18,539,999	(4) 19,053,338	(d) 2.69	79,916,933	84,181,640	(d) 5.07

(1) Includes $2,691,287 undistributed expense.
(2) Includes $2,859,532 undistributed expense.
(3) Includes $8,176 undistributed expense.
(4) Includes $1,264 undistributed expense.

TABLE VII—OPERATING STATISTICS

	City Lines, 101 Companies 1928	City Lines, 101 Companies 1927	Increase or (d) Decrease, Per Cent	Interurban Lines, 37 Companies 1928	Interurban Lines, 37 Companies 1927	Increase or (d) Decrease, Per Cent	Combination Lines, 44 Companies 1928	Combination Lines, 44 Companies 1927	Increase or (d) Decrease Per Cent,
Passenger car-miles	723,195,767	729,281,768	(d) 0.83	35,203,881	37,414,645	(d) 5.91	210,991,556	215,431,560	(d) 2.06
Total revenue car-miles	724,792,180	730,932,505	(d) 0.84	47,355,280	48,068,369	(d) 1.48	231,814,612	236,127,527	(d) 1.83
Revenue passengers	4,331,220,007	4,442,139,260	(d) 2.50	57,675,329	60,098,530	(d) 4.03	(1) 820,643,630	(1) 868,361,351	(d) 5.50
Transfer passengers	(2) 1,205,777,220	(2) 1,231,821,359	(d) 2.11	(3) 1,183,601	(3) 1,257,842	(d) 5.90	(4) 150,500,860	(4) 159,234,662	(d) 5.48
Total passengers	5,558,794,467	5,691,493,550	(d) 2.33	60,416,859	62,860,239	(d) 3.89	(5) 984,914,715	(5) 1,042,077,191	(d) 5.49
Passenger revenue	313,120,871	313,577,627	(d) 0.15	13,013,114	13,855,475	(d) 6.08	86,243,761	90,270,836	(d) 4.46
Revenue car-hours	(6) 67,341,035	(6) 68,598,984	(d) 1.83	(7) 2,017,900	(7) 2,026,382	(d) 0.42	(8) 18,513,517	(8) 19,058,888	(d) 2.86
Passenger car-hours	(9) 67,273,689	(9) 68,505,981	(d) 1.80	(10) 1,252,863	(10) 1,301,778	(d) 3.76	(11) 18,230,629	(11) 18,647,453	(d) 2.24
Miles of single track	9,006.87	9,027.05	(d) 0.22	2,876.87	2,898.81	(d) 0.76	7,281.31	7,322.04	(d) 0.56
Passenger cars operated (a)	(12) 18,915	(12) 19,043	(d) 0.67	(13) 593	594	(d) 0.17	(14) 4,166	(14) 4,321	(d) 3.59

(a) Average maximum number of cars in service daily.
(1) Reported by 43 companies.
(2) Reported by 81 companies.
(3) Reported by 14 companies.
(4) Reported by 36 companies.
(5) Reported by 43 companies.
(6) Reported by 96 companies.
(7) Reported by 28 companies.
(8) Reported by 41 companies.
(9) Reported by 96 companies.
(10) Reported by 28 companies.
(11) Reported by 41 companies.
(12) Reported by 92 companies.
(13) Reported by 33 companies.
(14) Reported by 37 companies.

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TABLE VIII—DERIVED RATIOS

	City Lines, 101 Companies 1928	City Lines, 101 Companies 1927	Increase or (d) Decrease, Per Cent	Interurban Lines, 37 Companies 1928	Interurban Lines, 37 Companies 1927	Increase or (d) Decrease, Per Cent	Combination Lines, 44 Companies 1928	Combination Lines, 44 Companies 1927	Increase or (d) Decrease, Per Cent
Railway operating revenue.	$318,953,403	$323,285,916	(d) 1.34	$21,362,469	$22,147,952	(d) 3.55	$101,987,342	$106,240,802	(d) 4.00
Per mile of single track..	35,412	35,813	(d) .12	7,426	7,640	(d) 2.80	14,007	14,510	(d) 3.47
Gross income.....	$70,642,232	$70,529,620	0.16	$2,420,005	$2,787,750	(d) 13.19	$19,520,531	$18,646,896	4.69
Per mile of single track..	7,843	7,813	0.38	841	962	(d) 12.58	2,681	2,547	5.26
Passenger revenue.....	$313,120,871	$313,577,627	(d) 0.15	$13,013,114	$13,855,475	(d) 6.08	$86,243,761	$90,270,836	(d) 4.46
Per revenue passenger...	(1) 7.23c.	(1) 7.06c.	2.41	22.56c.	23.05c.	(d) 2.13	(12) 9.52c.	(12) 9.42c.	1.06
Per total passenger	(1) 5.63c.	(1) 5.51c.	2.18	21.54c.	22.04c.	(d) 2.27	(12) 7.93c.	(12) 7.85c.	1.02
Per mile of single track..	$34,765	$34,738	0.08	$4,523	$4,780	(d) 5.38	$11,845	$12,329	(d) 3.93
Per passenger car-mile...	(1) 43.30c.	(1) 43.00c.	0.70	36.96c.	37.03c.	(d) 0.19	40.88c.	41.90c.	(d) 2.43
Per car operated.....	(2) $15,279	(2) $15,176	0.68	$20,489	$21,602	(d) 5.15	(13) $17,116	(13) $17,336	(d) 1.27
Per passenger car-hour..	(3) 4.12	(3) 4.04	1.98	(8) 6.23	(8) 6.33	(d) 1.58	(14) 3.85	(14) 3.93	(d) 2.04
Revenue passengers.....	4,331,22",007	4,442,139,260	(d) 2.50	57,675,329	60,098,530	(d) 4.03	(12) 820,643,630	(12) 868,361,351	(d) 5.50
Per mile of single track..	480,880	492,092	(d) 2.28	20,048	20,732	(d) 3.30	(12) 123,503	(12) 130,290	(d) 5.21
Per passenger car-mile...	(1) 5.99	(1) 6.09	(d) 1.64	1.64	1.61	1.86	(12) 4.24	(12) 4.40	(d) 3.64
Per car operated.....	(2) 207,751	(2) 211,472	(d) 1.76	(7) 90,262	(7) 92,262	2.17	(15) 175,153	(15) 177,546	(d) 1.35
Per passenger car-hour..	(3) 61	(3) 61	.....	34	33	3.03	(16) 45	(16) 47	(d) 4.26
Total passengers.....	5,558,794,467	5,691,493,550	(d) 2.33	60,416,859	62,860,239	(d) 3.89	(12) 984,914,715	(12) 1,042,077,191	(d) 5.49
Per mile of single track..	617,173	630,493	(d) 2.11	21,001	21,685	(d) 3.15	(12) 148,225	156,354	(d) 5.20
Per passenger car-mile...	(1) 7.69	(1) 7.81	(d) 1.54	1.72	1.68	2.38	(12) 5.09	(12) 5.28	(d) 3.60
Ratio: Transfer passengers to revenue passengers (per cent).....	(4) 30.6	(4) 30.6	.....	(9) 6.05	(9) 6.19	(d) 2.26	(15) 19.08	(15) 19.17	(d) 0.47
Revenue car-miles.....	724,792,180	730,932,505	(d) 0.84	47,355,280	48,068,369	(d) 1.48	231,814,612	236,127,527	(d) 1.83
Per mile of single track..	80,471	80,971	(d) 0.62	16,495	16,582	(d) 0.52	31,837	32,249	(d) 1.28
Per car operated.....	(2) 34,904	(2) 34,941	(d) 0.11	(7) 69,139	(7) 69,799	(d) 0.95	(13) 47,414	(13) 46,666	1.60
Per car-hour.....	(3) 9.36	(3) 9.25	1.19	(8) 13.29	(8) 13.40	(d) 0.82	(14) 9.79	(14) 9.70	0.93
Car-hours (revenue).....	(5) 67,341,035	(5) 68,598,984	(d) 1.83	(10) 2,017,900	(10) 2,026,382	(d) 0.42	(13) 18,513,517	(13) 19,058,888	(d) 2.86
Per car operated.....	(6) 3,783	(6) 3,837	(d) 1.41	(11) 4,697	(11) 4,706	(d) 0.19	(17) 4,417	(17) 4,387	0.68

(1) Reported by 100 companies. (5) Reported by 92 companies. (9) Reported by 14 companies. (12) Reported by 43 companies. (15) Reported by 36 companies.
(2) Reported by 91 companies. (6) Reported by 86 companies. (10) Reported by 33 companies. (13) Reported by 37 companies. (16) Reported by 40 companies.
(3) Reported by 95 companies. (7) Reported by 33 companies. (11) Reported by 27 companies. (14) Reported by 41 companies. (17) Reported by 34 companies.
(4) Reported by 81 companies. (8) Reported by 28 companies.

though traffic was off 2.50 per cent. This was a result of the higher average fare per passenger received during the year. As with the combined properties, the savings were due to a reduction in service and to savings in cost per car-mile.

In this city classification the net revenue from auxiliary operations fell 13.90 per cent. The total amount of this item was small and the reduction of 3.01 per cent in taxes helped reduce the decrease in net, so that the operating income was only 0.72 per cent lower than in 1927. While not so large in amount as for the combination lines, the city lines increased the non-operating income 10.30 per cent, making the gross income 0.16 per cent higher in 1928 than in 1927. Deductions from gross income, however, were up 1.74 per cent, so that the net income was 2.92 per cent lower than in the previous year. In amount the net for 1928 was $23,187,834 as against $23,886,138 in 1927. Out of these amounts the dividends paid by 28 companies in 1928 were $12,778,350, while in 1927 dividends of $12,903,692 were paid by 30 companies.

Interurban Roads Make Poorest Showing

Of the three groups the interurban roads made the poorest showing. Although traffic held up better than on the combined city and interurban properties they did not make compensating gains in other items. The passenger car-miles were reduced 5.91 per cent while the loss in revenue passengers was 4.03 per cent. Freight car-miles, on the other hand, were increased, so that the total revenue car-miles were only 1.48 per cent lower in 1928 than in the year before. The average fare per revenue passenger, unlike the fares in the other groups, went down from 23.05 cents to 22.56 cents, although the changes in fare during the year were minor.

Operating expenses of these interurbans went down 2.69 per cent while revenues dropped 3.55 per cent, so that the net operating revenue was off 8.79 per cent. Despite the smaller net revenue the taxes were higher, and operating income was 13.38 per cent less than in 1927. Non-operating income was down 12.64 per cent and fixed charges increased 1.53 per cent. There was a deficit of $3,962,443 in 1928 compared with one of $3,498,641 in 1927.

TABLE IX—COMBINED STATEMENTS OF ALL THREE TYPES OF COMPANIES ON A CAR-MILE BASIS

	City Lines 101 Companies: Cents per Car-Mile 1928	1927	Increase or (d) Decrease, Per Cent	Interurban Lines 37 Companies: Cents per Car-Mile 1928	1927	Increase or (d) Decrease, Per Cent	Combination Lines 44 Companies: Cents per Car-Mile 1928	1927	Increase or (d) Decrease, Per Cent
Railway operating revenue.	44.01	44.23	(d) 0.50	45.11	46.08	(d) 2.11	44.00	44.99	(d) 2.20
Railway operating expenses.	32.31	32.49	(d) 0.55	39.15	39.64	(d) 1.24	34.48	35.65	(d) 3.28
Net operating revenue...	11.70	11.74	(d) 0.34	5.96	6.44	(d) 7.45	9.52	9.34	1.93
Net revenue; Auxiliary operations.....	0.09	0.10	(d) 10.00	0.33	0.31	6.45	0.35	0.27	29.63
Taxes.....	2.90	2.96	(d) 2.03	2.47	2.41	2.49	2.39	2.40	(d) 0.42
Operating income.....	8.89	8.88	0.11	3.82	4.34	(d) 11.98	7.48	7.21	3.74
Non-operating income.....	0.86	0.77	11.69	1.29	1.46	(d) 11.64	0.94	0.68	38.24
Gross income.....	9.75	9.65	1.04	5.11	5.80	(d) 11.90	8.42	7.89	6.72
Deductions from gross income.....	6.55	6.38	2.66	13.48	13.08	3.06	6.98	7.01	(d) 0.43
Net income.....	3.20	3.27	(d) 2.14	*8.37	*7.28	.....	1.44	0.88	16.36

* Deficit.

TABLE X—OPERATING EXPENSES ON A CAR-MILE BASIS

	City Lines 101 Companies: Cents per Car-Mile 1928	1927	Increase or (d) Decrease, Per Cent	Interurban Lines 37 Companies: Cents per Car-Mile 1928	1927	Increase or (d) Decrease, Per Cent	Combination Lines 44 Companies: Cents per Car-Mile 1928	1927	Increase or (d) Decrease, Per Cent
Way and structures.....	4.16	4.02	3.48	6.69	6.66	0.45	5.73	6.07	(d) 5.60
Equipment.....	4.12	4.19	(d) 1.67	4.65	4.89	(d) 4.91	4.32	4.72	(d) 8.47
Power.....	4.04	4.13	(d) 2.18	6.56	6.82	(d) 3.81	5.01	5.02	(d) 0.20
Conducting transportation..	14.87	15.09	(d) 1.46	12.60	12.76	(d) 1.25	13.20	13.51	(d) 2.29
Traffic.....	0.11	0.09	22.22	0.69	0.76	(d) 9.21	0.39	0.36	8.33
General and miscellaneous..	4.65	4.60	1.09	7.96	7.80	2.05	5.86	6.00	(d) 2.33
Transportation for investment-credit.....	—0.01	—0.02	(d) 50.00	—0.02	—0.05	(d) 60.00	—0.03	—0.03	.....
Total operating expenses.	*32.31	†32.49	(d) 0.55	‡39.15	39.64	(d) 1.24	34.48	35.65	(d) 3.28

* Includes 0.37 cents undistributed expense.
† Includes 0.39 cents undistributed expense.
‡ Includes 0.02 cents undistributed expense.

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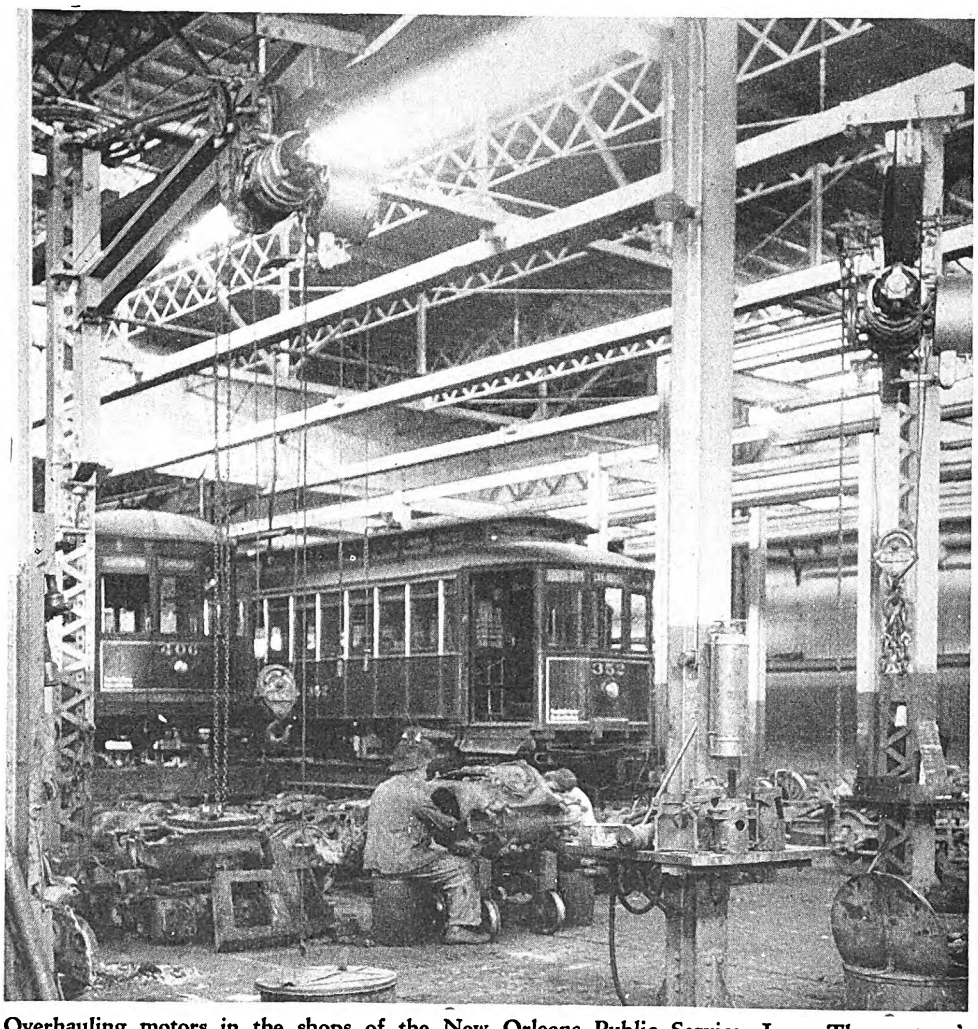
Systematic Maintenance Cuts Costs on

Scientific departmental organization, careful training of employees, and engineering supervision of work have resulted in improved performance of equipment



Overhauling motors in the shops of the New Orleans Public Service, Inc. The motor is mounted on a four-wheel carriage which supports it at a height convenient for the workmen

SINCE 1922, maintenance of equipment costs and car failures have declined steadily on the railways represented in the Electric Railway Association of Equipment Men, Southern Properties, as told in last month's issue of the JOURNAL. In Atlanta, Birmingham, Memphis and New Orleans, the average annual reduction in maintenance costs from 1922 to 1927 was $350,000, making a total of $2,100,000 for the six-year period. The average annual reduction in car failures was 77½ per cent, the maximum reduction in 1927 being 87½ per cent. The activities of the equipment men's association have been responsible in large measure for this outstanding achievement. The free interchange of cost data and other maintenance figures, the discussion of common problems at the association meetings, and the inspection of properties in the cities where meetings are held have given this group of equipment men an entirely new outlook. A spirit of competition, friendly yet earnest, has been created and has acted as a powerful force for improvement. The specific reasons why maintenance costs on these properties were 49 per cent lower and car failures were 87½ per cent lower in 1927 than in 1921 are worthy of careful study.

First, let us consider organization. These mechanical departments are organized with the underlying thought that the work of each department bears a very definite relation to the work of every other department, and the whole must function as a unit with the definite object of securing the highest possible standard of maintenance at the lowest possible cost. The duties of each department are clearly defined and the relations between departments are thoroughly understood by all. The organization of the rolling stock and shops department of the New Orleans Public Service, Inc., is shown by an accompanying chart.

It is believed that the scientific control of many of the operations in the shops, such as the dipping and baking of armatures and the electrical and mechanical testing of apparatus, can be best secured through engineering supervision. Another deep-rooted belief is that the education of employees is an important factor in creating a high standard of workmanship. Educational facilities are provided so that not only the workmen but shop foremen and carhouse foremen also may have an opportunity to learn how to do their jobs better and to fit themselves for a better position in the organization. One property, for example, has mapped out a complete educational course and has prepared its own instruction manuals.

To aid further in creating an organization which will function smoothly, these companies believe in periodic meetings of department heads for discussion of the problems and co-ordination of the work. Meetings of shop

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department heads with carhouse foremen, at which operating costs and other maintenance data are discussed, are employed to keep up an active, friendly rivalry for the reduction of maintenance costs and car failures.

Having developed an efficient organization and having provided for competent, intelligent supervision of the work to be done, the next step in this improvement program appears to have been the development of a system of overhauling and inspection based on the old maxim that "an ounce of prevention is worth a pound of cure." In other words, preventive maintenance is

outhern Properties

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Special Engineer
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the guiding policy upon which the whole system is founded.

They have started out with the theory that a car in first-class condition should, with proper periodical inspection, operate a certain number of miles before requiring any extensive repairs or overhauling. Experience has indicated that on their properties this mileage is, roughly, 50,000. It is then assumed that at the end of that period the car should be completely and thoroughly overhauled, with the expectation that it will successfully operate through another similar period. Supplementing the overhauling, these properties have inaugurated a system of rigid inspection on a 1,000 car-mile basis. Inspections are made at the carhouses; minor repairs only are permitted at these points in the belief that repairs of an extensive nature can best be made by the trained shop forces.

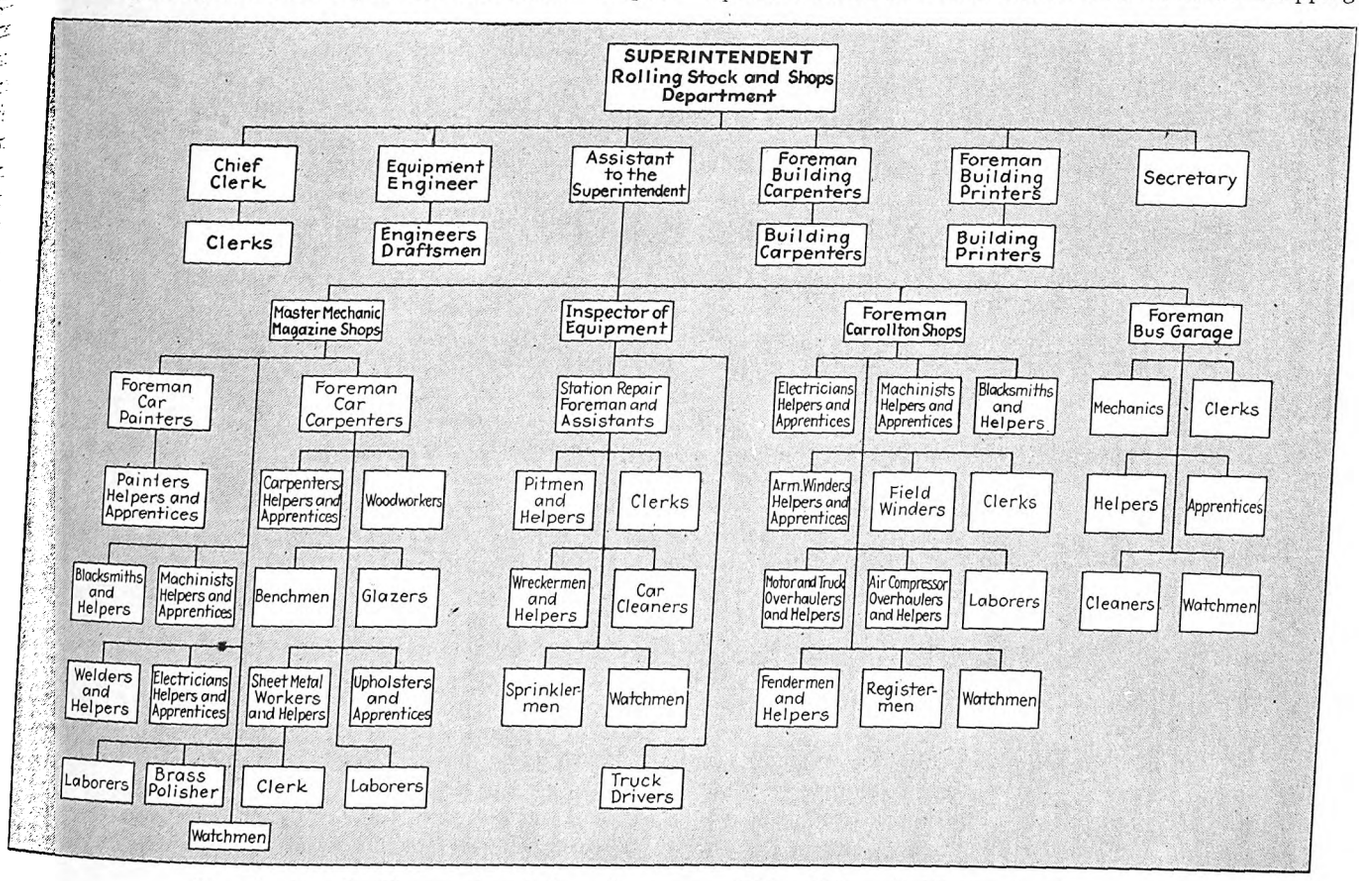
The record of car failures, or pull-ins as they are called, is a convincing illustration of the effectiveness of the overhauling and inspection system adopted. Its effect in reducing the principal causes of car failures is shown in the accompanying table. Monthly and annual figures on these and more than 50 other classified causes of car failures are interchanged by members of the association and serve to keep up an active competition.

The system of overhauling can best be described by following a car through the shop of one of these properties. The New Orleans property has been selected for this purpose. There overhauling is divided into two parts:

1. Car equipment overhauling.
2. Car body overhauling and painting.

Car equipment is overhauled on a 40,000-car-mile basis at the Carrollton shops. Bodies are overhauled at intervals of eighteen to twenty months at the Magazine shops. At the end of a 40,000-mile period, an order issued from the superintendent's office sends the car to the overhauling department. The department foreman is responsible for the quality of the work and a shop engineer is responsible for all of the testing of the overhauled equipment and the final performance of the car. The shop layout and the scheduling of work are such as to permit steady production. This, of course, involves the use of a sufficient number of spare equipment units so that the overhauling and re-equipping of the car may proceed without awaiting the overhauling and testing of any particular piece of equipment.

A car hoist raises the car body so that the trucks can be removed. The motors are removed by electrically-operated monorail hoists and transferred to the stripping



Organization of rolling stock and shops department of New Orleans Public Service, Inc.

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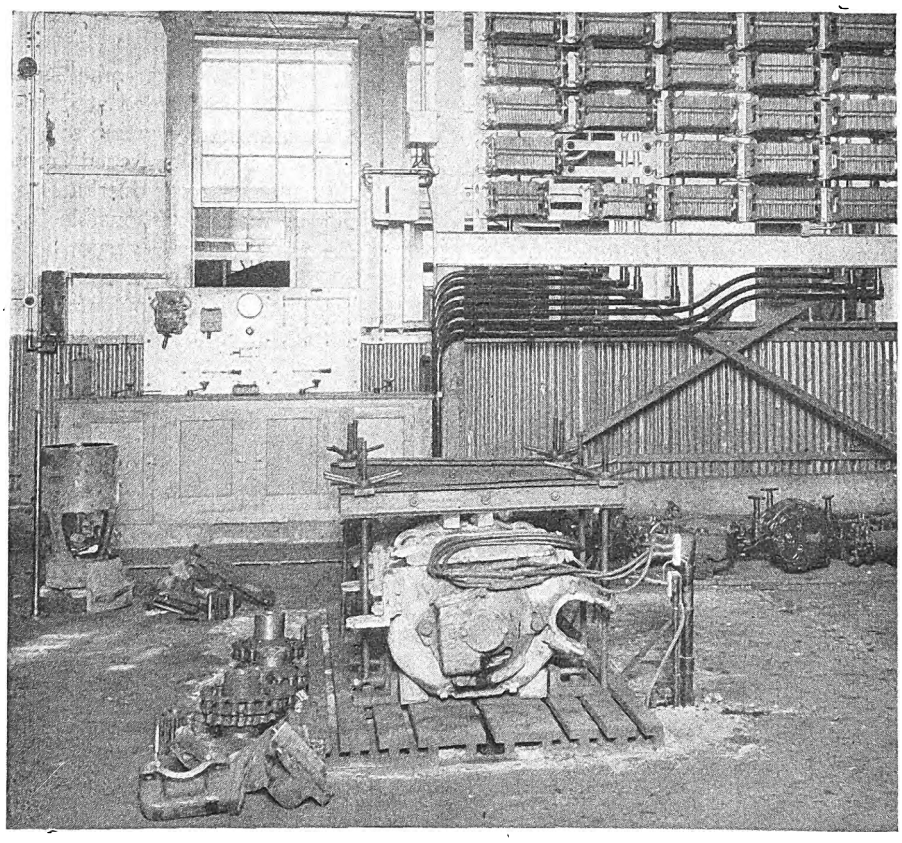
position by a transfer crane. Oil and waste are removed from the bearing and the axle caps and bolts are removed and placed in a cleaning tank. Axle caps, after being cleaned, are checked and those requiring overhauling are sent to the machine shop. A small four-wheel carriage conveys the motor to a position beneath the jib crane where the armature and pinion are removed. The frame head or armature bearing caps are then removed and placed in the cleaning tank. The brush-holders are removed and sent to the electrical department. The armature is conveyed to the armature department.

A jib crane then transfers the motor shell to a storing position where the field coils are given a hammer test, their resistance checked and a 1,750-volt a.c. dielectric test applied for one minute. Coils which do not meet all



Testing motors before they are returned to service

three of the above tests are sent to the armature department and are replaced with new or repaired and tested coils and a complete polarity check made.

After this, the motor shell is returned to the assembling position and thoroughly cleaned. This operation consists of placing the shell on a grating in the floor, surrounding it with a canvas-covered frame, and agitating the dirt with compressed air. A suction fan connected to the grating removes the dirt. Field bolts are checked for tightness, weak or broken springs on commutator, or oil-well covers replaced, motor leads and bushings examined and replaced if necessary. Outside leads are treated with a flexible insulating paint and the inside leads, field coils and interior of the shell are sprayed with air-drying varnish.

The overhauled brush-holders are reassembled in the frame, frame heads placed on the shaft of an overhauled armature and the bearings checked. Bearings showing excessive wear are replaced. The commutator-end frame head is then driven and bolted into place, the shell turned pinion-end up, the armature inserted and the pinion-end frame head put in place. The brush-holder alignment is checked, new brushes installed and the brush tension checked. The motor is then removed to the test floor where the armature bearings are packed with long fiber wool waste.

The motor is then given a fifteen-minute "running-in" test, the direction of rotation being reversed several times. At this time the armature end play and bearing temperatures are checked. The field coil resistance and the brush tension are rechecked.

Motors equipped with rewound armatures (and about 10 per cent of all other motors in addition) are given a load test, consisting of a 30-minute run, fifteen minutes in each direction, at 150 per cent of the one-hour rating.

Next, the pinion, previously heated in boiling water, is driven in place and the armature shaft washer and nut drawn up tightly against the pinion. Limit-of-wear gages are used to determine the discarding point of both pinions and gears and every effort is made to keep gears and pinions matched. The axle caps are loosely bolted to the motor shell, the motor is sprayed with truck paint and returned to the truck overhauling position.

In the meantime, practically all of the other electrical, mechanical and pneumatic equipment has been removed from the car, sent to the proper department, thoroughly overhauled and tested and returned for assembling. Also, the trucks have been most thoroughly overhauled and the work of reassembling the equipment begins. Before the trucks are placed under the car, the motor control, air compressor and buzzer wiring are given a 1,500-volt a.c. test for one minute. After the body has been placed on the trucks and the motors connected, a series of tests is applied to insure that all connections have been properly made.

To illustrate the thoroughness with which armatures are overhauled, let us follow an armature through that department. Armature overhaul is classified either as "dipped and baked" or "rewound," according to the work done on them. An armature of the first class is given a bar-to-bar test and also a 1,500-volt a.c. test for one minute. All bands and dressings are removed, the commutator string band is painted, fillers are placed on low coils and the core bands replaced. The armature is then cleaned and preheated for four hours, after which its insulation resistance is measured. Next it is dipped and placed in the baking oven for at least 30 hours. The actual removal from the oven is determined by the insulation resistance which must be at least 0.6 megohm. The armature is redressed and the end bands replaced; the commutator is calipered and a light cut taken, after which it is slotted if necessary. A second bar-to-bar test and a high-potential test are then applied, the commutator is covered with cardboard, the bearings fitted to the shaft and the armature returned to the motor department.

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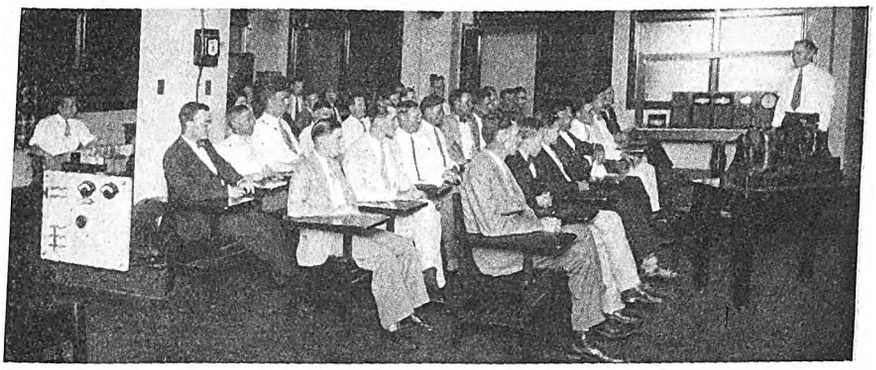
Armatures which require rewinding go through substantially the same procedure after being rewound. Armatures of this class, after being stripped of old coils, are checked for loose or bent laminations and for bent or sprung shafts.

Short-circuited field coils of modern motors are replaced with new ones as the number to be repaired is so small that impregnating equipment cannot be justified. Field coils of the older motors are stripped, given a dipping and baking treatment, and thoroughly tested to insure their fitness for service.



Employee education has played an important part in improving maintenance practices

Overhauling and testing of each piece of equipment are thorough. The quality of the work is clearly reflected in the steady decreases in the number of pull-ins due to equipment failures. Supplementing the thorough overhauling methods, of course, is a carefully worked-out system of inspection at each of the five carhouses, on a 1,000-car-mile basis. These inspections cover everything from the trolley wheel to the brake shoe. Careless inspection simply is not tolerated. If a car fails between inspection periods the records disclose the identity of the inspector and he is cautioned by the foreman. A second offence takes him to the superintendent of equipment for a stronger admonition and, on a third offense, he is invited to find work elsewhere.

ANALYSIS OF IMPORTANT CAUSES OF CAR FAILURES

Company	Car Failures Caused by	No. of Failures Annually from Each Cause 1921	1922	1923	1924	1925	1926	1927	1928
Atlanta	Armatures	...	320	270	177	147	63	41	13
	Motor leads	271	177	80	32	13	12	9	4
	Hot journals	331	187	82	30	24	7	3	0
	Hot armature bearings	45	40	25	21	8	3	5	1
	Controllers	292	191	156	155	79	21	30	10
	Brakes	397	194	121	69	50	26	26	7
New Orleans	Armatures	1,505	400	56*	35	20	13	11	7
	Fields, leads and cables	1,168	315	43*	12	12	12	4	0
	Gears and pinions	72	20	7*	11	5	1	1	0
	Controllers	280	54	13*	12	7	3	2	2
	Air and hand brakes	1,056	203	57*	27	8	2	1	1
	Circuit breakers	44	20	5*	1	0	1	2	0
Birmingham	Hot journals	245	114	31	16	31	14	20	10
	Air brakes	230	141	74	66	30	17	12	8
	Brake rigging	262	119	67	70	29	32	36	16
	Armatures	277	325	202	172	167	171	141	80
	Fields	211	224	192	130	141	117	119	40
Memphis	Armatures	...	93	...	...	...	...	...	39
	Hot armature bearings	...	25	...	...	...	...	...	8
	Controllers	...	23	...	...	...	...	...	7
	Trolleys	...	16	...	...	...	...	...	2
	Hot journals	...	19	...	...	...	...	...	0

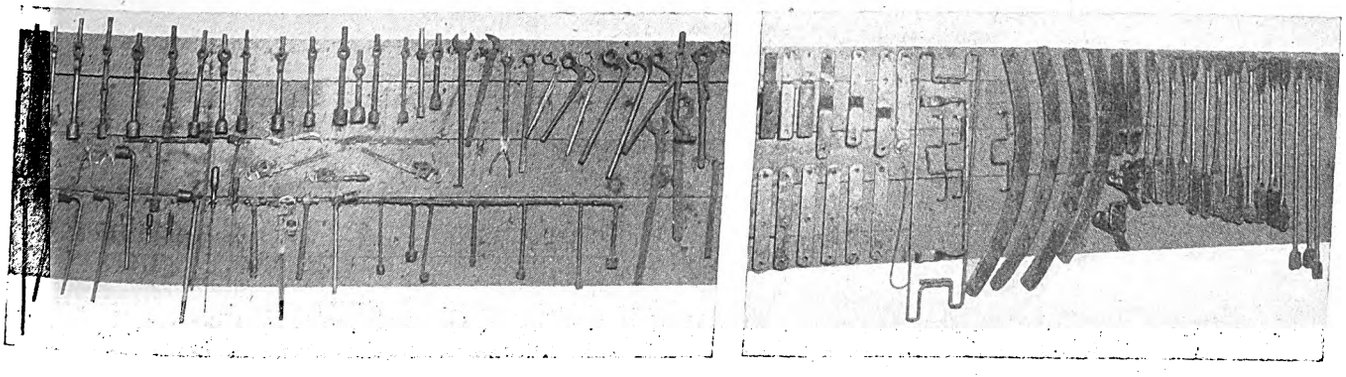
*Figures for 1923 cover only first nine months.

Only light repairs are made in a carhouse. Apparatus requiring major repairs is replaced with tested units. To illustrate, burned contact tips of line breakers may be renewed but if any other repairs are found necessary the unit is replaced by one from stock and is sent to the overhauling department where the necessary repairs are made and the unit tested, after which it is returned to stock. Each carhouse carries in stock a small supply of replacement units, including such items as a line breaker, circuit breaker, lightning arrester, resistor, motorman's brake valve, air compressor, compressor governor, truck brake rigging, wheel and axle and axle assembly.

In addition to the inspection and incidental repair or replacement of units, the oiling, cleaning and washing of cars are done in the carhouses. Other work done at these points is the grinding of wheels and the changing of wheels and axles, as this can be done in a fraction of the time necessary to send a car to the shop. It has the further advantage that the car need not be held out of service for such work, only between peak hours. The carhouses also maintain and operate sanding, sprinkling and emergency wrecker service.

A complete supply of hand tools and brake rigging maintenance parts is kept on a centrally located board at each carhouse. This method of storing tools and maintenance parts not only improves appearances but reduces lost motion to a minimum and serves as a check on tools, since a foreman coming on the job will not accept the board unless it is completely filled or missing tools are accounted for. In connection with the inspection and repairs at carhouses, a complete record is kept which gives the superintendent of equipment a most effective check on all work done and on equipment failures.

Although the overhaul and inspection systems on the four properties are not identical in all respects, the conception of the job to be done is the same. The practices outlined are considered typical of the type of organization and maintenance methods in use in the four mechanical departments.



A complete supply of hand tools and brake rigging parts is kept on a centrally located board at each carhouse

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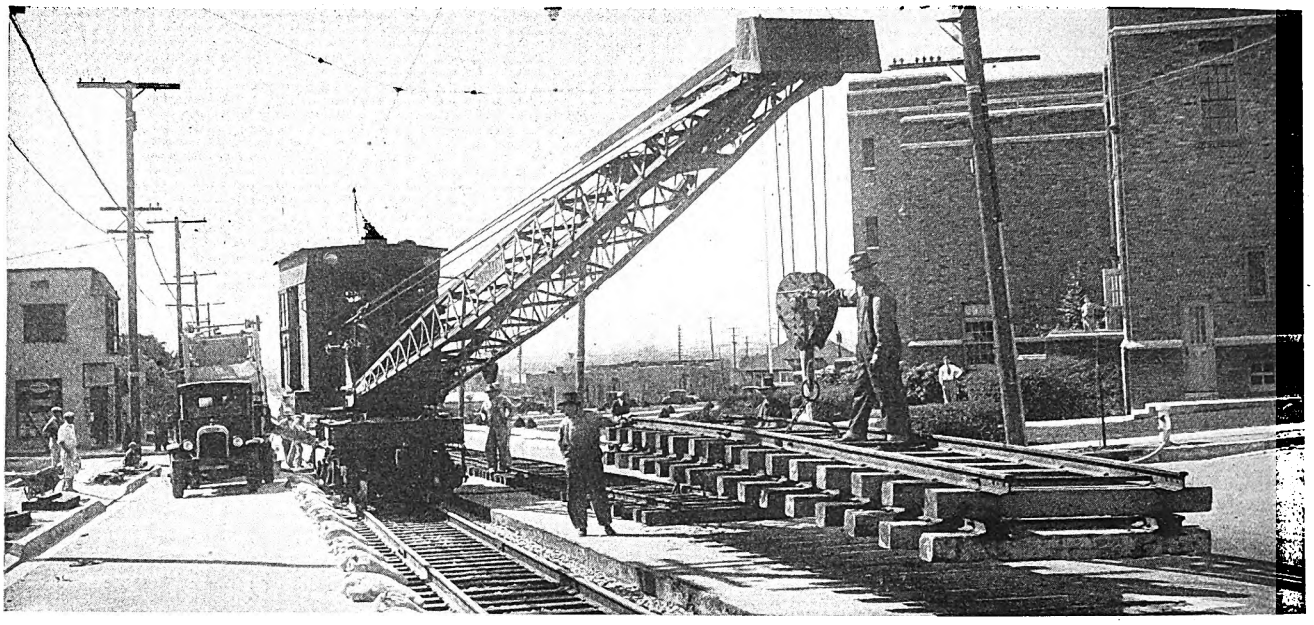
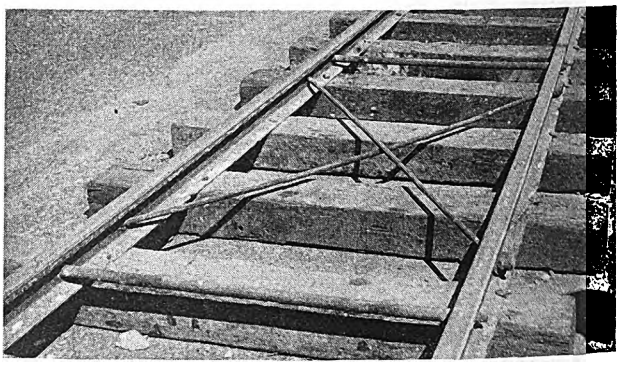


Portable track in 33-ft. sections is placed, removed and carried from one location to another by means of a crane car

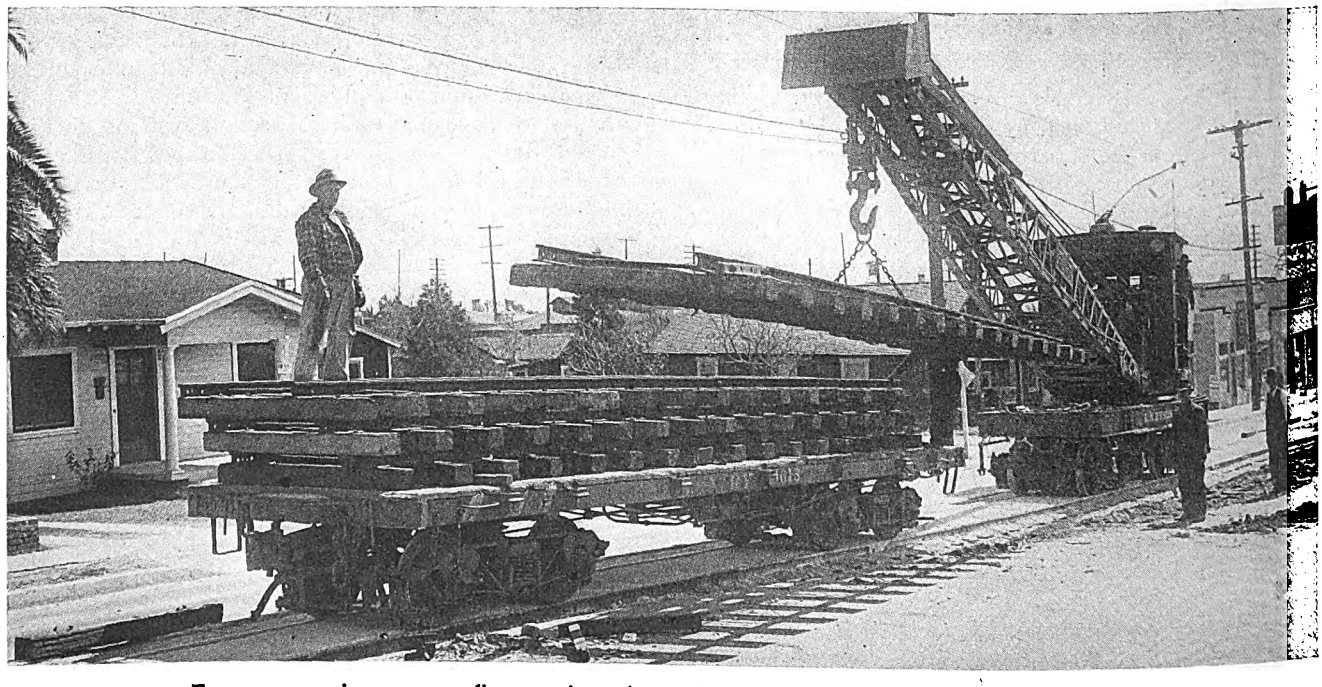
Portable Emergency Track Used in Los Angeles

TRACK reconstruction work by the Los Angeles Railway has been facilitated by the use of portable emergency track. This is made up in 33-ft. lengths using 70-lb. rails and ties securely fastened with spikes and $\frac{5}{8}$-in. lagscrews. The lagscrews are driven through holes drilled in the inside flange of the rail, while spikes are used on the outside flange. Tierods are run through pipes which are cut the width of the gage to prevent the rails from spreading. In the center of each section are skew bracings to prevent the rails from creeping.

These sections can be conveniently carried on flat cars to the site of the work. They can also be picked up by the crane and carried, two sections at a time, from one location to another, as necessity demands. More than 900 ft. of track can be laid in half an hour. It is estimated by the engineering department of the railway that there is a saving of $1 per foot of single track over the old method.



Rails are spiked on the outside to wood ties. The tierods run through pipe spreaders. Diagonal cross bracing is used to give rigidity to the section



For transportation to some distant points, the sections of portable track are carried on a flat car

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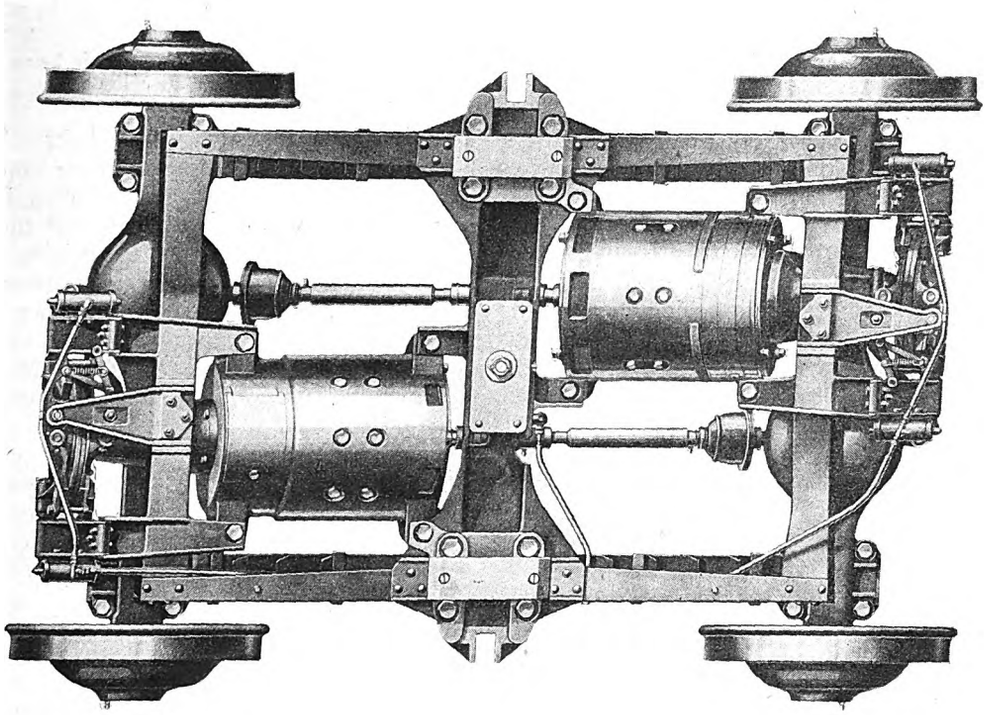
New Timken Truck

Equipped With Armature Shaft Brake



New Timken worm-drive truck which has a disk brake mounted on an extension of the armature shaft at the commutator end of each motor

Disk brake on commutator end of each motor is actuated by two small-diameter air cylinders. Wheel design simplified. Unsprung weight of new worm-drive model has been reduced to 2,445 lb.; total weight is 6,030 lb.

SUBSTANTIAL reduction in unsprung weight has been accomplished in a new type of worm-drive truck, designed by the Timken Detroit Axle Company, by placing the brake mechanism on the armature shaft of each motor instead of the wheels or axles as has been customary heretofore. The new truck, known as model 52, is similar in many respects to the model 51 truck exhibited last fall at the A.E.R.A. convention at Cleveland. The disk brakes, however, are an innovation for which many advantages are claimed. Besides the reduction in unsprung weight, the simplification of wheel design is considered to be an important improvement.

The armature shaft brake is mounted on the commutator end of the motor. An extended armature shaft and housing containing a bearing to support the shaft are carried over the axle, placing the brake out in the clear. This brake consists of a 16-in. self-ventilating disk with two pairs of shoes on each side operated by air. The four shoes have a total area of 123.27 sq.in., which is slightly greater than the total lining area of two wheel brakes of the type previously used. Brake material is moulded directly to the shoes and, for this reason, the total thickness of brake lining is usable.

The armature shaft is in one piece and the extended portion is supported on a roller bearing in the end of the special housing which is incorporated in the motor end cover. The disk and hub are designed to be mounted on the armature shaft so that the center line of the disk comes over the center line of the outboard bearing. The shoes are carried on cranks having 1 in. throw and mounted in brackets, each of which is attached to the frame end cross-member by three bolts. Adjustment to center the shoes in relation to the disk is made at the factory by shimming between this bracket and the truck frame end cross-member. Braking reaction is taken up by this cross-member.

Each pair of brake shoes is actuated by a small diameter air cylinder through a lever and crank arrangement, which gives sufficient braking effort when using 50 lb. of air pressure to slip 26-in. wheels with normal passenger load. As the bottom of the disk is a considerable distance

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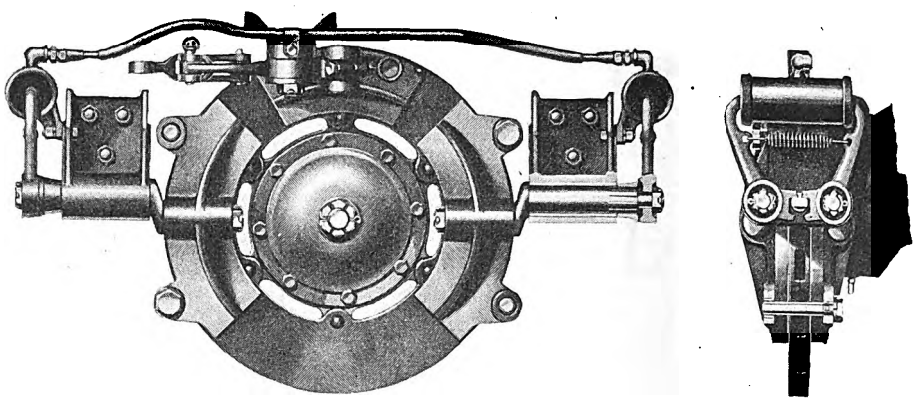
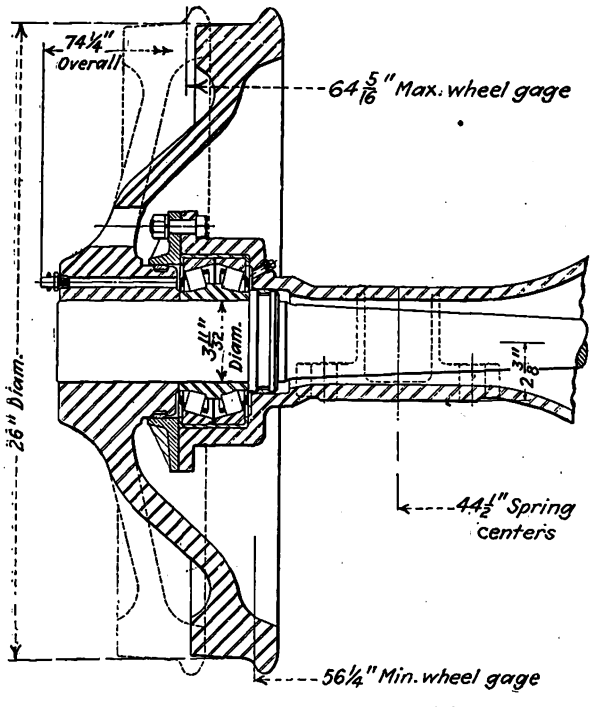
above the top of the rail, it is not subject to wheel wash as are wheel brakes. The centrifugal action of the disk will tend to prevent any oil, water, dirt, etc., remaining on the disk in sufficient quantities to affect braking. No adjustment for wear is necessary until at least one-half the brake material has been worn away. When adjustment is necessary it is made by loosening the nuts holding the serrated levers in place against the serrated collars and rotating the levers to compensate for wear and then locking them in place. It is thought that only one adjustment should be necessary in the life of the linings, which should be 20,000 car-miles or more.



The brake disk is acted upon by two pairs of brakeshoes, each pair being operated by a crank connected to a small-diameter air cylinder

Because of the position of the brake in the clear beyond the axles, replacement becomes very simple. The whole brake and mechanism are entirely accessible from a pit and there is no necessity for disturbing any part of the car body, trucks, axles, or motors to replace the shoes or any other part of the brake. To replace shoes, the shoe crank and bracket assembly on each side can be disassembled by removing three bolts. Shoes can then be removed by taking the nut off the crank.



Elimination of wheel brakes has greatly simplified wheel design. By changing the offset, the truck can be adjusted to any desired track gage

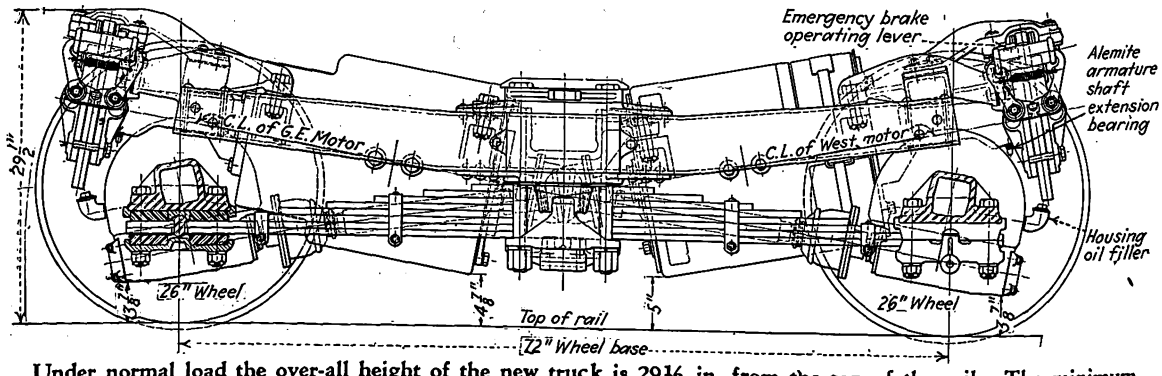
Due to the low coefficient of sliding friction between tire and rail, the braking stresses set up in the various members are no greater than the driving stresses. If the operator should make an air application before cutting out his controller, the stresses set up by locking the wheels with wheel brakes are considerably greater than if the wheels are locked with the armature shaft brake, as under the latter condition the armature is slowed down and locked with the wheels. There are no additional loads put on the armature bearings as an additional bearing has been added in the extended housing to take care of the static and torsional loading imposed by the brake.

Mounted at the top of the armature shaft disk is an additional pair of shoes operated by hand. The total area of lining on these shoes is 41.08 sq.in. per pair. The shoes are mounted on levers which are carried by a supporting bracket attached to the frame and cross-member. This bracket is adjustable so as to center shoes in relation to the disk. They are actuated by pulling on a link which operates the two levers carrying the shoes.

The new model truck without motors has a weight of only 4,160 lb. Each truck is designed for two 50-hp. high-speed motors which will add approximately 1,870 lb. to the weight. The total weight is 6,030 lb., of which 2,445 lb. is unsprung.

The maximum weight which can be carried on the two trucks of a double-truck car is 60,000 lb. Wheel gage can be adjusted from a minimum of 4 ft. 8½ in. to a maximum of 5 ft. 4½ in. by varying the wheel offset.

It is expected that these new model 52 trucks will be in production early in May. Already orders have been received from the St. Louis Public Service Company, Chicago Surface Lines, Louisville Railway, Department of Street Railways, Detroit, Cleveland Railway, Pittsburgh Railways, and Boston Elevated Railway.



Under normal load the over-all height of the new truck is 29½ in. from the top of the rail. The minimum clearance is 3⅞ in. under the rear axle housing

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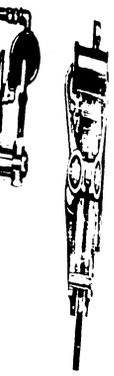

TIE REQUIREMENTS of Electric Railways

By

HOWARD H. GEORGE
Superintendent of Way
Cleveland Railway

U. S. electric railways have in use approximately 101,000,000 wood ties, and buy 4,700,000 ties per year, of which only 1,170,000 are treated. These facts were brought out by Mr. George in an address before the National Association of Railroad Tie Producers

THERE are in the United States and Canada at the present time approximately 43,400 miles of electric railway tracks, exclusive of electrified steam railroads. The total for Canada is approximately 2,500 miles, leaving about 40,500 miles in the United States, in which tracks there are probably not more than 101,200,000 ties of all kinds. There is no absolute record of the number of these ties that are substitutes for wood, or how many of the wood ties are treated. In 1922 one of the special committees of the American Electric Railway Engineering Association endeavored to secure information relative to the extent of the use of substitute ties and sent out an inquiry to 64 of the principal street railway properties known to be users of this type of tie, with a total mileage of 17,156, or about 42 per cent of the total in the country. Replies were received from only 24 companies, whose total mileage was 8,477, or only 21 per cent of the total mileage in the country. These companies reported having in service a total of 219,415 substitute ties. The weighted average spacing of these ties was found to be 4.3 ft., so that the ties reported in this investigation represented a little less than 180 miles of track.

The data referred to were so limited in their extent that I was unwilling to use them as the basis for my analysis of the situation as it exists at the present time. I accordingly sent out to a selected list of electric railways throughout the entire United States, which included every large property and many of the smaller ones, a special letter, requesting this information for their properties. The list included about 165 companies and covered practically every state in the Union. Replies were received from 156 companies with a total of 27,572 miles of single track. This is more than 67 per cent of the total electric railway mileage in the country and may, therefore, be considered as forming a fairly accurate cross-section of present practice in regard to the use of substitute ties by the electric railway companies. The above companies reported a total of 1,717 miles of track constructed with substitute ties, or a little less than 6¼ per cent of the total mileage reporting.* Out of the 156 companies reporting, 42, or more than 26 per cent, reported no substitute ties; and, from my personal general knowledge of the properties not covered by the inquiry, I feel that it is quite safe to state that, had the data been secured from them, the percentage figure just given for track built with substitute ties would be decreased.

Assuming that the percentage would not change materially if data for all trackage were included, this would mean that there are approximately 2,547 miles of electric railway track in the United States constructed with substitute ties. This would leave about 38,353 miles of track built with wood ties and would represent a total of approximately 101,000,000 wood ties. The latest information which I have had an opportunity to study indicates that the electric railways are purchasing about 4,700,000 wood ties per year, of which about 1,170,000 are treated. This latter figure would undoubtedly be increased somewhat if records were available to show the number of ties that were given some form of treatment by the electric railways themselves. The figures indicate that the average life of wood ties in electric railway tracks is slightly less than 21 years. The use of creosoted wood ties by the electric railways has not yet approached anywhere near that by the steam railroads.

The use of treated ties by the electric railways is on the increase and is bound to go forward more rapidly as their financial condition improves. While there is still much to be desired in this respect, it is probably safe to say that the prospects look better today than they have at any time since the war. As an economical proposition, the treatment of timber of any kind should not be figured in terms of first cost only. The thing that counts is the average cost per year of useful life. This is where the wood preserving business has failed to take fullest advantage of the possibilities of promotion in a field which offers great possibilities in the line of an increased market for its product.

*This includes the track in New York City and Washington, D. C., with underground conduit system.

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It is well known that, in open track, the best untreated white oak tie obtainable today cannot be expected to give much more than ten years of satisfactory service, and other types of untreated timber proportionately less; and, furthermore, even when obtainable, its cost is as great as that of a pressure-treated red oak tie of the same dimensions, if not greater. In paved city track such white oak ties, if not disturbed, may be expected to last as long as the rail, where the life of the latter does not greatly exceed fifteen years, but it would certainly not be safe to replace another rail on these same ties. On the other hand, this is entirely feasible in the case of a properly treated tie, even in the case of relatively inferior grades of wood, as we know they have a life of from 25 to 30 years under such conditions.

Climate Affects Life of Ties

Of course, sub-soil and climatic conditions materially affect the life of an untreated tie, and these must be taken into consideration in selecting the kind of timber to be used. We also have reason to believe that the best quality of untreated timber which is being supplied today cannot be expected to give the same length of service as has been secured from the same class of untreated timber cut from virgin forests in years gone by. Lumber might prove fairly satisfactory for certain soils and localities, but would not be at all satisfactory in many others. Then, too, the availability of certain local timber close to the point of use is another controlling factor. The observations made by the U. S. Forest Bureau and by many of the larger railroad companies have fairly well established the relative serviceability and longevity of the various kinds of timber used for ties; and, with these data available as they are, the user must then apply his own local-condition factors in deciding how far afield he can afford to go in order to obtain timber of a better grade.

With reference to the kind of preservative which should be used, I feel that this is a question which the individual must decide for himself. Personally, I favor Grade No. 1 creosote oil for pressure treatments, although I know of some very satisfactory results from the use of both water-gas-tar oil and coal-tar distillate. My position at this time is not to attempt to argue for any one type of preservative, but simply to go on record as favoring some form of preservative treatment, on the principle that half a loaf is certainly better than none. The only word of caution I wish to add is that some preservative treatments do not lend themselves to electric railway track construction, because of their effect in accelerating electrolytic action and corrosion of the rail and fastenings. One problem to which the wood preserver should devote a great deal of thought is that of reducing the manufacturing cost of wood-preserving oils. This will do more than anything else to increase the use of preservative treatment by the electric railways.

General Agreement Regarding Tie Dimensions

A survey of tie practice of 196 companies, members of the American Electric Railway Association, representing 28,086 miles of single track, indicated that 86 per cent of the total mileage replying used ties 6 in. in depth, 77 per cent used ties 8 in. in width, and more than 64 per cent used ties 8 ft. in length. By far the largest part of those who did not use 8-ft. lengths specified 7-ft. lengths. Approximately 84 per cent of the mileage reporting was standard gage track, the remainder from 3 ft. 6 in. to a maximum of 5 ft. 4½ in.

I quote the above data to emphasize the rather general agreement among the electric railways with regards to the matter of wood tie dimensions. The divergence from standard gage is limited to a relatively few companies, representing but a small percentage of the entire industry; and, in most cases where the gage differs from standard, an 8-ft. length of tie is used.

The essential difference between the requirements for a wood tie in paved track and one for open track is that for the latter the expense of replacement is relatively small compared with that in paved track, and the consequential effect of tie failure does not make itself felt in other elements of the track structure to the same extent as in paved track. Therefore, it is essential that only the longest-lived timber, and that which will provide the greatest spike-holding power, be used. Otherwise, premature loosening of the rails, with the certain serious damage to the pavement, and ultimately the entire track structure, is bound to result. Then there is the matter of rather close conformity to the nominal dimensions. The trench for an electric railway track is excavated closely to given dimensions in order to disturb the minimum amount of the adjoining pavement. Sometimes there is laid a concrete base in the bottom of this trench, on which the track is afterward built. In either case it is essential that the length and depth of the ties be kept quite close to the nominal dimensions specified.

Initial Compression a Problem

There is one other factor in track construction which it might be well to discuss at this time, which is important in any type of track, but particularly so in track on paved city streets, where subsequent maintenance operations at relatively frequent intervals is so expensive as to be prohibitive. Even when sawn ties are used and tie plates are employed to better distribute the load over the tie, it is impossible, when spiking the rail to the tie, to eliminate all of the factors which are responsible for a slight initial loosening of the rail when cars are first operated over the track. There is a certain amount of compression which this loading will cause that tends to bring the rail base and plate into more intimate contact with each other. It also compresses the wood fibers under the tie plate and seats the tie plate more solidly on the tie to the point where the natural resiliency of the wood is brought into play and further loosening of the rail fastening is materially retarded. Some woods act much better in this respect than others. White oak, for example, is probably the best, but it is not so susceptible to treatment as many other woods of inferior quality. It would be of material value to the electric railway engineers if the tie producers would develop accurate data along this line for various kinds of wood and for different surface finishes and for different methods of fastening the rail to the tie.

The switch tie problem will probably never be a serious one with the electric railways for their track in city streets, for the reason that the trench in which the track is installed is of such dimensions, and the special trackwork layouts frequently so complicated, as to make it impracticable to use long ties, due to the difficulty of installing and replacing them. For this reason the majority of the electric railways will probably continue to install their special trackwork layouts on standard length crossties interlaced as may be found most practicable. The general use of mechanical tamping machines has overcome the difficulty previously experienced of tamping ties in special trackwork layouts.

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Keeping Cars Fit in Vancouver

British Columbia Electric Railway repaints cars on 70,000-mile basis, using enamel system

WHEN a street car of the British Columbia Electric Railway, Vancouver, B. C., has traveled 70,000 miles, which takes approximately eight months, it is held from service for entry into the overhauling shops.

When the car comes in to the shop it is lifted off its trucks, which are delivered to the mechanical department complete. Next the body of the car is lowered onto dummy trucks and towed into the carpenter shop. Here all the windows are removed and workmen go over the doors, floors, seats, and other portions of the car, completing necessary repairs. Then the car is transferred into the paint shop. On arrival every portion of the car is washed and scraped where necessary.

To facilitate the work the car is placed on its own trucks when it enters the paint shop. Body and trucks are painted at the same time, a spray being used on the trucks. The body painting is done by hand, five coats being used. The process takes approximately seven days from the time the car enters the carpenter shop until it leaves the paint shop.

The material used for painting the car bodies is a fire-red enamel. About 5 gal. are used on city cars. In addition, 1½ gal. of sash color, 1½ gal. of ivory paint and 1½ gal. of dull semi-finished varnish are also needed. It takes 160 hours to complete this portion of the reconditioning. The cost, including material and labor, is about $210. Interurban cars cost one-third more to paint and recondition than city cars.

In addition to painting the cars, 170 trucks and service cars are painted in the shop. The motor coaches operated by both the B. C. Electric Railway and its subsidiary, the B. C. Rapid Transit Company, go through the same process as is used on the cars, except that in the Rapid Transit Company's coaches the upholstery is cleaned. The coaches come into the paint shop approximately every 90 days. The average output of the shops is nine cars per month. Seven painters and five helpers are employed continuously on this work.

While the paint shops are situated at Kitsilano along with the mechanical department, the paint shop is entirely separate to prevent floating dust from settling on the newly-painted surfaces. The shop is not heated by the fan system but has steam coils throughout. The object of this is to eliminate air currents which might carry dust through the shop. The heat can be varied from 0 to 100 deg. The stock room has a capacity of two months' supplies of paints, varnishes and oils. It has a concrete floor and 22-in. galvanized-steel plates around the walls at a height of 6 ft. The benches are also covered with galvanized steel, so that the paint and oil can be readily removed. This is done by washing them every night with paint remover.

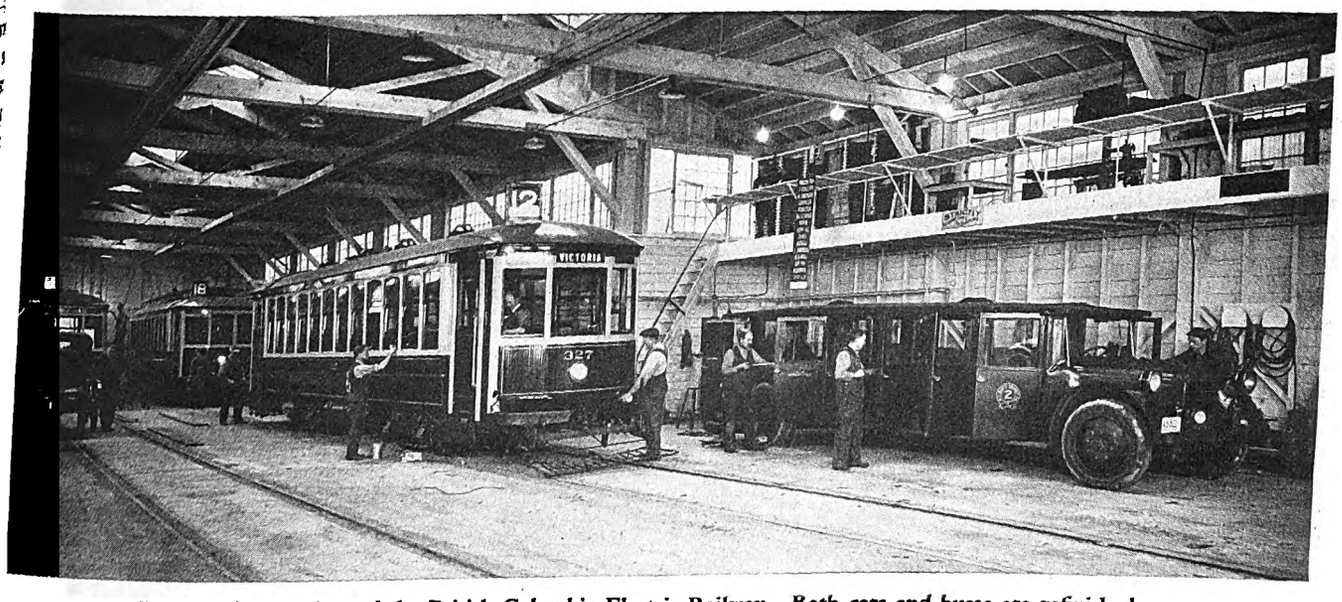
To assist the painters, scaffolds mounted on wheels have been made. They are constructed of light-angle sections and can easily be moved by two men. They vary in height from 2 ft. 6 in. to 8 ft. 6 in., there being three platforms in all, with railings around the outside to protect the workmen. Each scaffold will accommodate three men at one time.

Mirror for Inspecting Converter

By S. M. Spindle
Engineer Power Department Cleveland Railway
Cleveland, Ohio

WHEN repairing, inspecting or removing foreign objects from the interior of a synchronous converter armature, it is frequently desirable to be able to see the inner surface of the armature coils; i.e., the surface exposed to the armature spider. In the compactly built machines of today this is virtually impossible by direct vision.

To fill this need the electrical maintenance division of the Cleveland Railway has developed a device consisting of a mirror, 3x5 in. in size, mounted through small worm gearing to a hollow tubular handle. By turning a knurled knob at the end of the handle the angle formed by the face of the mirror and the handle may be altered as desired. With the mirror inside the armature and the handle projecting out between the commutator spider arms a very comprehensive view of the interior may be easily obtained. A small lamp is rigidly attached to the handle in such a way as to illuminate the surface to be inspected, but not to shine upon the mirror. The wires are carried through the tubular handle to the lamp.



Interior of paint shop of the British Columbia Electric Railway. Both cars and buses are refinished. The gallery at the right is used for sign repairs

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Look for the

PRIZE WINNERS

in the

June Issue

AT A MEETING of the judges in ELECTRIC RAILWAY JOURNAL'S Maintenance Contest, to be held at association headquarters in New York on May 7, 1929, the second group of prize winners will be announced. There is a separate prize of $25 for the best item submitted from each department—equipment, track, electrical and bus.

Are you overlooking this opportunity to be identified with the progressive maintenance men of the industry? Entries are now coming in for the next group of departmental prizes. There is still plenty of time to join the ranks of those who are cooperating in this effort by the JOURNAL to raise the standards of local transportation maintenance.

Items submitted now will be judged for the third group of individual $25 prizes. They will also be eligible for the annual cash prize of $100, for the departmental certificates of merit and for the annual company maintenance trophy.

If you want to arouse interest in your department and company in going after these awards (in addition to the cash prizes) write to the JOURNAL for printed folders giving full details of this greatest maintenance competition in the history of the industry!

There is no limit on the number of items that can be submitted by any individual, department or company. Nor is "fine writing" necessary. Just write a letter describing methods or devices used in maintenance work that save time and labor or improve workmanship. Your item does not need to cover something unusual or novel. A better method of doing an old job, or a simple jig, fixture or tool that saves labor and time, may win one of these prizes. Be sure to inclose a photograph or sketch illustrating your idea, *and write "Maintenance Contest" at the top of your letter.*

The JOURNAL pays $5 for every item published, even though it does not win a prize. Make your maintenance ideas pay dividends by passing them along to the other fellow! Don't watch others romp off with these prizes. There may be several winning ideas that have been knocking around your department for months. Send them in now!

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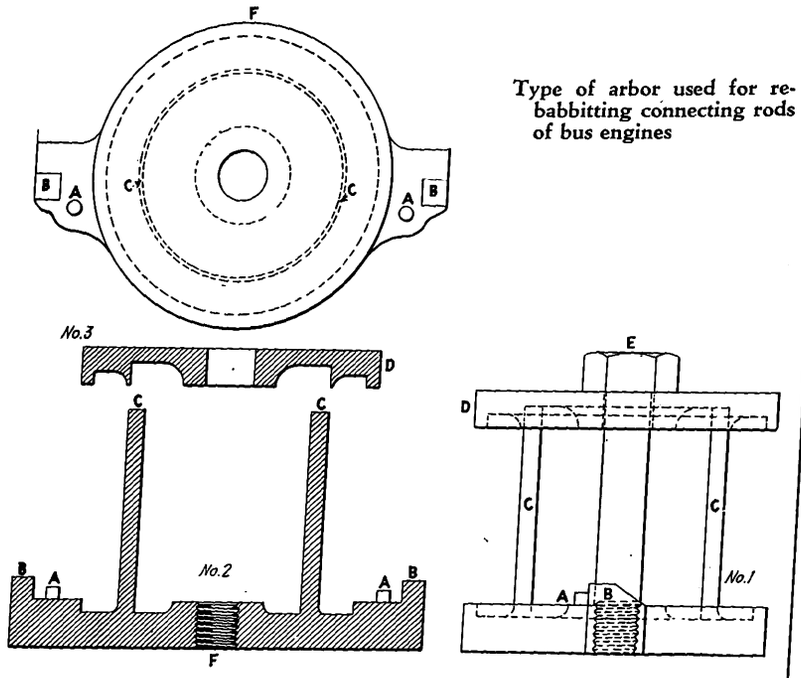
Rebabbitting Connecting Rods for Bus Engines*

By F. A. Marsh

Superintendent of Equipment
St. Petersburg Municipal Railway
St. Petersburg, Fla.

WHEN it was found expensive and unsatisfactory to get bus engine connecting rods reconditioned outside the shop of the Municipal Railway of St. Petersburg, Fla., an arbor for babbitting was designed. This consists of three parts: a base with a circular portion extending upward, a cap and a ½x2⅝-in. hexagonal head capscrew. To allow air to escape and for replacing any babbitt which may be lost in leakage the connecting rods are drilled with two holes. A ⅛-in. hole is drilled parallel to the stem for the air and a ¼-in. hole is drilled to the top bearing portion for babbitt.

Rods are cleaned thoroughly and then tinned. Shims, 0.005 in. thick,



Type of arbor used for rebabbitting connecting rods of bus engines

*Submitted in Electric Railway Journal Prize Contest.

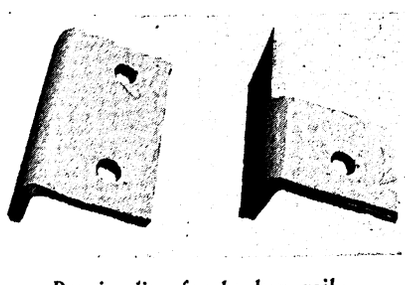
(OVER)

Rail Clips for Emergency Repairs*

By F. W. Drowley

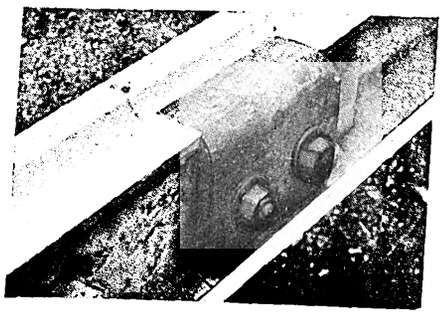
Roadmaster Way Department
Toronto Transportation Commission,
Toronto, Canada

FREQUENTLY on lines of the Toronto Transportation Commission the head has broken off from old girder rail in tangent track which is about due for replacement. Due to the short car headway or other conditions of vehicular traffic, it may not be possible to do a proper repair job at the time. It is the practice, therefore, to use a temporary clip which is bolted to the rail and replaces the broken section of the railhead.



Repair clips for broken rail

Clips of various lengths are carried by the emergency trucks and are fastened in position quickly by standard splice bar drilling, with large machine bolts to replace the regular track bolts. In cases where rail ends have broken in cast bound frogs or crosses, it is necessary to cut off about 3 in. of the ball outside the casting and drill a hole in the web to bolt the clip in place. Washers or shims are placed between the web and the clip to hold the gage line of the clip to proper location.



Repair of a broken rail made with a rail clip

*Submitted in Electric Railway Journal Prize Contest.

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Rebabbitting Connecting Rods for Bus Engines—Continued

are used in assembling, and blind nuts instead of standard to avoid getting babbitt in to the threads of the studs. With the rod in the arbor and the babbitt at proper temperature the assembled parts are pushed down in the hot babbitt to a depth of 6 in. and stirred around thoroughly. A wooden box about 12 in. square and 8 in. deep is filled with damp sand, in which a depression is made of a size slightly larger than that of the rod with the arbor attached and to a depth of about 5 in. When the rod is withdrawn from the babbitt it is placed in the sand, which is then packed around it an inch or so higher than the arbor. A riser of babbitt is then poured in the depression with a ladle to insure a perfect rod regardless of shrinkage or leaks.

When the babbitted rod has cooled to a temperature less than 100 deg. F. it is taken out of the sand and the arbor is removed. The only machining operation necessary is boring out $\frac{1}{16}$ in. or so and relieving the sides for the oil ways.

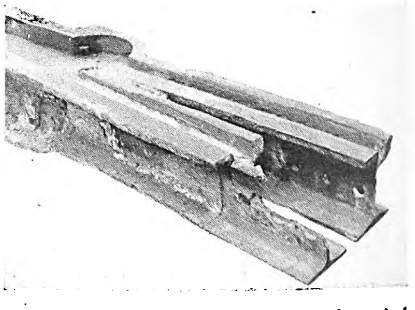
The arbor shown in the accompanying illustration is designed with lugs and pins at A and B to rebabbitt Yellow Coach Model X rods. The same type of construction, however, can be used for other types. The flanges and fillets being babbitted do not need machining, and when the blind nuts are removed and standard nuts replaced the rod is ready for what little machining is necessary. If extreme care is used in making the arbor, the cost of about $4.50, will be repaid in the class of work and low cost of machining which results. If many rods must be rebabbitted several outfits would increase efficiency.

By this dipping process the rod and babbitt are of equal temperature and the bearing is free from air bubbles, dross and dirt, and when the rod is held up on one finger by the wrist pin end and struck with a piece of metal, it will give out a clear metallic ring. This shows perfect adhesion between the babbitt and rod.

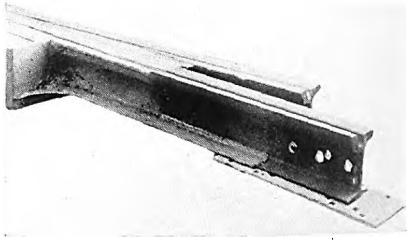
Repairing Broken Ends of Manganese Track Castings*

By R. J. Fennell
Assistant Roadmaster Toronto Transportation Commission, Toronto, Canada

DUE to fracture along the bolt holes it has been necessary to remove from service on lines of the Toronto Transportation Commission several switch and mate castings from the ends of which the ball and part of the web had been broken. Ordinarily, these castings would go to the scrap heap, although they might have given from five to ten years' further service had it not been for the break. A method of rehabilitation has been developed whereby the broken surfaces of the ball and web are evened up by grinding and then a short length of similar rail shaped to fit this surface and the whole seam welded with the metallic arc. Finally, a pair of $\frac{3}{4}$-in. plates is applied and they, in turn, are seam welded at the top and bottom. The accompanying illustration shows the method of repairs.



Broken joint in the straight heel of a switch



Broken switch casting after repairs have been made

**Submitted in* Electric Railway Journal *Prize Contest.*

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Electric Railway Journal Maintenance Data Sheet

LINE—14

Overhead Poles Supported on Long Ties*

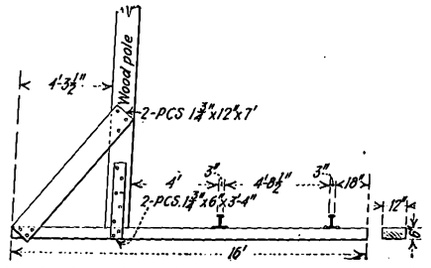
By Angus G. Scott

Assistant Superintendent of Overhead Lines
Cleveland Railway, Cleveland, Ohio

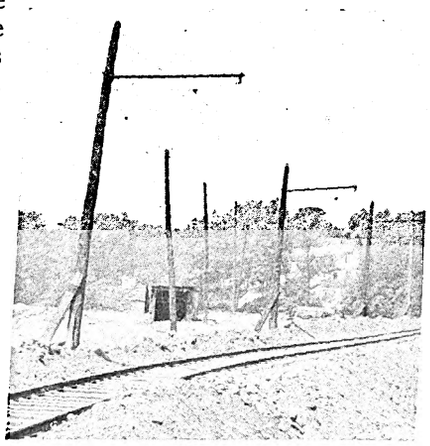
FOR dump tracks where the rails are being shifted as the fill progresses, the Cleveland Railway has found it advantageous to support the overhead by wood poles mounted on extra long ties. Formerly the poles were set in the ground, and whenever the track was shifted it was necessary to reset the poles and replace the overhead.

With the new method of attaching the poles to the ties it is unnecessary for the overhead department to make any changes when the track is shifted. The track crew automatically shifts the overhead along with the rail, thus avoiding the expense of digging new holes and transferring poles and equipment.

The accompanying illustration indicates how this idea can be used to advantage, and the sketch shows the method of attaching wood poles to the extra long ties. Two double braces are spiked to each side of the pole and tie, and the pole in turn is spiked to the tie. The bottom plates are nailed to the tie and pole butt. Any suitable planking may be used. To hold the wire tight a counterweight, insulated several times from the trolley, is attached to the end pole, which is in turn mounted to the last tie. Any slack which may occur in the line is then taken up automatically. The economy of this operation is readily apparent, and, of course, depends upon the number of times the track is shifted, and the number of poles involved.



Method used for fastening wood pole to tie



Overhead construction supported by poles mounted on long ties on temporary track at Cleveland

**Submitted in* Electric Railway Journal *Prize Contest.*

Electric Railway Journal Maintenance Data Sheet

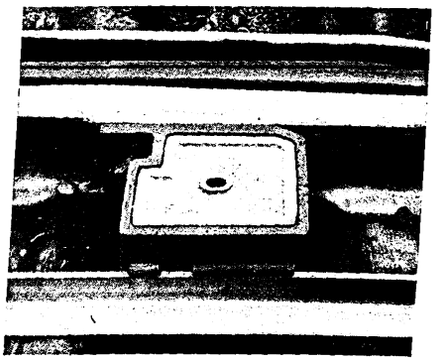
TRACK AND WAY DEPARTMENT—48

Track Switch Box Support*

By W. J. McCallum

Foreman Way Department
Toronto Transportation Commission,
Toronto, Canada

DUE to the increasingly heavy loads imposed by vehicular traffic many bolted-on switch boxes on the tracks of the Toronto Transportation Commission have been broken off from the casting. In this condition they drop below the level of the pavement, especially at the outer edge. To overcome this trouble a lug has been incorporated in the switch box casting so that it rests on the top edge of a 3x3x½-in. angle, the latter being welded to the lug. The angle in turn is supported by adjacent ties.



Type of support used for switch boxes of the Toronto Transportation Commission

**Submitted in* Electric Railway Journal *Prize Contest.*

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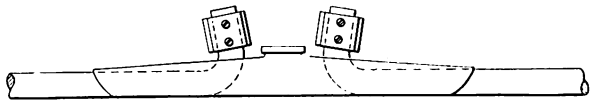
Emergency Splicing Ear*

By Julius E. Reifschneider

Engineer Ithaca Traction Corporation, Ithaca, N. Y.



Emergency trolley ear in use by the Ithaca Traction Corporation

FOR splicing broken trolley wire which is too old and worn to be deserving of permanent repair, a convenient emergency ear is used by the Ithaca Traction Corporation. This consists of an ordinary trolley ear with a hole drilled on each side of the boss. The ear is placed at the break with the broken ends of the wire projecting upward through the two holes, as shown in the accompanying illustration. Clamps are attached to the projecting ends to hold the wire in position. While not suitable for use as a permanent repair job, this emergency ear has proved convenient for temporary use on account of its cheapness and of the ease of installation. Such ears are always carried on the line car.

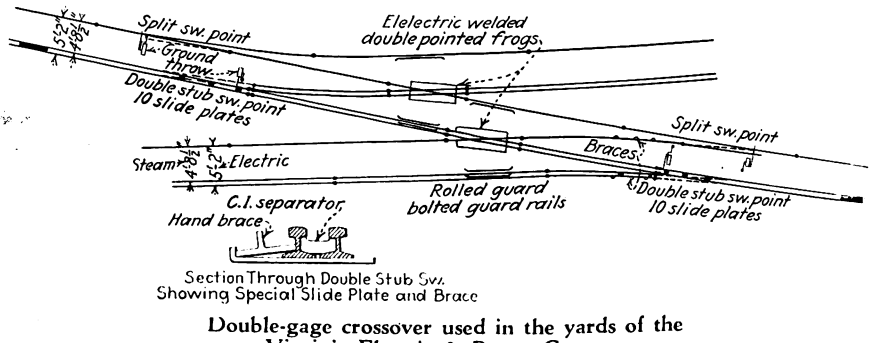
**Submitted in* Electric Railway Journal *Prize Contest.*

Double-Gage Crossover Relieves Congestion*

By C. B. Hall

Chief Clerk Mechanical Department Virginia Electric & Power Company, Norfolk, Va.

CONSIDERABLE congestion occurred in the yards of the Virginia Electric & Power Company, because the track gage for the electric cars is 5 ft. 2 in., while that for steam railroad cars which deliver material is 4 ft. 8½ in. To remedy this condition certain tracks were equipped with double rails and a double-gage crossover was installed. This has brought about a yearly saving of $300 in hauling fees alone, and has speeded up the unloading of freight cars materially.



Double-gage crossover used in the yards of the Virginia Electric & Power Company

The design and construction of the double-gage crossover was carried out by J. C. Newman, engineer maintenance of way, for the company. Installation of a reversed split and stub switch on each turnout of the crossover completes the through service over a change in track gage. The special double-pointed frogs were made up of old 70-lb. T-rail welded together at the seams. The cost of the crossover was approximately $400. Labor was the major item, since other parts were made of second-hand material.

**Submitted in* Electric Railway Journal *Prize Contest.*

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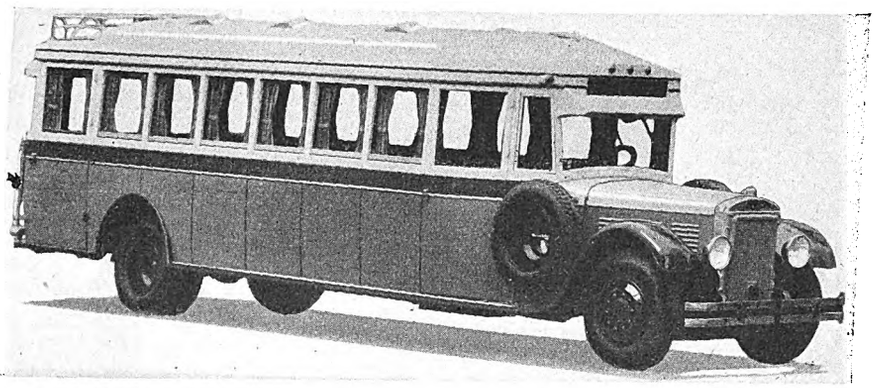
New Offerings of USEFUL Equipment

New Mack Bus Has Low Engine Speed

IN A NEW Mack bus recently put on the market, the motor has a 4½x5½-in. bore and stroke, and is suspended at four points in Mack Rubber Shock Insulators. Although 110 hp. is developed, the engine speed is kept as low as 1,700 r.p.m. The six cylinders are cast in block having removable heads in pairs. The crankshaft is drop forged, case hardened and counterbalanced with integrally forged counterweights. Fuel feed is optional and electric pumps, vacuum tanks, or both, are available. Carburetor is of Zenith double venturi type, model 105 DC, 1¼ in. The capacity of the gasoline tank is 80 gal., being mounted on the right side in a cradle suspended on three rubber shock insulators.

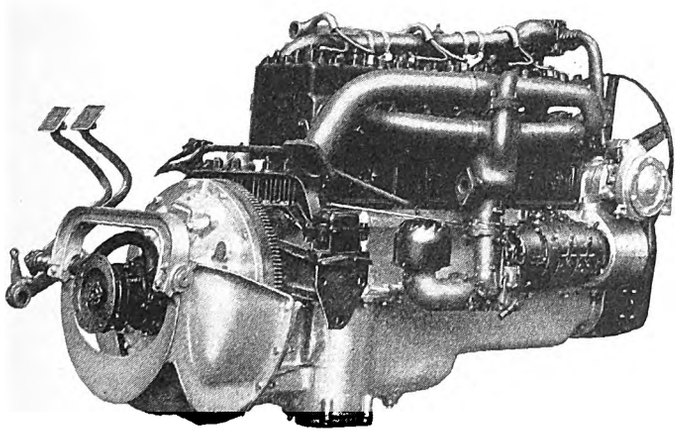
Final drive is of the dual reduction type, having a full-floating rear axle, with a one-piece banjo drop forging of heat-treated chrome-nickel steel. Model BK is available in two standard wheelbases, 233 and 265 in., either of which is suitable for city type or parlor car bodies. The 233-in. chassis equipped with a 96-in. city type body, having seat centers of 30 in., will accommodate 29 passengers, or with seat centers of 28 in., 33 passengers may be accommodated, while the 265 in. wheelbase chassis will accommodate 37 passengers. The 265-in. chassis, equipped with parlor car body having 30-in. seat centers, will accommodate 33 passengers, or with seat centers of 34½ in., 29 passengers may be accommodated, even with the use of reclining chairs or other similar models.



The Parlor body on the 233-in. wheelbase chassis will accommodate 29 passengers, while the 265-in. wheelbase type can carry a parlor body for 33 passengers

Rubber shock insulation, is used to an extent even greater than heretofore. Not only are the spring tips secured to the frame by blocks of live resilient rubber compressed into steel boxes, replacing spring shackles pins and bushings, but similar means are employed for the suspension of the radator, the engine, the transmission, the gasoline tank, the steering column and the front bumper.

Four-wheel brakes of the expanding mechanical type enable model BX to travel with safety at high speed. Augmenting these brakes is the vacuum booster attachment by means of which additional power may be exerted on all four wheels with but little effort on the drivers part. The total braking area of both sets is 759 sq.in. and of the hand brake, which is mounted separately, 144 sq.in.



The new Mack six-cylinder motor, which develops 110 hp. at 1,700 r.p.m., is cast in block with removable heads in pairs

Water-Cooled Carbon Electrode Holder

FOR heavy-duty welding by the carbon-arc process, a new water-cooled carbon electrode holder is announced by the Lincoln Electric Company, Cleveland, Ohio. This is designed primarily to insure greater comfort and less fatigue for the welder. With this type of holder it is possible to weld with the arc tip of the carbon electrode projecting less than 3 in. from the carbon-holder. Consequently, there is less carbon area heated, thereby reducing the vaporization of the carbon. Smaller carbons can be used with higher current density, which effects a saving in electrode costs.

The weight of the new type holder is 3¼ lb. The hose which carries the water is also used to carry the cable to the holder. Each of the two water tubes contains a small light cable from the connector to the holder. The water flowing through the holder also acts as a cooling agent for the cable. The carbon-holder consists of coiled copper tubing through which water circulates. The carbon electrode is

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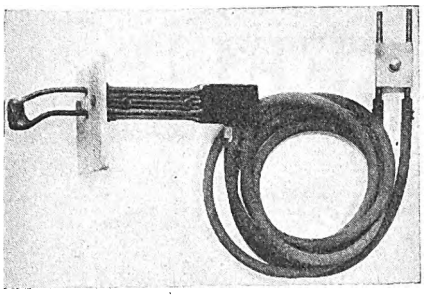

Water-cooled carbon electrode holder

inserted through the tubing. A hand shield of compressed magnesium protects the operator's hands from the arc rays. The water-cooling system is incorporated in the hand grip of the holder to keep it cool.

Recent Developments in Atomic-Hydrogen Welding

By Peter P. Alexander
Thomson Research Laboratory
General Electric Company

RECENTLY a new method for atomic-hydrogen welding has been developed in the laboratories of the General Electric Company. The apparatus used is simple, consisting of a support to hold the tungsten electrodes and two tubes directing a hydrogen flame around them. All energy which is supplied to the weld is from the electrical circuit, while the gas serves only to shield the electrodes, to protect the metal from oxidation, and to increase the efficiency of the arc.

There are several processes using the indirect arc for welding, but they are inefficient. It is only when air is replaced by hydrogen that the efficiency of the process of indirect arc welding is increased to such a degree that it becomes a successful process. All the energy is coming from the electrical circuit, so it is essentially an electrical welding method and yet it possesses all the characteristics of a gas-welding process. This process is adaptable to the welding of thin materials. Another field of its application is welding of special alloys and those with a low-melting point. Since in the atomic-hydrogen process the electrodes are non-consuming, the material can be added to the welded plate from a special welding rod of any desired composition. If it would be attempted with direct arc, it would be found that if the electrode has high chromium or carbon, it is almost impossible to maintain an arc. However, if the arc is maintained independently, this rod could be used quite easily.

The importance of aluminum and other light alloys is increasing. It is almost impossible to weld these alloys with the direct electric arc, although they can be welded with gas. On account of a very low-smelting point of these alloys when arc is established between the electrode and the plate, much of the metal is vaporized, but with indirect arc the temperature may be easily kept within the desired limits.

Hydrogen protects the alloys from oxidation. The greatest obstacle for welding aluminum, however, is the formation of aluminum oxide, which prevents the metal from running together. With atomic hydrogen welding, it is possible to weld aluminum under certain conditions without the danger of forming aluminum oxide, and it is even possible to reduce the aluminum oxide already formed to its metallic state. Still, it is not practical at the present time to use the atomic-hydrogen welding process for welding thin aluminum sheets without fluxes, on account of the desire to maintain a high speed of welding the thin materials. In practical applications of the torch for welding thin aluminum sheets, it has been found necessary to use additional fluxes.

Spring-Cushioned Rattan Seats

COMFORT and durability are the features claimed for the new rattan and leather seats No. 201-E, designed by The J. G. Brill Company, Philadelphia, Pa. These seats are unusual in construction in that they are upholstered in a combination of rattan and leather. The cushion, which is of the spring-edge type, 18 in. wide, 4½ in. deep at the front and rear and 5½ in. at the crown, is upholstered in canvas-lined rattan on top and edged all around with brown taxi grain leather. This leather facing, while adding to the appearance of the seat, serves the more useful purpose of providing a flexible edge for the spring cushion, thus allowing the deep spring-edged type of construction and providing a more comfortable and durable seat than possible with an all-rattan upholstery. Another advantage claimed for this seat is the elimination of complaints by women passengers resulting from torn clothing which would be caused by projecting pieces of broken rattan on the edges of the ordinary rattan cushion.

The leather facing provides a flexible edge for the deep spring cushion

The back of the seat is upholstered in rattan. The aisle and wall plates and pedestals are of pressed steel. These seats were first designed for the eighteen cars recently furnished the city of Phoenix, Ariz., by the American Car Company. As the Phoenix cars are of the double-end construction, the seats are of the reversible type.

High-Conductivity Lips for Trolley Ears

WITH the idea of lowering overhead line maintenance cost by reducing the arcing and burning of trolley ears, the Westinghouse Electric & Manufacturing Company has developed their new "Champion" trolley ear. Experience shows that trolley ears burn out rather than wear out by the abrasion of the trolley wheel or shoe. If the material used in the lips of the trolley ear has a conductivity equivalent to the trolley wire used, some of this burning will be eliminated. This is accomplished in the "Champion" ear by using lips made from bronze or copper sheet having high conductivity. This sheet is blanked and shaped with loops formed on the top into which an aluminum-copper alloy of very high strength is cast by the permanent mold method. This assures a metal under the trolley wire of high conductivity and also a strong boss. These ears are manufactured in 9-in. and 15-in. lengths for Nos. 00, 000 and 0000 round wire.

New trolley ear with high-conductivity copper lips

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NEWS *of the Industry*

Fare Increase Sought

Company in Portland, Ore., wants 10-cent cash fare. Five-year comparative income statement

FACING declining revenues, increasing operating expenses and taxes, and increasing capital investment, the Portland Electric Power Company, Portland, Ore., filed on April 22 with the Public Service Commission a new tariff calling for an increase in the basic adult fare on city lines from the existing 8-cent cash and six tickets for 45 cents to a straight 10-cent cash fare. The tariff also calls for an increase in school children's tickets from 25 to $1 to twenty for $1. The existing 8-cent fare was put into effect July 1, 1922, when it was increased from 6 cents. The step from 5 to 6 cents was taken on Sept. 15, 1918, these two increases being the only ones ever asked by the Portland company. Under the newly-filed tariff universal transfer privileges are to be continued.

The new tariff was accompanied by a petition by Franklin T. Griffith, president, setting forth in full the reasons why relief from a situation rapidly growing intolerable is desired. Showing that the rate of return on the capital invested in railway property has steadily declined from year to year from 4.01 per cent in 1924 to 1.31 per cent in 1928, the petition states that the company faces "confiscation of the property and demoralization of the service" if relief is not granted, and invites a public hearing where interested persons may have the opportunity to examine all angles of the problem.

The communication contained a comparative income statement for the years 1924 to 1928, and elaborated at some length on the factors influencing the decrease in annual net operating income of $517,000 in that period. The decline in gross revenues was charged principally to the increased use of the private automobile; the increase in operating expenses, in spite of labor saved through an increasing use of one-man cars, to the expense of operating unprofitable additions to service forced on the company by the absolute necessities of a growing community. The increased capital investment involved in these service extensions, which have been effected largely through bus lines, has amounted approximately to $500,000 in the four-year period, an item contributing to the decreasing rate of return. A reconstruction program facing the company in the near future is cited as an added reason for immediate relief.

Preliminary announcement of the fare increase asked by the company was made to a group of prominent Portland business men by Mr. Griffith at a luncheon meeting, April 19, in which the reasons for the increase were fully discussed.

COMPARATIVE INCOME STATEMENT OF CITY LINES OF PORTLAND ELECTRIC POWER COMPANY

Year	Gross Revenue	Operating Expenses	Bridge Rental	Taxes	Total Expenses and Taxes	Operating Income	Average Invested Capital	Rate of Return Per Cent
1924	$4,874,681	$3,658,111	$97,604	$339,127	$4,094,843	$779,837	$19,459,967	4.01
1925	4,835,977	3,682,582	98,181	289,960	4,070,724	765,253	19,676,919	3.89
1926	4,755,770	3,753,060	95,951	325,740	4,174,751	581,018	19,830,388	2.93
1927	4,630,431	3,729,748	94,645	358,045	4,182,439	447,992	19,936,384	2.25
1928	4,523,475	3,789,850	91,496	379,218	4,260,565	262,909	20,050,846	1.31

Depreciation included in operating expenses is depreciation found by Public Service Commission for rail lines plus depreciation on buses.

Harley Johnson Safety Awards

A new safety record was established by employees of the Chicago Rapid Transit Company during 1928, when less than 3½ per cent of the 5,848 men and women in service sustained lost time or disability injuries.

Employees of the transportation department of the elevated line set a new high mark with only 80 disability injuries in a grand total of 57,227,346 car-miles operated during the year—an average of 715,342 car-miles per disability injury. In addition to being the best safety mark in the history of the company, it is one of the most remarkable of the kind ever recorded.

The North Side division led all other divisions of the transportation department, operating "L" trains an average of 1,109,796 car-miles—more than 44⅓ times around the world—for each disability injury.

With a view to promoting even higher safety standards on the "L" lines, four shields donated by Harley A. Johnson, general manager, will be presented to the departments establishing the best employee safety records each six months of the year. These trophies will be awarded on Jan. 1 and July 1 of each year. They will be known as the Harley A. Johnson Awards for Accident Prevention.

5¼ Per Cent Interest for New York Subway Notes

Controller Berry, of New York City, has announced that the new subway construction notes, on which he is about to call for bids, will bear interest at the rate of 5¼ per cent. These are four-year notes, complying with the Board of Estimate's policy, under which the city will raise out of taxes a large part of the money it needs for the construction of the new municipal subway.

The amount of the present issue is $52,000,000; it is part of a total authorization of $318,000,000. The first instalment was marketed a year ago, after the controller, in a court action, had unsuccessfully opposed the decision of his colleagues. At that time the rate was 4 per cent.

New Franchise in Albany, Ore.

The city of Albany, Ore., has awarded a franchise to the Oregon Electric Railway for a railroad link over the streets and sidewalks of Albany within the area bounded by its present track and the Southern Pacific line on the north and south and by Main Street and the eastern city limits on the west and east. The motive power will be optional in the new franchise as the former franchise specified electrically-driven cars. The term of the grant is 50 years, superseding the old one held by the Oregon Electric Company, which expires in 1937.

A. J. Witchell, chief engineer for the line, states that both freight and passenger service will be permitted. The arrangement is significant in that it will make possible a connection with the northern railway lines and the Southern Pacific in East Albany. Transportation of logs from the timber area in eastern Linn County is the aim. According to Mr. Witchell, new lines between Lebanon and Foster and between Sweet Home and Calapooia have been located.

Trainmen Stirred by St. Louis Company's Statement

A recent exchange of communications between the officials of the local amalgamated union and Stanley Clarke, president St. Louis Public Service Company, indicates the strained relationship that has developed because of the failure of the Missouri Public Service Commission to announce its decision on the wage controversy submitted to the commission for arbitration several months ago.

The new controversy resulted from an article "Will Car Fares Be Increased" that appeared in the April 15 issue of *Transit News*, the official publication of the railway, distributed to riders. This was interpreted by union officials as propaganda on the part of the company preparatory to a drive for a 10-cent fare, regardless of the outcome of the wage controversy.

The *Transit News* article pointed out that fares are largely governed by the wages paid employees, that the 5,500 employees of the Public Service Company are paid a total of nearly $10,000,000 a year in wages, a sum approximately two-thirds of the operating cost. The article contended that the men are receiving higher wages than the average paid in other cities. It expressed regret that the riders could not pass on the wage question similar to the recent vote on the question of whether the wages of the city's firemen should be increased $25 a month, a measure which was defeated.

"Our motormen and conductors have much the same relation to you that the city firemen have," the article continued. "They are public servants, performing a necessary task," etc., concluding higher carfare was equivalent to higher taxes.

The burden of the answer of the representatives of the men was that the plea was "obviously an attempt to prepare the public for a 10-cent fare request and you also

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improperly seek to shift in advance to the street car men the public criticism you expect from that request."

The company in its rejoinder kept its answer almost entirely to the issue of the adequacy of the pay now being received by the men contrasted with that paid elsewhere.

To this the representatives of the men made reply in a communication in which they took exception to Mr. Clarke's statement "because, like the *Transit News*, it is replete with misleading half-truths, tending to prejudice the public against the street car men."

To this last communication President Clarke declined to reply, saying that so far as the company was concerned the controversy was a closed incident, the company resting its case on the points contained in the statement previously issued.

It is very uncertain when the state commission will pass on the wage dispute.

Levis Banquets H. E. Weyman

Some managers are roasted and others are toasted. H. E. Weyman, general manager Levis Tramways, Levis, Que., is in the toasted class. On April 2, some 150 of his fellow-citizens honored him with a banquet to mark his energetic work as president of the Chamber of Commerce and his fifteenth anniversary in the rescue and upbuilding of the Levis transportation system. With the banquet came a permanent reminder of the occasion in the form of a fine set of tableware.

Mayor LeBlond, toastmaster of the evening, dwelt upon Mr. Weyman's untiring efforts to advance the commercial and industrial progress of the "South Side." As a graceful conclusion, he quoted Longfellow's "Psalm of Life" with its emphasis on "Learn to labor and to wait."

"The hero of the fête," (to translate *Le Quotidien* literally) in a happy reply to the Mayor, said this occasion proved that an overwhelmingly French-Canadian community could take an Anglo-Canadian to its bosom. He hoped that the example of Levis in this respect would be a precedent to others. After thanking his friends for their gift, he discussed the advantages of the Levis district as one offering 12 miles of first-class harbor with the further advantage of being able to build double-deck piers without the necessity of excavation. Since publicity was imperative in these days, the Chamber had distributed broadly during the year the first publication of note on the merits of the district.

Mr. Weyman was followed by Noel Belleau, a noted lawyer who said: "You see before you a man of tranquil mien who labors unceasingly for the good of his community and who is astonished to find that his work is appreciated by all the world." Continuing, Mr. Belleau related how Mr. Weyman had restored the Levis tramways system and made it a matter of community pride; and that when he completed this work, he must have said: "Now I belong to the people," as evidenced by his splendid rejuvenation of the Chamber of Commerce.

The *Chronicle-Telegraph*, of Quebec, the big city opposite Levis, took note of the banquet in an editorial entitled "Levis Forges Ahead." Of Mr. Weyman, it wrote: "He has not only brought the public utility in question to a high station of efficiency but—most unusual feat—has made it a popular institution in the community."

Bootlegging of Rides Prohibited

A LAW passed by the Maryland General Assembly to permit owners of automobiles to transport fellow employees to and from their work for for pay has been signed by Governor Ritchie to become effective on June 1. Car owners who plan to engage in this kind of service will be required to obtain an employees' certificate of convenience from the Public Service Commission, at the same time filing the names and other information dealing with those they plan to transport.

Only those who are not convenient to other means of transportation will be permitted to use this form of travel. Certificates so issued will carry a special license plate from the motor vehicle commissioner to cost $3 a year additional. Each owner of a passenger car so run must carry a copy of the certificate in his vehicle. Owners, will not be permitted to transport passengers for pay except as provided in the certificate.

Theatre Party for Metropolitan Section Members

"What Do You Say?" a musical comedy, is the attraction which has been arranged for the entertainment of the members of the Metropolitan Section in New York in accordance with the annual custom of the manufacturers. The theatre party will be held on the evening of May 3 at the Lyric Theatre, New York, 42nd Street west of Broadway. The members of the cast of the comedy are all employees of the Third Avenue Railway. Their services are being donated through the courtesy of Slaughter W. Huff, president of that company. Two tickets to the show will be sent to each member of the section. Since the seats are not reserved, the early arrivals will benefit most. The play will start at 8.15 sharp. Arrangements to present it were perfected under the direction of T. W. Casey, chairman of this year's committee.

$7,000,000 Capital Outlay to Handle 80,000 Stadium Crowd

Cleveland's new civic stadium will cost $2,000,000. Its capacity is estimated at 80,000. Properly to care for the crowds expected to attend the events there will entail an expenditure of $7,000,000 on the part of the Cleveland Railway. President Alexander said that a number of studies of possible rapid transit facilities to handle stadium crowds had been made by the engineering firm of Parsons, Klapp, Brinckerhoff & Douglas in connection with their transportation survey for the Cleveland Railway. He is quoted:

"The most feasible plan is underground operation on a loop starting at the Terminal tracks, north in West 9th Street to Lakeside Avenue, east in Lakeside to East 9th Street and south on East 9th Street to Huron Road, connecting with the Euclid Avenue subway, which would carry the loop back into the terminal area.

"This route would be accessible to surface cars and rapid transit trains from any part of the city. It would cost $7,000,000, but the cost would be materially reduced if it were constructed in conjunction with other proposed subways."

Mr. Alexander said the possibility of using the Big Four tracks, which run from the Terminal area at low level into the present Union Depot, had been considered, but that he did not think such an arrangement would be satisfactory. He said:

"That would make a stub arrangement. When one train was loaded another would have to back in. Trains can be loaded and dispatched much faster with a loop, where there is continuous movement."

Railway Participates in Baltimore Products Week

The United Railways & Electric Company, Baltimore, did its part toward the great success of "Baltimore Products Week," observed from April 22 to April 27, during which almost all the downtown stores showed products manufactured in Baltimore in their display windows. There were about 300 elaborate exhibits.

In connection with the event the United issued a handy guide which listed the exhibitors, gave the location of each display and recorded the numbers of all the car lines passing each place of exhibit.

The company printed 150,000 of the guides. Of this number 100,000 were placed in the street cars, 25,000 were distributed among the public school children, 15,000 were distributed to the pupils of the parochial schools and 10,000 were mailed by the United or distributed through the company's bureau of information. The company said:

"Among the most important of Baltimore's products is safe, economical, convenient street car transportation. In round figures 300,000,000 such rides were produced in 1928. The railway industry of Baltimore, carrying hundreds of thousands daily between homes, factories, stores, churches, business offices, construction projects, theatres—and home again—is one of the city's 'essential industries.' Its products—street car rides—are among the city's 'essential products.' Its duty is public service. The United Railways is proud of Baltimore and proud of its opportunity to serve Baltimore. Its lines are links between the homes of Baltimoreans and the exhibits of 'Baltimore Products Week'—every week throughout the year."

The company also helped to boost the exhibit by displaying dash signs on all the cars. These read: "Among Baltimore's Chief Products—Street Car Rides—Nearly 300,000,000 Produced in 1928."

It was explained that the 300,000,000 included revenue and transfer passengers.

Medals for Safe Driving—Twenty-four operators of the Pittsburgh Motor Coach Company, subsidiary of the Pittsburgh Railways, were awarded medals at a party given in their honor on March 20. T. W. Noonan, in charge of the Pittsburgh Motor Coach Company, praised the 24 men and then C. E. Graham, Jr., manager of the Pittsburgh office, Ocean Accident & Guarantee Company, presented the medals to the men. There were music, refreshments and entertainment.

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American Standards for Track Bolts and Nuts

Proposed American standards for track bolts and nuts, as recently approved by the sub-committee of the sectional committee of the standardization of bolt, nut and rivet proportions, are ready for criticism. Track and way departments of all electric railways will be interested in this new proposed standard. The proposal is in tentative form for discussion and criticism. Copies may be obtained by addressing C. B. LePage, assistant secretary of the American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y.

The dimensions given have been determined from data obtained by tests which were carried on under the direction of the sub-committee, and in co-operation with the rail committee of the Engineering Division of the American Railway Association.

The sectional committee consists of 46 members representing manufacturers, consumers and general interests. It was organized by the Society of Automotive Engineers and the American Society of Mechanical Engineers, as joint sponsors, under the procedure of the American Standards Association.

Traffic Studies Planned in St. Louis

Traffic studies to be the basis of recommendations to the Transportation Survey Commission at St. Louis, Mo., are now being made by R. F. Kelker, Jr., Chicago, engineer for the commission.

Initial studies and reports will take up the present railway lines and how that service may be speeded up and existing surface routes be used to a fuller extent.

Mr. Kelker will work out a plan for rerouting street cars in the downtown section without increasing trackage. The existing downtown lines are now taxed to their maximum capacity in the morning and evening rush hours, while many important lines that, it is felt, should enter this district directly, now merely skirt it. In a maximum half-hour in the afternoon, 331 cars enter the district bounded by Ninth Street, Washington Avenue, Fourth and Pine Streets. It is said that Mr. Kelker hopes through rerouting to bring a maximum of 349 cars into this section in the maximum half-hour.

Preliminary studies have revealed that the average speed of the St. Louis street cars compares very favorably with that of cars in other cities. It has been found that the lines with modern cars and facilities for quick loading and unloading of passengers and quick acceleration and retardation have much higher speed averages than the lines with old equipment.

As is well known Mr. Kelker contends that before expensive rapid transit facilities are installed, a city should make full and effective use of all existing facilities. He favors subways only as a last resort.

Canadian Association to Hold Silver Jubilee—Montreal has been selected as the meeting place for the Canadian Electric Railway Association. The convention, which will mark the 25th anniversary of the founding of the association, will be held at the Stadium on June 5, 6 and 7. Convention headquarters will be at the Windsor Hotel.

COMING MEETINGS
OF
Electric Railway and Allied Associations

April 29-May 3—Chamber of Commerce of the United States, annual meeting, Washington, D. C.

April 30-May 3—Arkansas Utilities Association, Arlington Hotel, Hot Springs, Ark.

May 1-3—Indiana Public Utilities Association, Indiana Gas Association and Indiana Electric Light Association, annual joint convention, Hotel Gary, Gary, Ind.

May 3—Metropolitan Section, American Electric Railway Association, 33 West 39th Street, New York, N. Y.

May 9—Central Electric Railway Master Mechanics' Association, Lima, Ohio.

May 13-15—National Highway Traffic Association, annual meeting, Stevens Hotel, Chicago, Ill.

May 15—Central Electric Railway Traffic Association, Fort Wayne, Ind.

May 15—Association of Electric Railway Equipment Men, Middle Atlantic States, semi-annual meeting, Wilmington, Del.

May 20-23—National Conference on City Planning, annual meeting, Buffalo and Niagara Falls, N. Y.

June 3-6—National Association of Purchasing Agents, annual convention, Hotel Statler, Buffalo, N. Y.

June 5-7—Canadian Electric Railway Association, annual convention, Montreal, Quebec.

June 21-22—New York Electric Railway Association, Bluff Point, N. Y.

June 27-28—Central Electric Railway Association, Michigan City, Ind.

July 24-26—Electric Railway Association of Equipment Men, Southern Properties, Lafayette Hotel, Lexington, Ky.

July 26-27—Central Electric Railway Accountants' Association, Angola, Ind.

Aug. 15-16—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.

Aug. 27—National Association of Railroad and Utilities Commissioners, Glacier National Park, Mont.

***Sept. 28-Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium, Atlantic City, N. J.**

Rerouting Helpful in Atlanta

Opening of the last unit of the new Central Avenue-Pryor Street viaduct in Atlanta, Ga., has resulted in changes in railway routing by the Georgia Power Company, greatly simplifying traffic through the downtown section of the city.

One of the most important changes has been the rerouting of the Inman Park-Grant Park car line. Formerly this line entered the downtown district on Edgewood Avenue, crossed the north-and-south traffic on Peachtree Street, turned south on Broad, and recrossed the traffic lines on Hunter Street before turning on Washington Street to go to Grant Park.

Wherever possible cars are turned back at the so-called "railway gorge" to make a loop without crossing the downtown section. Where this is not possible, cars have been rerouted to use the new viaducts and relieve the crossings at Peachtree and Broad Streets. Only where absolutely necessary do street car lines now cross from east to west and vice versa.

Consideration of Louisville Increase Deferred

Action in the matter of the fare plea of the Louisville Railway, Louisville, Ky., is not expected for several weeks. The city had 60 days in which to take action, after which, under existing laws, the increase would automatically become effective. The Council did take action, but only to the extent of extending the time for passing upon the matter by 90 days, with the result that the 60-day period is just about ending, and there is the 90-day extension, before action is necessary.

Partial Relief in Iowa

An act partially relieving electric railways of the burden of paving between tracks has been passed by the Iowa Legislature during the present session. It provides as follows:

Street railways shall provide a suitable foundation for the track of a width equal to their ties, but in no case less than the width comprised between lines lying 1 ft. outside of each rail of the track, and shall be assessed for the construction or reconstruction of paving between the rails and for 1 ft. outside of each rail, in the amount that the cost of such pavement per yard of area exceeds the cost per yard of the remainder of the paving upon such street. In the making of assessments for paving, in the event that the track or tracks also are to be paved or repaved, the engineer shall estimate the cost of building such improvement, and he shall also make an estimate of the cost of building such an improvement upon said street as it would be in the event that the street car tracks did not there exist; and the street railway shall be charged with the difference in said estimates of cost and shall pay the same as other special assessments are paid.

Separate bids shall be taken in case of single track upon that portion of the street between the rails and 1 ft. outside of each rail, and in case of double track upon the entire portion of the street included between lines parallel to and 1 ft. outside of the outer rail of each track. The street railway shall be permitted to bid upon this portion of the pavement and the lowest bidder thereupon shall be awarded the contract. One-third of the remaining cost of the improvement for the area between the rails of the tracks of the street railway and 1 ft. outside shall be assessed against the street railway, one-third thereof shall be assessed against the abutting property and the owner, and one-third shall be paid for by the city either out of the improvement fund or general fund.

All repairs or maintenance between and 1 ft. outside the rails made necessary by the operation of the street railway and any other repairs or maintenance made necessary by the operation of the street railway shall be made by the railway and if not so made, the city shall have the power to make such repairs and assess the cost to such company.

The word "paving" as used in the preceding section shall include any kind of hard surfacing, gravel or macadamizing together with the necessary paving base.

The provisions of the act shall apply to cities acting under special charter.

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Recent Bus Developments

Railways Dominate Bus Field

Companies in Toronto, Hamilton and Montreal greatly strengthen their positions as common carriers

THE recent acquisition by the Toronto Transportation Commission of four independent interurban motor coach lines, which gives the publicly-owned railway system control of practically every line operating into and out of the Queen City, recalls to the *Canadian Financial Post* similar consolidations which have been effected in Montreal, Hamilton, and on the Pacific Coast.

Last year, for instance, the Ontario Bus Owners' Association undertook to work out a scheme, involving about eight lines in the province, whereby passengers could be routed by motorcoach from almost any point in Ontario to anywhere in the United States, this being made possible by a working agreement with the operators across the border. Gray Coach Lines, Ltd., subsidiary of the Toronto Transportation Commission, was the leader in this scheme. With the purchase of all the bus lines operating as far as Oshawa on the east, Hamilton and Niagara Falls on the west, and all the lines to the north, they have simplified considerably the through-routing of passengers desiring to travel by motor coach because all the lines in this area are controlled by one company.

The same thing applies in Hamilton, where the Dominion Power & Transmission Company, Ltd., has likewise taken over independent lines and have forged the various lines into a strong department of the company. In Montreal, Provincial Transport, Ltd., has also bought out most of the independent operators, and now control motor coach operation in Montreal and vicinity.

Over on the Pacific Coast the Vancouver Island Transportation Company, Ltd., recently established, has taken over twelve coach lines operating in and around Victoria as well as considerable property. It has an authorized capitalization of $500,000 first mortgage 7 per cent debentures, of which $350,000 is issued, and 5,000 shares of common stock of par value of $100 each, all of which are issued.

The purchase of the twelve established motor coach lines included equipment, terminal leases and an exclusive franchise granted by the corporation of the district of Saanich giving the company sole rights to operate vehicles for the carriage of passengers for a twenty-year period. All the old routes have been improved and expanded, and the company is negotiating for further purchases to increase its control of operation on Vancouver Island.

Buy New Motor Coaches

To return to the Toronto development: Immediately after taking over the four lines, the Toronto Transportation Commission announced the purchase of 35 new coaches, which brings the total equipment operated by the commission up to 221 vehicles. This is made up as follows: Buses and coaches operated prior to the purchase, 171; buses and coaches acquired with the routes, 15; coaches ordered, 35.

Ten of the new coaches are of 17-passenger capacity, with reclining chairs. Fifteen are 21-passenger vehicles, while the remaining ten are 35-passenger coaches, which have a regular seating capacity of 29 with six folding seats extra. All are of the parlor type. The commission expects first deliveries in the second week of May, with final deliveries in the first week of June.

Asked for the reason for the smaller type of coach—the 17-passenger—the manager of the Gray Coach Lines explained that the company intended to give more frequent service with the small-capacity vehicles. The new schedules will be announced soon.

The Toronto Transportation Commission with 221 vehicles dominates the field in Toronto; the Dominion Power & Transmission Company, with the recent acquisition of six lines operating out of Hamilton and in Preston and Galt, is supreme in the Ambitious City; Provincial Transport has acquired 31 lines in and around Montreal and now has a total of 125 buses and coaches; and on Vancouver Island the Vancouver Island Transportation Company practically controls the situation there with a fleet of 46 buses and coaches and prospects of an early increase in this equipment.

No-Parking Speeds Up Baltimore Traffic

NO-PARKING regulations put into effect on Fayette Street, Baltimore, recently, have resulted in speeding up the movement of cars of the United Railways & Electric Company on that thoroughfare. Officials of the company declare that the cars have been enabled to increase their speed between 10 and 15 per cent. Opposition to the banning of parking on both Fayette Street and Lexington Street, which developed before the new rules were put into effect, has subsided.

Another Step in Taggart Tangle

That no additional taxicabs be allowed to operate in Seattle for an entire year, and that present operators be placed under rigid new city regulation, are requests made to the city officials by opponents of Sam W. Taggart and associates, who are seeking an exclusive taxicab franchise. At the suggestion of John E. Carroll, president of the City Council, an amendment to the existing taxicab ordinances is being prepared by T. J. L. Kennedy, corporation counsel. This measure will be in keeping with the views of George B. Avery, superintendent of public utilities, who has sought to preserve competition in the taxicab business under stricter city control over rates and the number of taxicabs in service, instead of granting the Taggart monopoly measure.

Rate-cutting to the point of competition with the Seattle Municipal Street Railway by taxicabs hauling five passengers for one fare has afforded the Taggart interests grounds for one of their strongest arguments for a monopoly.

Jitneys Ordered Off Chicago Streets

Six small jitney companies, which have been operating a total of 75 buses on the northwest side of the city of Chicago at a 5-cent fare, have been ordered by Municipal Judge Damron to cease operations pending issuance of permits.

Resolutions subsequently adopted by the City Council, however, enjoined the police from interfering with the operation of these independent lines.

Alderman Joseph C. Ross argued that if the order were to be enforced the Council would be showing favoritism to the Chicago Motor Coach Company, which is operating buses on Chicago streets at a 10-cent fare with no authority from the city. To this Alderman Jacob M. Arvey replied that the Chicago Motor Coach company was protected in its rights by a court injunction.

Additional Bus Service for Providence—Petitions have been filed with the Public Utilities Commission by the United Electric Railways, Providence, R. I., asking approval of a plan to operate buses between Providence and Woonsocket and between Providence and Crescent Park. Temporary abandonment of electric car service in Woonsocket and the substitution of buses also were asked. The proposed rebuilding of Main Street, Woonsocket, makes it necessary to discontinue trolley service temporarily. If permission is granted by the state authorities, "the buses will supplement the trolley service." How long both types of service would be operated the company has declined to say.

Substitution in New Brunswick—Public Service Co-ordinated Transport, Newark, N. J., has been authorized by the City Commission of New Brunswick, N. J., to remove its tracks and overhead structure on Schuyler and French Streets and Codwise Avenue and to abandon the Middlesex line running between New Brunswick and Perth Amboy. Buses will be substituted. They will connect with buses operating between Plainfield and Metuchen. The date for the substitution has not been announced.

Buses to Lynchburg's Union Station—Authority to abandon its railway service from Main Street to the Union Station in Lynchburg, Va., has been granted to the Lynchburg Traction & Light Company, after a hearing before the Virginia State Corporation Commission. The company will substitute bus service. An agreement between the company and the City Council of Lynchburg was presented at the hearing. With the petition was filed the answer of the city, in which the city joins in the petition. The company is to reroute its Cabell Street bus line to care for travel to and from the Union Passenger Station. Cars are not to be removed from the Union Station line until the company provides new buses for the route.

Southern Pacific Seeks to Buy California Bus Line—Permission has been sought of the California Railroad Commission by the Southern Pacific Motor Transport Company, the motor stage subsidiary of the Southern Pacific Company, to purchase all of the outstanding stock of the California Parlor Car Tours, Inc., Los Angeles, for $75,000.

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Financial and Corporate

Wichita Reports Presented

Plan taking shape under which local syndicate proposes to take over Illinois Power & Light holdings

REPORTS made by the engineering firm of Black & Veatch, Kansas City, and Clinton H. Montgomery & Company have been submitted to the city of Wichita, Kan. The first, an engineering firm, and the other one, accountants, were employed by the city last fall to make a valuation of the rail lines and to audit the books of the Wichita Railroad & Light Company. With the reports in hand, negotiations have begun looking toward a valuation as a rate base, the fixing of new fares which will apply both to street cars and buses, with a free transfer between, and the working out of a new franchise.

The Wichita properties, namely, the Wichita Railroad & Light Company and the Wichita Motor Bus Company, are under option from the Illinois Power & Light Corporation as of March 1, 1927, to a syndicate in which Messrs. Campbell, Wheeler and Clevinger are interested. This contract gives the Wichita group three years, if necessary, to refinance and purchase the property. Involved in the program is the securing of a new franchise, the working out of a new fare schedule on both street cars and buses, and the rerouting of the latter.

The Wichita Transportation Company was organized as a holding company of the other two companies, but since the street railway was under the jurisdiction of the city, while the bus operation was under the jurisdiction of the Kansas Public Service Commission, the Wichita Motor Bus Company was organized, entirely separate from the original company, the Wichita Railroad & Light Company. Through the Public Service Commission, the company succeeded in getting a new schedule of fares on the buses, as well as a rerouting, the bus fares being 8 cents cash, two for 15 cents, five for 35 cents and 24 for $1.50.

Nearly two years ago, a proposal was submitted to the City Commission asking for an equitable franchise and for an increase in the street car fares to that of the buses. The present street car fare rate is 6 cents cash, nine for 50 cents, resulting in an average fare of 5.88 cents.

The Kansas Legislature last winter passed a so-called, home rule bill, applying to cities of 90,000 people and more, which would vest the jurisdiction over the buses in the City Commission, if and when a franchise were granted to companies operating both facilities. In the Wichita case, the franchise would probably be granted to the Wichita Transportation Company.

Important Deal Rumored in Michigan

Well-substantiated reports are to the effect that the Michigan Central Railroad is closing negotiations with the committee of bondholders for the purchase of the defunct Michigan Railroad's interurban lines between Grand Rapids and Kalamazoo, Battle Creek and Allegan. Executive officials of the Michigan Central imply that the lines would not be bought for operating purposes.

Shipping interests in Grand Rapids foresee in the purchase a cutoff between Grand Rapids and Chicago for westbound freight routed over the Michigan Central. Persons acquainted with the plan say the line would also give the Michigan Central access to a new territory with several prosperous towns that are good shipping points and would obviate the diversion of western freight by way of Jackson, Mich. The property would also give the Michigan Central considerable new trackage and exclusive service to several big mills and industries in Grand Rapids.

The Michigan Railroad's property was bid in by the bondholders several weeks ago at a sale conducted by the United States District Court for eastern Michigan. Announcement of the pending deal came from the interurban headquarters at Jackson, and will be subject to certain restrictions imposed by the court. The deal would include all track, right-of-way and property connected with the two lines. Interurban freight service will be continued for 60 days.

$15,000,000 Bonds Urged

Expert for Detroit municipal railway says system can not keep pace with improvements by financing them with earnings

DETROIT'S municipal railway is charging a fare insufficient to meet the demands that are being made upon the system for extensions and improvements in service, and the Council should be asked to authorize a bond issue of $15,000,000 for the use of the department, John H. Morgan, auditor for the municipally-owned lines, has so informed the members of the Street Railway Commission. The system cannot keep pace with the growth of the city on the present revenue because earnings are insufficient.

For the present construction year the Council has tentatively authorized the expenditure of $5,600,000 for improvements, extensions and new equipment. Mr. Morgan said that this money cannot be obtained from the present revenue of the system. No suggestion was made at the session at which the Morgan report was presented to increase the fare, although figures compiled by the American Electric Railway Association reveal that the average fare in the country is now in excess of 8 cents as compared with 6 cents in Detroit.

In lieu of an increase, Mr. Morgan suggests that the Council be asked to appropriate $15,000,000 to be used by the D. S. R. as it is needed. The street railway department could then use this money to provide better service and also to construct lines to newly-developed sections of Detroit.

Mr. Morgan said that the present method of financing cannot continue, and suggested that the commission go before the Council and "lay all cards upon the table." The city is paying to private interests 6 per cent for money loaned and by bond issue could go out and borrow the money for 4½ per cent he said.

In arguing for a refinancing of the system, Mr. Morgan stated that annually the Michigan Bell Telephone company is spending $10,000,000 in Detroit to keep pace with the growth of the city; the Detroit Edison Company $20,000,000 and the Detroit City Gas Company, $8,000,000.

Mayor Lodge said that the commission, before going to the Council for an authorization for the bond issue, should first ascertain if the system is in a position at the present time to take care of outstanding obligations. When questioned later the Mayor said that if bonds were issued there would be no question but that the revenue from the system would be sufficient to meet interest and sinking fund charges upon the new issue. This would be made possible by the fact that the money now taken from revenue for track repairs, equipment, etc., would be made available for bond retirement and interest.

$29,357,465 Value

City Engineer so reports on property of Market Street Railway, San Francisco in preliminary statement

VALUATION of the properties of the Market Street Railway, San Francisco, Cal., in their present condition is placed at $29,357,465 by City Engineer O'Shaughnessy. This is an increase of $2,991,099 over the figures of 1921, due, according to Mr. O'Shaughnessy, to increase in cost of materials and labor. The final report in eight volumes of 500 pages each is expected to be ready in several weeks. The report just made public is a brief summary of the completed set-up.

Valuation Detailed

Valuation of the lines of the Market Street Railway, upon which the franchises expire this year, according to the city's interpretation, and in 1930, according to the company's contention, show the following:

Reproduction cost new	$9,003,436
Condition, per cent	58+
Reproduction cost new, less depreciation	5,239,569

Mr. O'Shaughnessy's present valuation, as of June 30, 1928, based on Interstate Commerce Commission system of accounting and covering the entire Market Street system shows the following figures:

Reproduction cost new	$46,605,977
Condition, per cent	63
Reproduction cost new, less depreciation	29,357,465

The city engineer says that these figures will require readjustment to make certain allowances, such as the city's interest in the tracks on Ocean Avenue, additions and betterments and changes in inventory since June 30, 1928.

The valuation of June 30, 1921, also made by Mr. O'Shaughnessy, was as follows:

Reproduction cost new	$35,273,442
Condition, per cent	75
Reproduction cost new, less depreciation	26,366,366

$11,000,000 Increase

The difference in cost of materials and labor between 1921 and 1928 resulted in the $11,000,000 increase in reproduction cost new, partially offset by the 12 per cent decrease in condition, giving a final present valuation only $3,000,000 more than in 1921.

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The city engineer will also report that the request for a detailed statement on what the city will do in rerouting and improvements, when it takes over the Market Street lines, cannot be made for some weeks, as the field surveys are still in progress.

$479,226 Surplus in St. Louis in 1928

The statement of the St. Louis Public Service Company and subsidiaries for the year ended Dec. 31, 1928, shows consolidated net income of $972,195 after depreciation, taxes, interest, etc., equivalent after dividend requirements on $7 preferred stock and after deduction of $250,000 for sinking fund requirements, to 66 cents a share earned on 343,620 no-par shares of common stock. This compares with net loss of $108,192 in 1927.

The consolidated income account for the year 1928 compares as follows:

	1928	1927
*Gross earnings	$19,862,058	$19,533,261
Expenses	13,814,110	13,699,189
Depreciation	1,266,128	1,599,021
Taxes	1,889,825	1,851,139
Interest and miscellaneous chrages	1,919,800	2,492,104
Net income	$972,195	†$108,192
Preferred dividends	492,969	.....
§Surplus	$479,226	‡$108,192

*Includes non-operating income. †Loss. ‡Deficit §Amount available for sinking fund requirements and common stock.

The balance sheet of the St. Louis Public Service Company and subsidiaries as of Dec. 31, 1928, shows total assets of $78,344,502 and total surplus of $17,970,884. Current assets amounted to $1,656,926 and current liabilities $1,996,985.

Refunding Desired in Seattle

A series of conferences with Mayor Frank Edwards, of Seattle, Wash., other city officials and A. W. Leonard, president Puget Sound Power & Light Company, has been started in an effort to refund approximately $11,000,000 of Seattle's debt for the purchase of the Municipal Street Railway. The plan would cover about 30 years, with annual payment of between $300,000 and $500,000 so that a large part of the railway current earnings may be used for extensions and new equipment.

Under the present arrangement, the city is paying $833,000 a year in principal on the purchase price of $15,000,000, together with interest, which brings the total annual payments close to $1,200,000, and leaves virtually nothing to finance extensions and new equipment. The railway last year was compelled to borrow about $800,000 from the city light and water departments. George B. Avery, superintendent of public utilities, and Councilman A. Lou Cohen induced the last Legislature to pass a special street railway refunding bill for Seattle in the hope that the city might be given approximately 30 years, instead of ten, in which to retire the debt. A. W. Leonard, the city is advised, has full authority to represent both the Old Colony Trust Company, which acts for the bondholders, and the Stone & Webster interests.

Edmonton Sale in Prospect—Negotiations are under way for the purchase of the Edmonton Municipal Street Railway System in Edmonton, Alberta. C. J. Yorath, president Canadian Utilities, Ltd., of Calgary, Alberta, has offered the Edmonton City Council $3,500,000 for the street railway and the municipal light and power systems. His company would add to the power resources of the city by an additional development and augment the equipment of the railway. Payment would be spread over a period of twenty years and the city of Edmonton would be required to create a fund for payment of debentures on municipal utilities outstanding on Dec. 31, 1928. This amounts to approximately $2,234,701.

Foreclosure Suit Against Bristol Line—A bill in equity was filed in the United States District Court at Philadelphia on April 19 by the Union Trust Company, of Maryland, trustee for the foreclosure of a mortgage on property of the Trenton, Bristol & Philadelphia Street Railway, Bristol, Pa. This mortgage covers the outstanding 30-year bonds, amounting to $544,500 on which no interest has been paid since 1925. The default in interest amounts to $108,900.

New Director in Oakland—Frank Lloyd, purchasing agent Key System Transit Company, Oakland, Cal., has been elected to the board of directors to fill the vacancy caused by the resignation of C. P. Murdock. Mr. Lloyd has been connected with the Key System for twenty years.

Oklahoma Railway Acquisitions—The Interstate Commerce Commission has authorized the Oklahoma Railway to acquire control by lease of the Oklahoma City Junction Railway, a 6-mile line, and permitted to acquire control of the 5-mile Oklahoma Belt Railway to purchase of capital stock and by lease.

Decrease in Net for March Quarter in Providence—Totaling $644,549, the gross operating revenue of the United Electric Railways, Providence, R. I., for March, showed a decrease of 2.82 per cent, compared with the preceding month. Net earnings for the month amounted to $41,435, after deductions, interest and all other charges. This was a decrease of 13.83 per cent, in comparison with net earnings for March, 1928. For the quarter ended March 31, the company showed gross earnings of $1,867,712, a decrease of 4.77 per cent compared with a similar period last year. Net earnings, after all charges, amounted to $96,543, a decrease of 42.91 per cent over the March quarter in 1928.

Deposit Time Extended for Michigan Railroad Issue—Notice has been issued to holders of Michigan Railroad first mortgage five-year 6 per cent gold bonds due on May 1, 1924, that the bondholders' protective committee for this issue, comprising Allen G. Hoyt, Stanley A. Russell and William W. Bride, will receive deposits under the agreement dated Oct. 23, 1924, until May 10 next. Holders failing to deposit their bonds on or before that date will not be entitled to become parties to the agreement or to share in the benefits thereof, and will acquire no rights thereunder. The Bay City-Flint division of the Michigan Railroad is reported sold to two Saginaw scrap-metal dealers. The sale included 47 miles of track, all overhead wires and 39 interurban cars.

Spokane Railways Sells Park—Natatorium Park, amusement park of Spokane, has been sold by the Spokane United Railways to Louis B. Vogel, concessionaire. The reported price is $100,000.

Conspectus of Indexes for April, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	April 1929 **7.75**	March 1929 **7.75**	April 1928 **7.61**	April 1929 **7.75**	Jan. 1924 **6.91**
Electric Railway Materials* 1913 = 100	April 1929 **145.0**	March 1929 **144.8**	April 1928 **140.0**	March 1924 **163.9**	Feb. 1928 **139.5**
Electric Railway Wages* 1913 = 100	April 1929 **230.1**	March 1929 **230.1**	April 1928 **228.8**	April 1929 **230.1**	Jan. 1924 **217.4**
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	April 1929 **200.9**	March 1929 **203.4**	April 1928 **202.2**	March 1924 **206.8**	Sept. 1927 **199.4**
Eng. News-Record Construction Cost (General) 1913 = 100	April 1929 **203.4**	March 1929 **207.8**	April 1928 **206.4**	March 1924 **224.7**	Nov. 1927 **202.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	March 1929 **97.5**	Feb. 1929 **96.7**	March 1928 **96.0**	Nov. 1925 **104.5**	April 1927 **93.7**
Bradstreet Wholesale Commodities 1913 = 9.21	April 1929 **12.90**	March 1929 **13.00**	April 1928 **13.42**	Dec. 1925 **14.41**	July 1924 **12.23**
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	March 1929 **153.0**	Feb. 1929 **154.4**	March 1928 **151.4**	Nov. 1925 **167.1**	May 1924 **141.0**
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	March 1929 **159.8**	Feb. 1929 **161.0**	March 1928 **161.1**	Nov. 1925 **171.8**	March 1929 **159.8**
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	March 1929 **13[illegible].7**	Feb. 1929 **140.4**	March 1928 **118.2**	Feb. 1929 **140.4**	July 1924 **73.4**
Bank Clearings Outside N. Y. City 1926 = 100	March 1929 **103.9**	Feb. 1929 **110.1**	March 1928 **101.6**	Feb. 1929 **110.1**	May 1924 **84.4**
Business Failures Number	March 1929 1703	Feb. 1929 1720	March 1928 2001	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	**35.44**	**62.26**	**53.20**	**122.95**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

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Personal Items

E. R. Heiny Promoted

IN RECOGNITION of his successful handling of a number of difficult problems in the rehabilitation of the Lincoln Traction Company, Lincoln, Neb., after it had been taken over by Nebraska units of the United Light & Power Company, E. R. Heiny, general superintendent, has been promoted to the position of vice-president and general manager. Mr. Heiny is thoroughly trained on both the technical and executive sides of the work of supplying street car service.

He was graduated in 1908 from the University of Pennsylvania as an electrical engineer, and immediately entered the service of the Philadelphia Rapid Transit Company, being a member of its engineering corps for four years. From there he went west into the service of the McKinley interests, operators of a number of interurban lines out of St.

E. R. Heiny

Louis, becoming, during his nine years of service there, division superintendent of the Illinois Traction Company, a member of the McKinley group. In 1918 he was made superintendent of transportation for the Lincoln Traction Company, then locally owned. Later he became general superintendent, and has been in charge of the operating end ever since it was divorced from other utility service and centered activities on transportation.

Mr. Heiny has been able not only to restore the company to popular favor, but also has been diligent in effecting a working agreement with the regulatory authorities that has gained willing co-operation in eliminating unnecessary car lines, and in developing supplementary bus service. Eight bus lines giving better service, earning larger gross revenues, and costing less to operate have so far been established. His efforts at co-ordinating service while keeping it satisfactory is reflected in a constantly increasing surplus.

Changes on South Shore Lines

R. H. James, was recently elected vice-president of the South Shore Lines. He will have direction of all traffic matters, including rates and divisions. Mr. James joined the Commonwealth Edison Company in May, 1925, and was appointed to the president's office, a position he still holds.

In December, 1925, under instructions from Samuel Insull, he organized and was appointed executive in charge of the traffic bureau, and at the same time was also appointed vice-chairman of the executive traffic committee.

In June, 1928, he joined the Chicago, South Shore & South Bend Railroad as assistant to the chairman, and in March, 1929, was elected a vice-president of that railroad.

In March, 1929, he was elected a vice-president of the Chicago, Aurora & Elgin Railroad, and in April, 1929, a vice-president of the Chicago, North Shore & Milwaukee Railroad.

Three changes were put in effect on April 1 by Charles H. Jones, general manager.

William H. Ragsdale, formerly general shop foreman, became master mechanic.

Merle Aldrich, formerly electrical engineer, became engineering assistant to master mechanic.

Charles F. Ludden, formerly assistant to Mr. Aldrich, became acting electrical engineer.

Changes in West Penn

Paul M. Mase, formerly assistant general auditor with the West Penn Electric Company, has been made controller of the Monongahela West Penn Public Service Company and subsidiary companies, with headquarters at Fairmont, W. Va. His first West Penn connection was with the Pittsburgh, McKeesport & Greensburg Street Railway in 1904 in the capacity of clerk and from 1906 to 1910, inclusive, he was cashier at Oakford Park. For nearly twenty years he has held various responsible positions in the accounting department of the Pittsburgh office, culminating in his promotion to controller of "Monongahela West Penn." Mr. Mase was born in Greensburg, Pa., and received his early education there, later attending Ohio State University for three years.

Due to Mr. Mase's promotion, a number of advancements and changes has been made in the accounting department. A. W. Evans, auditor of disbursements, assumes jurisdiction of the distribution and payroll work in addition to his present duties, and reports to M. W. Glover, general auditor. Mr. Evans has been with the company since Nov. 1, 1921, being employed from then until March 1, 1923, as chief clerk in the disbursement department. On the latter date he became auditor of disbursements.

Prior to becoming affiliated with the West Penn organization, Mr. Evans spent ten years with the Midvale Steel & Ordnance Company as chief cost accountant, two years in the army as first lieutenant with the ordnance department, and two years as resident auditor for the General Electric Company at the plant of the Allegheny Steel Company in Brackenridge.

George W. Buchanan is appointed to the position of assistant auditor of disbursements. He was formerly distribution auditor in Cuba and Mexico for The Foundation Company of New York City.

Other changes affect the duties of F. S. Diebold, who in addition to work orders has been put in charge of payrolls and construction, and those of R. C. Oswald, who is now chief clerk in charge of distribution and vouchers.

Honor for G. W. Van Derzee

G. W. Van Derzee, vice-president and assistant general manager of The Milwaukee Electric Railway & Light Company, was unanimously elected president of the Wisconsin Utilities Association, Milwaukee, Wis.

His first work with The Milwaukee Electric Railway & Light Company was in power sales and he shortly became assistant to S. B. Way, then vice-president. A while after Mr. Way became president of the company, Mr. Van Derzee was made vice-president and assistant general manager, in which position he continues.

After graduating from the University of Wisconsin in 1908, Mr. Van Derzee spent some time in graduate work and on the instruction staff at the Houghton School of Mines, after which he entered the shops and later sales forces of the General Electric Company in Milwaukee.

G. W. Van Derzee

He has been active in the commercial and public relations work of his company. In his present position, he has general supervision over the advertising, commercial, rate, accounting, purchasing and stores, and publicity departments and for years has been president of the company Employes' Mutual Savings and Building and Loan Association.

Mr. Van Derzee has had much to do with arranging the programs for some of the later conventions of the Wisconsin Electrical Association and more recently has been actively interested in the National Electric Light Association and the Association of Edison Illuminating Companies.

Milton R. Stahl, an attorney of St. Louis, Mo., has been appointed by Governor Henry S. Caulfield of Missouri to the chairmanship of the Missouri Public Service Commission. His term as commissioner will expire on April 15, 1935. He succeeds Dudley Calfee, of Jefferson City, as a member of the board and replaces Almon Ing, of Poplar Bluff, as chairman. Mr. Ing is still a member of the board. Mr. Stahl is a graduate of the University of Missouri, class 1916, and studied law at the Washington University Law School in St. Louis. He served abroad during the war and then returned to the law school and graduated in 1920. He is 35 years old.

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G. H. Stagg with Niagara Gorge

George H. Stagg has been appointed general passenger agent for the Niagara Gorge Railway, Niagara Falls, N. Y., operating the scenic belt line in the lower Niagara gorge. This appointment was announced by Lee H. Jones, traffic manager of the company, and approved by A. D. Robb, vice-president.

For several years Mr. Stagg has been traveling passenger agent for the Seaboard Air Line at Buffalo. He started his railroad career as a boy at the Elmira office of the Lackawanna Railroad where he spent twelve years, finally being advanced to city ticket agent. In 1901 he resigned to become associated with a Buffalo firm, but in 1905 returned to railroading, accepting the position of city passenger agent for the Erie Railroad in New York City. In 1912 he became associated with the Seaboard Air Line and has held the position of traveling passenger agent for that company until his resignation to become general passenger agent for the Niagara Gorge Railway.

Mr. Stagg was born in Philadelphia.

M. L. Hibbard Succeeds W. R. Putnam at Boise

M. L. Hibbard, for the past year assistant general manager of the Idaho Power Company, Boise, Idaho, has been made vice-president and general manager, succeeding W. R. Putnam, who resigned to join the Electric Bond & Share Company's organization in New York, in which system the Boise property is included.

Mr. Hibbard has had a wide experience in the utility field. Executive positions he has held include that of superintendent of the electric department of the Union Light & Power Company, Fargo, N. D., and later general manager of that company; engineer for the San Antonio Gas & Electric Company and the San Antonio Traction Company, San Antonio, Tex., in charge of engineering and construction of the gas, electric and street railway systems; general manager of the Fargo & Moorhead Street Railway; assistant vice-president in charge of operation, Northern States Power Company, Minneapolis, and later chief operating engineer of that company.

Mr. Hibbard is a graduate of McGill University, Montreal.

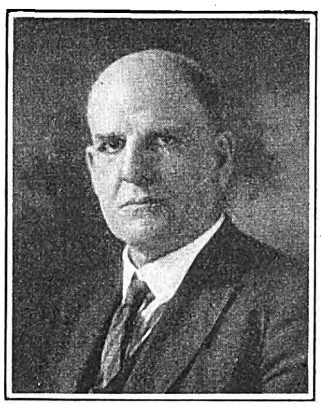
Changes in Washington Company

New appointments have recently been announced by George Newell, local manager in Everett of the Puget Sound International Railway & Power Company.

C. C. Coates, general superintendent of Pacific Northwest Traction Company, North Coast Transportation Company and Portland-Seattle Stage Company. T. F. Marsh, assistant general superintendent. E. M. Swift, superintendent of equipment. W. N. Ringrose, assistant treasurer. George Lancaster, purchasing agent.

All of these report to Mr. Newell.

H. R. Leigh, formerly assistant to Col. M. D. Mills, is appointed superintendent of the North Coast Transportation Company and the Portland-Seattle Stage Company. P. T. Lee continues as superintendent of the Pacific Northwest Traction stage lines and is also appointed assistant to H. R. Leigh. L. R. Holt is appointed general foreman of all stage transportation.



Charles H. Clark

Cleveland Men in New Posts

Messrs. Clark and George well known for their outstanding work in engineering fields

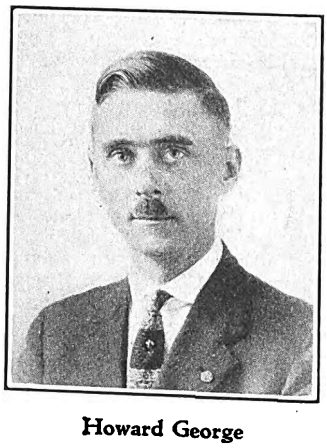
LITTLE need be said to the readers of ELECTRIC RAILWAY JOURNAL in the way of introducing Charles H. Clark and Howard George, who recently stepped into new rôles in Cleveland. Both have a background of electric railway experience in operating and mechanical capacities.

MR. CLARK AT CLEVELAND SINCE 1901

Mr. Clark, who became civil engineer of the Cleveland Railway, on April 1, working directly under President Alexander, first became identified with work in Cleveland in 1901 when he took charge of the track work of the Cleveland Electric Railway. He remained engineer of way until 1907. For about a year he was connected with the International Railway as engineer of way, and later was associated with the Andrews & Stanley interests, first on the New York & North Shore Traction System and later as engineer of maintenance of way Rochester Railway. In 1909 he returned to the Cleveland Railway as chief engineer.

WAS FORMERLY A MANUFACTURER

Mr. Clark began his railway career in the manufacturing end of the business with William Wharton, Jr., & Company as draftsman. Although he was graduated from Cornell University in 1892 he had started work a long time previous to that incident. At twelve years old he was a water boy on the West Shore Railroad. Later in the employ of T. W. Harris, contractor, he assisted in building the railways in Scranton, Cleveland, Troy and Norristown. Out of this work he drifted into general engineering and was engaged in the work of helping to build the Trenton Falls dam. From this work he became identified with the Utica & Mohawk Valley Railway and had charge of the construction of that line for the Andrews-Stanley syndicate. For these same interests he went to Cleveland in 1901.



Howard George

MR. GEORGE BEGAN HIS CAREER IN NEW JERSEY

Mr. George, who gives up the title of superintendent of research for superintendent of way, was well known as assistant chief engineer of the Public Service Production Company in Newark, N. J., prior to his becoming superintendent of research for the Cleveland Railway last year. He began his career in the railway industry in 1906 with the Public Service Railway. There he remained until June, 1925, serving successively as field engineer, division engineer, assistant to chief engineer and engineer of maintenance of way. It was in the latter-mentioned year that he was transferred to the Public Service Production Company, the construction subsidiary of the Public Service Corporation. Mr. George has been very active in American Electric Railway Association work, particularly in the Engineering Association. From 1923 to 1928 he served as chairman of the committee on way and structures. He has represented the American Electric Railway Association sectional committee on tie specifications of the American engineering standards committee, and also that on specifications for special trackwork materials.

Mr. George is a graduate in civil engineering of the University of Pennsylvania, class of 1907.

William C. Edwards has assumed the directorship of the Texas Public Service Information Bureau and the editorship of the bureau news bulletin. The last few years Mr. Edwards has spent in Washington, D. C., and Atlanta, Ga. In the April 15 issue of the *Public Service News*. Mr. Edwards states the purpose of the bureau is not only to furnish the public with accurate information regarding public utilities but also to contribute to the upbuilding of Texas.

J. N. Shannahan, president of the Omaha & Council Bluffs Street Railway, and chairman of the advisory council of the American Electric Railway Association, has been chosen to head the committee for the celebration of the 75th anniversary of the admission of Nebraska to the United States as a territory. Appointment to this civic committee is a reflection of the high esteem and public confidence which Mr. Shannahan has won in Omaha and Nebraska in his two years as head of the utility.

H. L. Engelhardt was recently promoted to the newly-created position of safety engineer in charge of the safety division, a new division authorized by the California Railroad Commission. Mr. Engelhardt, who assumes this rôle on May 1, has had many years' experience in safety work and during his two years' employment with the commission has devoted his entire efforts to that class of work. He will be assisted in his new duties by three safety inspectors, W. F. Lemon, H. C. Lemon and A. S. Meininger. This new division will investigate serious accidents and "will enable the commission to serve the public even more adequately than before in this important respect."

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Messrs. Nicholl and La Monte in New Rôles

As a farewell to Thomas H. Nicholl who resigned as superintendent of motive power of the Union Traction Company of Indiana on April 1, his associates expressed their appreciation of his services in the form of a banquet held at the Hotel Stilwell in Anderson, Ind. Mr. Nicholl has accepted a position with the Cleveland Railway in the research department.

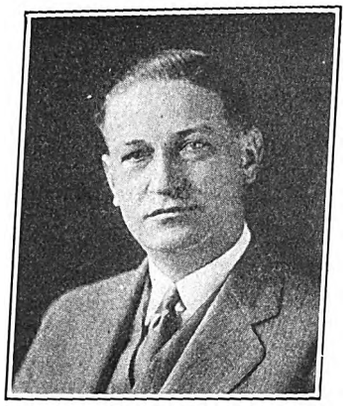
From September, 1914, to 1916, he was engaged as light and power solicitor with the Traction Light & Power Company, Anderson, Ind. In May, 1917, during the World War, Mr. Nicholl entered the First Army Officers Training Camp at Fort Benjamin Harrison. Upon completion of this training course he received a commission as Captain of the Tenth United States Infantry, where he served through the duration of the war. His first position upon leaving the army was with Ball Brothers, Muncie. He next was employed as manager of the Komo Chemical Company, Kokomo, where he remained until his resignation in August, 1922, to accept a position as acting superintendent of motive power with the Union Traction Company of Indiana, in which capacity he has been engaged until his recent appointment in Cleveland. During the past year or two Mr. Nicholl has been active in the Central Electric Master Mechanics Association, being its first president and now chairman of the standardization committee and a member of the handbook committee of that organization.

Mr. Nicholl was born at Baltimore, Md., on Dec. 11, 1893. He received his education at the University of Michigan.

Mr. Nicholl was succeeded by Heber La Monte, purchasing agent for the past three years. He will retain this position in addition to his new duties with headquarters at Anderson. Mr. LaMonte's first railroad work was with the Erie Railroad in May, 1911, when he was employed as yard clerk, chief yard clerk and assistant yardmaster at Huntington, Ind. In January, 1913, he was promoted to general yardmaster, which position he occupied for several years. He then left railroad service and was engaged in various official capacities with the Anderson Rubber Works until the fall of 1923. From 1923 to 1926 he was in the advertising and brokerage business out of Chicago. His first electric railway service began in 1926, as purchasing agent with the Union Traction Company of Indiana, which work has culminated in his present appointment to superintendent of motive power. Mr. La Monte was born on April 30, 1891, at Huntington, Ind. After graduating from the Huntington High School in 1908, he attended the University of Indiana for three years.

William E. Wood, of Richmond, president Virginia Electric & Power Company, who has been on a brief pleasure trip to Europe, has landed in New York from the Lloyd Sabaudo liner "Conte Grande." Mr. Wood remained in New York for a few days on business for the Virginia Electric & Power Company before continuing on to Richmond. Mr. Wood sailed on the "Berengaria" on March 8 from New York and spent most of the time in Germany and Spain. He took the steamer at Gibraltar on April 8.

J. P. Potter, vice-president Key System Transit Company, San Francisco, Cal., was recently elected vice-president of the Pacific Railway Club for the coming year.



Curtis L. Hill

Messrs. Hill and Lamb Will Give Tacoma Best Service

An ambitious program has been laid out by Curtis L. Hill, new manager of the Tacoma Railway & Power Company, Tacoma, Wash. In outlining the new policies of the company and its associated companies, the Tacoma Bus Company and Pacific Traction Company, Mr. Hill announced that the bondholders plan an aggressive business policy involving the expenditure of $366,000 for track and equipment improvements. He invited constructive criticism of the service saying that the problem was an engineering one and not a political problem and that he wanted all to consider the Tacoma Railway & Power Company a Tacoma institution.

Mr. Hill, a native of Tacoma, was educated in engineering at the University of Washington, served overseas in the air service, and has engaged in private engineering practice since the war. He has been affiliated with the Puget Sound Power & Light Company and the Tacoma Railway & Power Company since 1920, having served in the power department during that period.

L. L. Lamb, who becomes general superintendent of the railway, has been with the Tacoma Railway & Power Company since 1911 in various capacities connected with the maintenance of railway equipment. He has a wide experience in this kind of work.

The remaining members of the reorganized personnel were mentioned previously in ELECTRIC RAILWAY JOURNAL NEWS. Change in the control of the system to the hands of Richard T. Sullivan, Tacoma representative of the bondholders, was effective April 1. The Stone & Webster control had extended over the past 27 years.

L. L. Lamb

This change, by which direction of the company is lodged with local Tacoma interests, was foreshadowed some weeks ago by Scott Z. Henderson, receiver for the Puget Sound Electric Railway, former operator of the Tacoma-Seattle interurban and owner of the stock and second mortgage bonds of the Tacoma Railway & Power Company. Under the plan Mr. Sullivan remains in executive control instead of general manager of the system. The change involves the Pacific Traction and Tacoma Bus Companies as well as the Tacoma Railway & Power Company.

Homer Loring

Homer Loring, whose election to the board of directors of the Boston Elevated Railway, Boston, Mass., was mentioned previously, has always elicited the eternal "how" for his singular achievements in restoration and rehabilitation. He first came into the limelight some years ago when, as State Administrator for the Commonwealth, he instituted several polices of economy in the state service. Later he took over the control and rehabilitation work of the Eastern Massachusetts Street Railway, then known as the Bay State Street Railway, and when he left that position he was elected to the board of directors of the Boston & Maine Railroad. He became its chairman and was instrumental in bringing about the financial reorganization of the company, the reconstruction of its terminal facilities and the building of the new North Station. His latest work has been in connection with the restoration of the textile industry.

On the directorate of the Boston Elevated Railway there may not be very much to do unless the relation of the road to the Commonwealth changes, for the company is under public control, managed by a Board of Trustees.

All other directors were re-elected at the April 1 meeting.

A. LeRoy Hodges in Massachusetts

Public trustees of the Eastern Massachusetts Street Railway are confident that A. LeRoy Hodges will bring to the Brockton district an enthusiasm and a background of valuable experience. His appointment as manager of the Brockton District, effective on April 9, was mentioned in the ELECTRIC RAILWAY JOURNAL NEWS.

For several years Mr. Hodges was assistant general manager and a director of the Brooklyn City Railroad, a system with 230 miles of lines and operating 1,300 cars. During his connection with the Brooklyn company the road was completely rehabilitated, and the entire rolling stock modernized.

Mr. Hodges began his street railway career with the Westchester, Kennett & Wilmington Railway, Kennett Square, Pa., as secretary to the general manager. In 1908 he was secretary to the assistant general manager of the switch board department of the General Electric Company at Schenectady, and in 1911 became secretary to Vice-President and General Manager A. W. McLimont, of the Michigan United Railways, Jackson, Mich. When this property was leased to the Commonwealth Power, Railway & Light Company, he was appointed chief clerk to C. E. Morgan, general superintendent Michigan Railway, and continued in that capacity at Jackson and Grand Rapids until he went with the

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Brooklyn City Railroad in October, 1919, under Mr. Morgan.

Since the promotion of A. J. Boardman, former Brockton manager, to be vice-president and acting general manager, the public trustees have had under consideration numerous street railway operating men, in various parts of the country, for the Brockton management.

C. W. Squier in New Post

Clarence W. Squier, formerly of the staff of ELECTRIC RAILWAY JOURNAL, has assumed his new duties as associate editor of *Mechanical Engineering*, published by the A.S.M.E.

Not a theorist alone, but a practitioner, Mr. Squier is also a correctionist whenever and wherever he is brought face to face with needed transit improvements and developments. Testimony of this fact is seen in his four years' activity with the General Electric Company as designer of control apparatus, and in the capacity of designing engineer with the Sprague Electric Company when that company was pioneering in multiple-unit control apparatus. This intensive experience was to be extended across the Atlantic in 1904. At the Pittsburgh Works of the Westinghouse Company he followed the testing and equipping of the first 35 electric locomotives for the New York, New Haven & Hartford electrification.

In 1908, with a background of high spots in practical equipment work, Mr. Squier went to Brooklyn, where he was an important factor in the preliminary work looking toward the unification of the Brooklyn Rapid Transit System. After the dual rapid transit contracts were signed, Mr. Squier was appointed assistant statistical engineer for the Public Service Commission for the First District, State of New York. It was these duties he relinquished in 1918 to become associate editor of ELECTRIC RAILWAY JOURNAL, which saw, and later found in him, a valuable link in the chain of theoretical and practical transit development.

David V. S. Maxwell, retiring president of the Schnectady Rapid Transit, Inc., Schnectady, N. Y., has been made superintendent of bus operations, following the purchase of that company by the Schenectady Railway. Other officers, who will continue with the new owners, are Olin T. Randall, secretary, and Ernest H. James, treasurer. Until a survey of the bus operations in Schenectady and vicinity is made, the same policies will govern the continued operation as prevailed at the time of the purchase.

Julius Klein, director of the United States Bureau of Foreign and Domestic Commerce since 1921, has been appointed Assistant Secretary of Commerce by President Hoover. Mr. Klein is a Californian by birth and a recognized authority on commercial and trade matters. He is a regular contributor to periodicals on the subject of foreign trade and on economic and commercial problems.

J. D. Barnhart, for the last eleven years superintendent of shops of the electrified lines of the Illinois Terminal Railroad at Decatur, Ill., is now in charge of the shops of the former Illinois Terminal Company, at Federal, Ill., a suburb of Alton, his territory and jurisdiction having been extended to include that plant. Mr. Barnhart joined the Illinois Traction System as master mechanic at Granite City and two years later became superintendent of shops in Decatur. His latest advancement puts him in charge of car shops of both the steam and electric lines of the system.

A. Balfour Brehman has been elected president of the Union Traction Company, Philadelphia, operated under lease by the Philadelphia Rapid Transit Company. He succeeds the late Jeremiah Sullivan. At the special meeting of the board a new office of chairman of the board of directors was created, to which Arthur V. Morton, vice-president of the Pennsylvania Company for Insurance on Lives, was elected. An executive commitee of the board was also formed, composed of Edward M. Story, chairman; Joseph Gilfillan, Arthur V. Morton, John H. Mason, Sr., and John J. Sullivan. Officers of the company are ex-officio members of the committee.

John Leisenring has been appointed assistant to the chief engineer of the Illinois Terminal Railroad System, Springfield, Ill. One important duty will be supervision over problems involved in the operation of the railroad properties of the company including direct power supply facilities.

OBITUARY

William Gillies Ross

The life of the late William Gillies Ross, president and managing director of the Asbestos Corporation, Ltd., director and executive of many important industries and companies in Canada, and one of the best-known street railway experts in America, was crowded with successful effort in many phases of Dominion activity. A skilled economist and an astute financier, he played an important part in the reorganization and development of many Canadian enterprises.

Born in Montreal on Aug. 6, 1863, he was educated at the Montreal High School and in 1880 entered commercial life as a chartered accountant. Eight years later he associated himself with the late James Ross in the electrification of the railways in Winnipeg, Toronto, Montreal and St. John, and the organization of electric railways in Jamaica and Mexico City. He was named comptroller of the Montreal Street Railway in 1896, and assumed the managing directorate of that company and of the Montreal Park & Island Railway in 1904, retaining these two posts until 1910 when he entered the asbestos business. During these years he had also become second vice-president of the Montreal Light, Heat & Power Company; director of the Dominion Iron & Steel Company; president of the Quebec Railway, Light & Power Company; and president of the Canadian Street Railway Association. He served as president of the Street Railway Accountants Association of America in 1904, and in 1910 as vice-president of the American Street Railway Association. In this latter post he was the first Canadian so to serve. Mr. Ross founded and was first president of the Montreal Street Railway Mutual Benefit Society, an organization devoted to the relief and care of the electric railway's employees.

His war work, particularly his organization of the Navy League in Canada and his founding in the Dominion of the British sailors' relief fund, was recognized by His Majesty the King, who awarded him the Special Service decoration in appreciation of efforts on his part which resulted in more than $3,000,000 being obtained to aid the widows and children of British and Canadian seamen who had been killed during the war.

As an accountant and economist Mr. Ross had few equals in the Dominion. When experts from the United States and Great Britain needed aid in their efforts to solve the intricate task of rearranging the accounting of the Dominion Iron & Steel Company and of the Dominion Coal Company, he, in a short time, helped materially by suggesting the installation of methods which are still in use by these corporations. In every company which he directed, he reorganized the systems of accounting. He was frequently consulted by leaders of industry on accounting and financial problems.

At the time of his death, Mr. Ross was president and general manager of the Asbestos Corporation Limited; vice-president and director of the Amherst Park Land Company; director of the Canadian General Electric Company, Ltd., and director of the Fire Insurance Company of Canada.

P. W. Ellis, chairman Toronto Transportation Commission, Toronto, Ont., died in that city on April 22. He was a pioneer in the movement which resulted in the province acquiring a hydro-electric system of its own, and was interested in a score of public and private enterprises. He was the first president of the Canadian Manufacturers' Association, and had served as vice-chairman and treasurer of the Ontario Power Commission and as a member of the first hydro-electric power commission. The Toronto *Globe* stated that it was his strong zeal for public ownership showing itself in early life that enlisted the time, talents and energy of Mr. Ellis in the service of the people. If it were in the public interest no sacrifice was too great for him to make. He had made a thorough study of labor questions which proved of value to him in the discharge of his duties. He was 71 years old.

William J. Curtin, former general counsel for the Eighth and the Ninth Avenues Railways in New York and for the Brooklyn-Manhattan Transit Corporation, is dead. Mr. Curtin was born in Buffalo 59 years ago. He attended the Buffalo Law School and became an assistant district attorney in that city, later coming to New York.

Andrew F. Daley, for 22 years general foreman of construction for the Rockford Electric Company, operating the railway system in Rockford, Ill., died April 19. He was born in Baldwinsville, N. Y., 64 years ago.

Franklin D. Jones, lawyer and author, died recently. He was a recognized authority on trade associations and was prominently identified with several of them. His book on trade association activities and the law was recognized as the standard authority in the trade association field, while his historical development of the law of business competition is considered the most thorough and scholarly treatment of that subject in print.

C. H. Bartels, for 25 years employed by the East St. Louis & Suburban Railway, East St. Louis, Ill., first in the claims department and later as a special agent, died recently.

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Spring Construction Programs Getting Under Way

WHILE purchases of electrical material and wire for transmission and other purposes undoubtedly have been held up during the past few weeks due to the fluctuating prices of copper, the purchase of track material has gone forward and a number of noteworthy projects have gotten under way with the coming of better weather.

It is announced that the Milwaukee Electric Railway & Light Company will spend more than $1,000,000 in renewing and extending its street railway trackage during the year, including an extension of double tracks which will add nearly 2 miles to the company's system. The program is coordinated with municipal street paving plans so that the entire width of certain streets will be improved simultaneously. In addition, costly special work is to be replaced at a number of important intersections.

Virginia Electric & Power Company, Richmond, Va., launched its spring and summer program with the reconstruction of 6,000 ft. of single track on its Q Street line, preparatory to paving the thoroughfare with 6,000 yards of vitrified brick. The project, which will cost $60,000, is part of a $250,000 improvement outlay set for completion during 1929. The company has recently purchased 1,200 International steel twin ties for T-rail. The Bethlehem Steel Company is supplying one carload of rail tieplates, 660 tons, 7 in., sec. 407-A rail and 160 tons, 80 lb. A.S.C.E. T-rail.

City to Repave, Tracks in Seattle and Reconstruct Elevated

The city purchasing agent, Seattle, Wash., has received a low bid of $28,304 from the Bethlehem Steel Company for three solid manganese, special track layouts and 1,100 tons of rail for the municipal street railway lines. An ordinance appropriating $28,000 from city funds has been prepared to cover the cost of paving the municipal street railway's share of the street improvement on Second Avenue North and to do the necessary track reconstruction. The City Council has also passed a bill appropriating $140,000 for the reconstruction of the elevated railway structure on West Spokane Street and East Marginal Way.

The Cleveland Railway has started a $200,000 track extension program in the Cleveland Heights district. When completed the fare in Cleveland Heights will be increased in accordance with a franchise adopted last December. Approval has been given for the purchase of brake shoes to the value of $55,000 from the Railway Material Company; 40,000 creosoted, red oak ties from Republic Creosoting Company, $70,000; and weatherproof copper cable from the American Electrical Works, $6,500.

Engineers of the Capital Traction Company, Washington, D. C., are planning to install new rail and paving on Connecticut Avenue, a distance of 3,116 ft., and on Pennsylvania Avenue from 9th to 15th Streets. The Connecticut Avenue work is estimated at $28,000 and that on Pennsylvania Avenue at $38,000.

Allegheny Valley Street Railway, Pittsburgh, Pa., has received 370 tons of 70-lb. T-rail, to be used for rebuilding the line between Aspinwall and Cheswick.

Construction of about 4 miles of street railway track in Vancouver, B. C., is promised by W. G. Murrin, vice-president British Columbia Electric Railway, in a statement discussing the question of raising the fares from 6 to 7 cents. Various other major track extensions are also under consideration.

For sundry maintenance and improvement work the Chicago Surface Lines has recently purchased 250 tons of 7-in. rail, 100,000 lb. hook-head spikes, 13,500 welding plates, 15,000 tierods, 178,000 lb. trackbolts, 54,000 lb. welding rods, 2,120 switch ties and 130 crossing ties. Line material purchased includes 1,800 wood strain insulators, 3,500 insulated bolts, 100 quick-break switches, 9,375 split pole sleeves, and 75,000 ft. soft-drawn span wire.

Track reconstruction under way and contemplated on the lines of the Duluth Street Railway, Duluth, Minn., has necessitated the purchase of 10,000 tamarack ties, 2,400 white oak ties, 2,000 tieplates, 120 kegs of spikes and 20 kegs screw spikes. Orders have also been placed for 500 gross tons 5-in. Illinois section 8040, 25 gross tons 7-in. Lorain Steel Company section 93/507 and 18 gross tons 7-in. Lorain Steel Company section 114/480 steel rails, as well as 5 miles No. 00 trolley wire.

An extensive program of track construction and reconstruction is indicated by the purchase by the Toronto Transportation Commission, Toronto, Ont., of 1,200 gross tons 122-lb. section L.S. 122-491 grooved-girder rail, 50 gross tons 140-lb. section L.S. 140-468 girder-guard rail, 50 gross tons 114-lb. section L.S. 114-480 girder-guard rail, 11,000 standard trackbolts, 25,000 combination flat tieplates, 10,000 track spikes, 3,000 7-in. rail bonds, type AW-8, 750 pairs 26-in. six-hole standard splice bars and 600 pairs 122-lb. welding splice bars. This is in addition to seven complete special trackwork layouts and 400,000 granite paving blocks.

The Connecticut Company, New Haven, Conn., has ordered 1,600 tierods, 800 kegs track spikes, 1,035 gross tons of rails, 550 pair joint plates, 379 kegs trackbolts and 2,000 steel ties.

A program of track improvement and reconstruction undertaken by the Twin City Rapid Transit Company, Minneapolis, Minn., has necessitated the purchase of a quantity of material, including 700 gross tons 5-in., 80-lb. T-rail, section 8040, 800 gross tons 6-in., 100-lb. T-rail, section 10020 (both orders filled by Illinois Steel Company) 400 kegs railroad spikes, 8,000 white oak ties, 5,000 cedar ties, 33,600 vitrified paving brick, and 6,600 bbl. Portland cement. Two single-track branch-offs and five standard 75-ft. radius switches were supplied by the Lorain Steel Company. Line material purchased included 133,000 ft. $\frac{5}{16}$-in. seven-strand, double perfected galvanized wire, and 70,000 ft. $\frac{1}{4}$-in. wire from Jenney, Semple, Hill & Company. For work on car repair and remodeling there were ordered 1,500 34-in. steel car wheels and 150 steel billets from Illinois Steel Company, 25,000 ft. Southern white oak and 12,000 ft. No. 3 common oak lumber from various dealers, 200,000 gal. asphalt road oil were ordered from Standard Oil Company, and 30,000 gal. viscoline lubricant from Phillips Petroleum Company. New road building machinery purchased includes one No. 7 Rex concrete mixer, a No. 818 all-steel Universal crusher, and a $\frac{3}{8}$-cu.yd. shovel, supplied by the Motor Power Equipment Company and powered with a 25-hp. General Electric motor.

Lehigh Valley Transit Company Buys Track Machinery

Purchases of the Lehigh Valley Transit Company, Allentown, Pa., include 4,000 white oak ties, and a number of special track appliances, including two No. 8 BP L.G. electric grinders from the Chicago Pneumatic Tool Company, one Eccentric rail grinder No. 138 and one Sansom rail grinder No. 704 from the Verona Tool Works, and one Atlas rail grinder from the Railway Trackwork Company.

While no extensive improvements are planned, the Pittsburgh Railways, Pittsburgh, Pa., has made liberal purchases of track, overhead line and shop material for maintenance and repair. In the first category are listed 50 kegs of various size boat spikes, 100 kegs trackbolts, 50 kegs of machine bolts, 620 railroad crossing bolts and 2,580 ties. Line work projected has called for the purchase of 30 tubular-steel poles from the National Tube Company, 50 crossarm supports from the Electric Railway Improvement Company, 500 W216151 and 1,000 W268588 straight-line feeder insulators and 500 W256162 corner insulators from the Westinghouse Electric & Manufacturing Company. A quantity of sectional insulators, trolley guard and crossings was supplied by the Ohio Brass Company.

Washington Railway & Electric Company, Washington, D. C., has purchased six No. 158 pneumatic diggers and three CC-45 paving breakers from the Ingersoll Rand Company.

In addition to the experimental cars mentioned elsewhere, the Louisville Railway has also recently placed orders for 300 tons 7-in. A.E.R.E.A., 122-lb. grooved rail, 250 tons standard A.S.C.E., 70-lb. T-rail, 10,000 trackbolts and 6,000 machine bolts. Fifteen

Exhibitograph No. 9

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A.E.R.A. Exhibit Committee

Reports

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miles of No. 00 trolley wire and 5 miles phono-electric wire have also been purchased.

Construction is under way on the extension of the Park Street line in Beaumont, Tex., to the new baseball park.

The Ottawa Electric Railway, Ottawa, Canada, contemplates the purchase of 150 gross tons of 122-lb. grooved rail. This company has recently purchased a quantity of track spikes and trackbolts, mainly from Canadian manufacturers.

Rolling Stock Orders Numerous

Altoona & Logan Valley Electric Railway has placed an order with the Osgood-Bradley Car Company, Worcester, Mass., for five cars to cost approximately $18,000 each. Delivery is to be made during July or August. The J. G. Brill Company's Kuhlman plant has received an order for two double-truck, double-end cars for the Newell Bridge & Railway Company, Newell, W. Va. The same company has also recently received orders for 33 single-end motor car bodies and 200 Brill 76-E type trucks from the Chicago Surface Lines, five passenger and smoking motor bodies complete, with Brill 27-MCB type trucks for the Philadelphia & Western Railway, Norristown, Pa., and ten bodies, 42 ft. 1½ in. over-all length, complete with Brill 177-E type trucks, from the Delaware Electric Power Company, Wilmington, Del.

The Nashville Interurban Railway, operating an 18-mile route between Nashville and Franklin, Tenn., announces through its president, Elliott Napier, the purchase for July delivery of two high-speed interurban cars, seating 52 passengers each, from the Cincinnati Car Company.

Purchase of fifteen new cars to cost about $300,000 is planned by the British Columbia Electric Railway.

Completion of its program of remodeling the first group of cars used by the Key System Transit Company, Oakland, Cal., in its transbay service, has been announced by A. J. Lundberg, president. The improvements include the installation of deep-cushioned, individual leather seats; a new seating arrangement, industrial carpet and modern illumination units. Noise-deadening and shock-absorbing shims have been placed between the trucks and the car bodies and about the air compressors.

Gary Railways, Gary, Ind., has placed in service one of two light-weight interurban cars, supplied by the Cummings Car & Coach Company.

Orders have been placed by the Cleveland Railway for five pairs of Timken model 52 car trucks.

That the electric railways continue as the largest group purchasers of buses is indicated by the orders made public during the past month. The Rockford City Traction Company, Rockford, Ill., which already has a fleet of 26 buses, has added two 40-passenger, A.C.F., metropolitan type coaches. Mack-International Motor Truck Corporation reports sale of three model AB, four-cylinder, 25-passenger, city-type buses to the Illinois Power Company, Chicago; and one model AL, 33-passenger, city-type bus to the Houston Electric Company, Houston, Tex.

Twin Coach Corporation has recently delivered four coaches to the Los Angeles Railway, three to the Milwaukee Electric Railway & Light Company, six to the Detroit Motorbus Company, all of the urban type, and five suburban-express type coaches to the United Railways & Electric Company, Providence, R. I.

United Railways & Electric Company, Providence, R. I., has ordered ten Twin Coaches from the Twin Coach Corporation, Kent, Ohio. The company has also purchased a considerable quantity of material for the usual maintenance work, including 2,000 D-67 brakeshoes and 2,000 D-61 brakeshoes from the American Brake Shoe & Foundry Company.

Orders placed by the Denver Tramway Corporation, Denver, Colo., include an A.C.F. urban type bus, one model 53 White chassis, and one model 54 White chassis, mounted respectively with 25-passenger and 33-passenger Bender, pay-enter, city type bodies.

The Gray Coach lines, a subsidiary of the Toronto Transportation Commission which recently acquired five bus routes from private operators with the approval of the Toronto City Council, is now purchasing 35 new buses for June delivery at a cost of approximately $365,000.

The Twin City Rapid Transit Company also is planning to increase its fleet of buses by the purchase of two 33-passenger, model GY chassis, 239-in. wheelbase buses, complete with bodies, from the C. H. Will Motor Corporation, two 33-passenger, de luxe parlor car bus bodies from Eckland Brothers Company, three four-cylinder, Mack model AB 230-in. wheelbase chassis, and two 29-passenger, all-steel bus bodies from the Lang Body Company, Cleveland.

Other bus sales reported include three A.C.F., 40-passenger, metropolitan type coaches to the Portland Electric Power Company, Portland, Ore., one 21-passenger, Studebaker street car type bus to the Oklahoma Railways, Oklahoma City, Okla.; one A.C.F. de luxe urban coach to the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., fifteen A.C.F., 40-passenger metropolitan coaches to the Detroit Department of Street Railways, and three A.C.F., 30-passenger, urban coaches and two 23-passenger urban coaches to the Scranton Railway, Scranton, Pa. The Altoona & Logan Valley Electric Railway through its subsidiary, the Logan Valley Bus Company, has placed an order for five A.C.F., 23-passenger urban coaches.

Types of Cut Tacks and Nails Reduced

The Bureau of Standards of the Department of Commerce has published bulletin R47-28 dealing with recommendations for the manufacture of cut tacks and small cut nails, prepared in accordance with the departments' policy of bringing about the elimination of waste through simplified commercial practices. As the result of conferences, held under the auspices of the bureau, the leading manufacturers and users of these materials have tentatively agreed to accept the standards set up in the bulletin. Prior to the adoption of the present list, the possible selection of style, size, finish and packing of tacks and nails comprised 21,200 combinations. The present simplified list has reduced the number to 1,156 stock items. Among other organizations which have agreed to accept the proposed recommendation is the American Electric Railway Association.

High Price of Copper Retards Purchases by Public Utilities

Hand-to-mouth buying, which has been hailed as one of the great stabilizing influences in American business, seems to be chiefly responsible for the runaway market in copper, consumers of which, along with buyers of nearly every other commodity, had practically discontinued the practice of carrying reserve stocks. Ordinarily, economists agree, this practice contributes importantly to stabilization.

When, in the past, the retailers, the small users, and jobbers and wholesalers were forced to carry stocks because transportation was less efficient than now and subject to frequent and unexpected interruptions, a dangerous situation was created. With large stocks in the hands of so many persons, statistics were difficult to secure and overproduction of commodities frequently resulted before the situation could be corrected. Now, with the responsibility of meeting demand resting principally upon the producer, the danger is greatly minimized, as the producer is in a much better position to know the relationship between demand and supply. In the case of copper, however, this practice played into the hands of those who are anxious to attain more influence in that industry. The consumers would have been in much better position to protect themselves in this instance had more adequate statistics been available.

The recent great increase in the price of copper is regarded as an unhealthy boom, since in it were the elements of a combination of increased demand by the consumer and a disposition by the producer to exact the greatest toll out of a temporary shortage. As a result, world trade in that commodity has been disorganized and difficulties have been passed down into all the ramifications of that important business. That the consumers are not without redress is instanced by the recent recessions in the price of this metal.

Louisville Railway Receives Experimental Cars

The second of four different types of cars, which have been ordered by the Louisville Railway, Louisville, Ky., for trial purposes on its lines, was recently placed in service. The first of the new cars, supplied by the St. Louis Car Company, was delivered some weeks ago and was favorably received by the public. It seats 51 passengers in individual leather-upholstered seats, arranged in pairs, and is provided with other modern conveniences. The second car to arrive was supplied by the Kuhlman plant of the J. G. Brill Company. This car has a well entrance and exit, in contrast to the St. Louis car which had treadle-folding steps. The third car, to be supplied by the Cincinnati Car Co., is expected to arrive early in May. The fourth car will be built in the company's own shops, using Timkin trucks and Westinghouse high-speed motors. Seats will be of the semi-individual, leather-upholstered type. The two cars already received are similar in seating arrangement, ceilings are low and the front dash has adopted features of bus construction.

O. M. Edwards Company, Syracuse, N. Y., is to equip the 100 new cars being supplied to the city of Detroit, Department of Street Railways, by the Perley A. Thomas Car Works, with brass sash, together with necessary sash fixtures.

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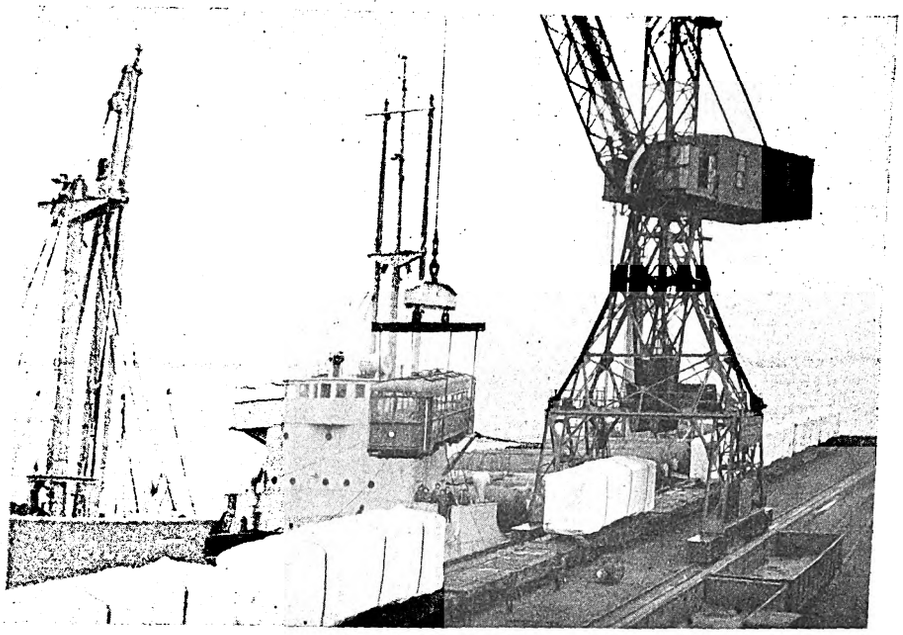
J. G. Brill Company Ships Cars to South America

As an evidence of the expanding character of American foreign trade which has extended to all branches of industry, there were recently shipped from Eddystone ten of an order of twenty trolley cars completed by the J. G. Brill Company at its Philadelphia plant for the Companhia Carris Porto Alegrense, of Porto Alegre, Brazil. The cars were completely assembled down to the last detail for shipment. This is said to be the first occasion that a foreign shipment has not been made in sections or unassembled. An accompanying photograph shows one of the cars being loaded aboard the Norwegian freighter, "Belpamela," from the pier at Eddystone.

The new cars are the first of the so-called "master-unit" type developed by Brill. A complete account of the reasons for developing the line and general specifications of the various models, were given in an article by George Frey published in this paper for Jan. 26, 1929. The car body is of the light-weight type, arranged for double-end, one-man or two-man operation. Sides are single-sweep curved, with skirt below the sill. Platforms are drawn in and the ends have sloping window sash, somewhat after the manner of the latest types of bus construction. A well at each step has two two-leaf folding doors at each corner of the platform for entrance and exit. Seats are of the reversible type, upholstered in rattan. "Admor" seats of mahogany are provided at diagonal right-hand corners, bringing the total seating capacity up to 44. A pedestal seat, with spiral spring and cushion, is provided for the operator.



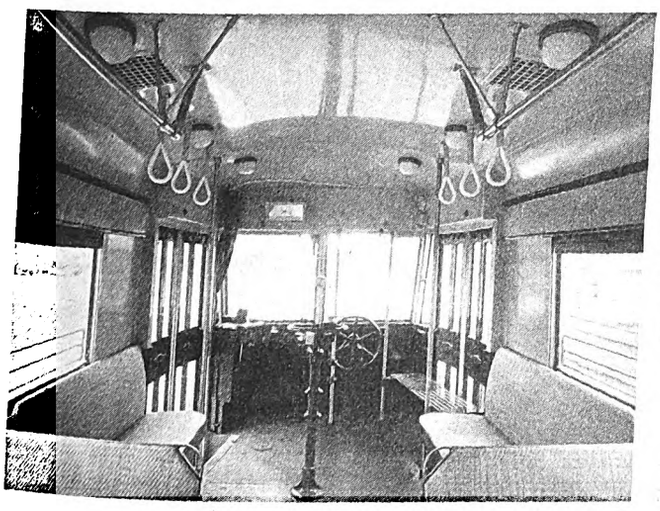
Loading new Porto Alegre cars on the Norwegian freighter "Belpamela" at Eddystone, Pa.

Underframe is of steel throughout, and copper bearing steel is used wherever needed to resist corrosion. The door mechanism is arranged to interlock with brakes. The motorman, or one-man operator, controls the doors at both ends of the right side of the car through a selector valve, and both ends of the left side through a double-control valve. The conductor is to operate the doors on each side of the platform at the rear through a control valve attached to a stand located at the center of the end sills, cross-wise of the car.

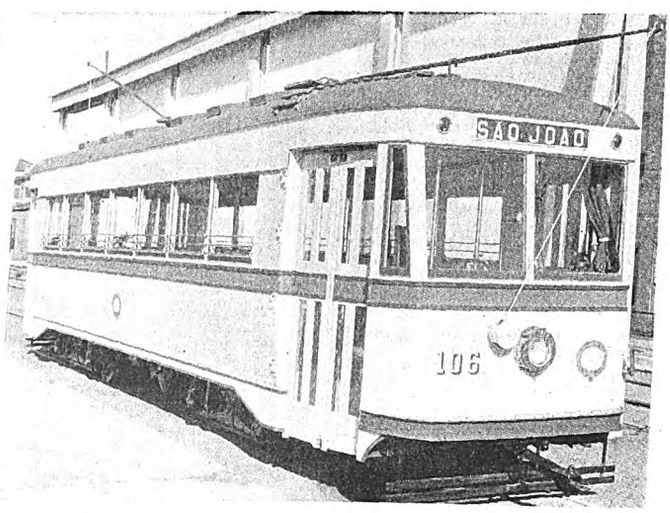
No scale weights of the cars are

SUMMARIZED SPECIFICATIONS OF CARS SHIPPED TO BRAZILIAN ELECTRIC RAILWAY

Name of Railway	Companhia Carris Porto Alegrense, Porto Alegre, Brazil
Number of units	20
Type of unit	One-man or Two-man, Motor Passenger, City, Double end, Double truck
Number of seats	44
Date of order	Dec. 31, 1928
Date of delivery	April 1, 1929
Bolster centers	17 ft. 5 in.
Length over all	38 ft. 1 in.
Length over body posts	27 ft. 5 in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 5½ in.
Height, rail to trolley base	10 ft. 6⅜ in.
Window post spacing	3 ft. 5 in.
Body	Semi-steel
Roof	Arch
Doors	Folding, end
Air brakes	General Electric
Axles	A.S.T.M. specifications
Car signal system	Buzzer, Faraday single stroke bell
Compressors	CP—27—B
Conduit	Duraduct and Duratube
Control	Safety Car, type K
Couplers	Brill radial drawbars
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote No. 86
Destination signs	Hunter, type 226-RB
Door mechanism	National Pneumatic Company
Fare boxes	Cleveland model 5
Floor covering	Yellow pine and Tuco Flexolith
Glass	Libby-Owns
Hand brakes	Peacock staffless
Hand rail and stanchions	Monel metal
Headlights	Crouse-Hinds
Headlining	Agasote, ¼ in.
Interior trim	Mahogany window sills, enameled steel posts and fittings
Journal bearings	Plain
Journal boxes	MCB, 3¼ x 6 in.
Lamp fixtures	Electric Service Supplies Co.
Motors	Four G.E.-265, inside hung
Roof material	Cypress, canvas covered
Safety car devices	Standard
Sash fixtures	Curtain Supply Company
Seats	Brill No. 201-E Phoenix type
Seat spacing	31 in.
Seating material	Rattan, leather faced
Slack adjusters	Brill mechanical
Steps	Stationary
Step treads	Kass
Trolley catchers	Keystone
Trucks	Brill No. 177-EX-1
Ventilators	Brill exhaust
Wheels	Steel tired, 27 in. diameter
Wheelguards	H-B
Windshield wiper	Brill single blade



Wide windows give a pleasing effect to the car interior



Streamline painting in bright colors creates an attractive exterior

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available. The estimated weight for all-steel cars of this type is given as 34,635 lb.

Porto Alegre, the point to which the cars are destined, is a city of about 100,000 population, containing large foreign elements, mainly German and Italian. It is the capital city and principal port of the Brazilian State of Rio Grande do Sul.

Single-Phase Railway System Reviewed

Development of the single-phase system for railway propulsion is the subject of an attractive special publication of the Westinghouse Electric & Manufacturing Company, known as Reprint 357. The history of the system is taken up from its inception. That history is, according to the authors, J. V. Dobson and F. C. Hanker, closely interwoven with the engineering activities of the late B. G. Lamme. Early experiments culminating in the equipment of the New York, New Haven & Hartford Railroad are considered in some detail. Following this are short sections on the Norfolk & Western, the Virginian, and the Pennsylvania Railroad installations. Brief mention is made of the motor-generator locomotives, such as are used on the Detroit & Ironton and the Great Northern systems.

At the end of the publication is a complete list of railways throughout the world using single-phase systems, with detailed statistics on the locomotives of all types employed on them.

Copperweld to Be Sold by General Cable

General Cable Corporation has consumated an agency agreement with Copperweld Steel Company, whereby General Cable Corporation is appointed the sole and exclusive agent in the United States to draw wire from Copperweld rods and to sell wire so drawn and wire products made therefrom.

Copperweld Steel Company has recently enlarged its special equipment for the production of Copperweld billets and rods and General Cable Corporation has, in its several plants, large capacity for the drawing of these rods into wire and for the fabrication of wire products. These complementary facilities, together with the engineering, sales and distribution organizations of both companies, will be effective to secure increased production and distribution of Copperweld wire and wire products, together with improved service to all users of Copperweld material.

Hereafter all copper-covered steel wire and wire products handled by General Cable Corporation will be produced exclusively from Copperweld material.

Full and complete sales and engineering service on Copperweld wire and wire products is now available through each of the divisions of General Cable Corporation.

Steel Companies Merge

Merger of the Commonwealth Steel Company, Granite City, Ill., with the General Steel Casting Company, Philadelphia, Pa., brings the American Steel Foundries, Baldwin and American Locomotive Corporations into a new combine, since General Steel Castings Company has recently been organized by those three concerns. J. P. Morgan & Company, New York, is handling the financing and has been designated as the depository for the stocks in the merger.

The Commonwealth Steel Company recently announced a $1,000,000 program of additions to its Granite City plant. This plant occupies about 80 acres with 170 acres of additional industrial property held by the company in the immediate vicinity, giving ample room for expansion. The plant is equipped with six large open-hearth furnaces, having a capacity of 100,000 tons annually, used chiefly in the manufacture of steam railroad locomotive beds, gas-electric rail car beds, Pullman car trucks and parts.

This company manufactures street car, interurban and trailer trucks for the electric railway industry and has truck installations on the Philadelphia Rapid Transit Company, Pacific Electric, Detroit Street Railway, Interborough Rapid Transit Company and other large properties.

ELECTRIC RAILWAY MATERIAL PRICES—APRIL 25, 1929

Metals—New York

Copper, electrolytic, cents per lb	17.775
Lead, cents per lb	7.00
Nickel, cents per lb., ingot	35.
Zinc, cents per lb	6.625
Tin, Straits, cents per lb	44.656
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	54.00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.10
Somerset mine run, f.o.b. mines, net tons.	1.80
Pittsburgh mine run, Pittsburgh, net tons.	1.58
Franklin, Ill., screenings, Chicago	1.70
Central, Ill., screenings, Chicago	1.45
Kansas crushed mine run, Kansas City	2.25

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅝ in. and larger, cents per lb	2.80
Tie plates (flat type), cents per lb	2.15
Angle bars, cents per lb	2.75
Rail bolts and nuts, cents per lb	3.90
Steel bars, cents per lb	1.925
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.70
Sheet iron (24 gage), cents per lb	2.90
Sheet iron, galvanized (24 gage), cents per lb.	3.65
Galvanized barbed wire, cents per lb	3.35
Galvanized wire, ordinary, cents per lb.	3.15

Waste—New York

Waste, wool, cents per lb	18.
Waste, cotton (100 lb. bale), cents per lb.:	
White	17.25
Colored	13.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb	10.3
White lead in oil (100 lb. keg), cents per lb.	13 25
Turpentine (bbl. lots), per gal	$0.585
Putty, 100 lb. tins, cents per lb	5.725

Wire—New York

Copper wire, cents per lb	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6 85
Weatherproof wire base, cents per lb	20.875

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	$2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.25
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, ¾-in., cu.yd., delivered	3.25
Sand, cu.yd., delivered	2.00

Old Metals—New York and Chicago

Heavy copper, cents per lb	13.875
Light copper, cents per lb	11.875
Heavy yellow brass, cents per lb	7.875
Zinc, old scrap, cents per lb	3.585
Lead, cents per lb. (heavy)	5.375
Steel car axles, Chicago, net ton	$17.75
Cast iron car wheels, Chicago, gross ton	14.75
Rails (short), Chicago, gross ton	19.25
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.75

TRADE NOTES

Ross F. Hayes, who during the past five years has been engaged as manufacturers' agent, railroad supplies, at New York, has become connected with the Adams & Westlake Company as representative in charge of Eastern sales of Rex car specialties. Hr. Hayes was formerly for many years with the Curtain Supply Company as Eastern manager at New York, and later was general sales-manager at Chicago. The Curtain Supply Company was consolidated about two years ago with the Adams & Westlake Company. Mr. Hayes goes to the Adams & Westlake Company at its Eastern office, 50 Church Street, New York.

General Electric Company, Schenectady, N. Y., has received orders for the first quarter of 1929 amounting to $101,365,208, compared with $79,925,840 for the corresponding period of last year, an increase of 27 per cent.

The White Company, Cleveland, Ohio, announces the promotion of Thomas Blagden, Jr., Australian division manager, to vice-president of the export region. L. M. Hart, managing director of The White Company, Ltd., has been appointed vice-president in charge of the Canadian territory. Vice-President Jay Rathbun, who has had the entire responsibility of the export and Eastern regions, will devote his time to the Eastern region exclusively. Messrs. Blagden and Rathbun will have their offices at 225 Broadway, New York.

Montain Treating Company, Westboro, Mass., has extended its operations into the pole-treating field, using its patented process of wood preservation. Licenses for the use of this process have been negotiated by the Pensacola Creosoting Company, Inc., Pensacola, Fla., and the Gulfport Creosoting Company, Gulfport, Miss. Plans are on foot to utilize a 50-acre site adjacent to the present plant at Westboro, Mass., for a pole-treatment and storage center to serve New England utilities.

J. C. Lincoln, formerly president of the Lincoln Electric Company, Cleveland, Ohio, has been elected chairman of the board. J. F. Lincoln has been elected president. The company makes a complete line of motors and arc-welding devices.

Sullivan Machinery Company, Chicago, Ill., manufacturer of compressors and air-driven machinery, has moved its general offices from 122 South Michigan Avenue to the Wrigley Building, 400 North Michigan Avenue, Chicago, Ill.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

CHARLES GORDON, *Editor*

LOUIS F. STOLL, *Publishing Director*

Volume 73 — New York, June, 1929 — *Number 15*

Community Transportation an Unrecognized Major Element in Prosperity

HAVING local transportation service conveniently available has come to be accepted as a matter of course by the American public. Memory fails to recall the time when such facilities did not exist. Before the advent of electric cars our fathers had cable cars, and before that, horse cars. In those early days the development of transportation facilities was of interest, but nowadays it receives scant attention. This waning appreciation of the economic importance of public transportation is due in part to long familiarity, and in part to the greatly increased interest in private transportation. Where one person formerly owned a horse and carriage, hundreds now own automobiles. The private automobile has become the pleasure vehicle for the masses, while the street car has been relegated to the rôle of a mere utility and has lost prestige accordingly. Despite its loss of social standing, however, the public transportation vehicle today remains a vital factor in the social and business life of every large community.

That the American public has become "automotive minded" is so clearly apparent that there is little need for calling attention to the fact. This is true not only of the so-called masses, but of intelligent business men and economists.

From the point of view of the local transportation industry, "automobile mindedness" in this country has produced a peculiar and highly critical situation. The nation has apparently forgotten that it has such a thing as a local transportation industry in which there is invested $6,000,000,000 of money and which has been very sick for more than a decade. It has overlooked, as well, the fact that this industry has played a vital part —and continues to do so—in the upbuilding of American communities and American industrial life as we know it today.

Business men and economists are keenly interested in the factors that have contributed to the country's prosperity during the past seven or eight years, and are eager to eliminate any conditions that may be harmful to the continuation of that prosperity. The difficulties of the farm industry, railroads, shipping, oil, textiles, and in a somewhat smaller degree, coal and lumber, elicit the interest and concern not only of business men and economists, but of the general public itself. The front pages of the newspapers of the nation have gone "economic." They reflect the popular interest in the continuation of present prosperity. The country has put an economist in the White House. The houses of Congress and the departments of the government are occupied with economic questions. National business organizations are concentrating on the economic inter-relations of business. But in all of this interest and activity the public seems to have lost sight of the size, importance and difficulties of the local transportation industry which is bound up vitally with industrial, economic and even social well being and progress of the nation.

Fifth Avenue's Beautiful Dream Is Shattered

FOR years the merchants of the aristocratic Fifth Avenue shopping district in New York City have talked grandiloquently about the tremendous number of customers who come rolling up to their stores in limousines. Spokesmen for the Fifth Avenue Association have rushed into print to oppose parking restrictions with vociferous statements concerning the evils of such measures. Their labored arguments, however, do not always stand up under the light of unbiased investigation. For example, a statement published a short time ago in the New York newspapers and credited to W. J. Pedrick, executive vice-president of that association, branded the Chicago parking restriction as a failure and declared it had worked great harm to downtown business in the Illinois metropolis. Subsequent investigation disclosed the facts to be the reverse and furthermore failed to show that Mr. Pedrick had talked with any of those who could have informed him authoritatively as to the actual results of the Chicago experiment. More recent statements from the same sources, purporting to be based on the result of parking "studies" covering a two year period, claimed that the private automobile was furnishing 51 per cent of the daily business of the Fifth Avenue stores.

Now for the first time an actual customer count has been made under the auspices of the Citizens' Street Traffic Committee at some 50 stores, and the merchants have learned to their astonishment that less than 4 per cent of their customers come by private automobile, while more than 96 per cent come by public conveyance, or walk to the stores. Thus, as regards transportation, the Fifth Avenue district turns out to be no different from Chicago, Philadelphia, Detroit, Los Angeles, and every other large city where a vast majority of the traveling public are users of public conveyances.

To what extent the figures disclosed by this survey will influence the Fifth Avenue merchants to recede from their position regarding the restrictions of the parking privilege, is impossible to forecast. It is proverbial that "none are so blind as those who will not see." Growing congestion is making the Fifth Avenue district more difficult of access every day. Unless the situation is remedied people will do their shopping in other districts more easily accessible. Yet the practice continues of using the public streets for the storage of private automobiles to the detriment of all moving traffic. In their own interest,

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the Fifth Avenue merchants should rouse themselves from their dreams of "carriage trade" and face the facts concerning parking the same as they would face any other facts connected with the conduct of their business.

A Contribution to the Struggle for Clearer Economic Insight

ON THE 15th of May there was made public for the first time the report of the committee on recent economic changes, of which Herbert Hoover was chairman, and which was based upon an economic survey of the period from 1922 to 1929 compiled by the National Bureau of Economic Research. Though quite brief and easily read, the report condenses into a few pages a résumé of economic philosophy based upon the study of current facts, which merits the careful attention of every industry and every good citizen of the country. The report and survey were recently published in book form by the McGraw-Hill Book Company under the title "Recent Economic Changes."

To a broader understanding of economic forces, more general co-operation within industry itself, and an enlarged measure of self-restraint on the part of all elements of the business, financial and industrial world, the committee attributes the fact that the period from 1922 to the beginning of 1929 was one of unusual stability and business activity. During this period the country has been successful in maintaining a condition of economic balance between the forces of distribution and consumption despite a period of rapid acceleration in activity, "spotty" penetration of prosperity as among industries and geographical districts, and unusual conditions arising out of peace-time adjustments.

One of the striking and significant developments of the period under study, according to the committee, is in the field of price relationships, wages and the cost of living. Between 1896 and 1913, the price level rose 2.3 per cent a year while the purchasing power of wages rose only 0.5 per cent a year, whereas during the period between 1922 and 1927 price levels declined 0.1 per cent a year while wages rose 2.1 per cent a year. The committee attributes to this combination of a steady rise in wage levels with a stationary cost of living, a widespread influence on the whole economic situation during the period of its study. It points out, also, that this high wage level was combined with low unit production costs, through increased productivity of labor by introduction of labor-saving machinery. No other period in our history has shown so striking an increase in productivity per man-hour. Per capita productivity was nearly 60 per cent greater than in the late 90's, and in manufacturing increased 35 per cent from 1922 to 1925.

Above all else the committee stresses the importance of maintaining an economic balance between the various factors and forces in our complex economic structure. All parts of the structure are interdependent and easily affected. Ignorance of economic principles, greed, inadequate or incompetent leadership, waste of natural resources, use of credit for speculation instead of productive purposes, or artificial unbalancing of prices as between industries, can quickly throw the entire complicated economic machine out of synchronism. Although the committee is unable to go further than this in pointing out specific measures for insuring the continued, smooth and accelerated flow of production, distribution and consumption, it holds that complete control of the economic system is a possibility to which we may look forward through increasing knowledge and skill, by following a course of continued research, study and orderly classification of facts. As to the causes of the successful combination of conditions through which we are passing, and which were the basis of the committee's report, it is apparent that they were partly accidental and partly the result of forward-looking industrial and economic thought and intelligent leadership.

Supreme Court Makes Railroad History

DURING the long struggle to determine the basis of "fair value," which has been the great bone of contention from the very beginning of commission regulation of railroads and public utilities, probably no more momentous decision has ever been made by the courts than that rendered on May 20 by the Supreme Court of the United States in the St. Louis and O'Fallon Railroad case. Certainly no more sweeping a victory has ever been won by a railroad in which so much was at stake, for it involved the principles upon which the Interstate Commerce Commission is to evaluate for rate making purposes and for the control of earnings, from $15,000,000,000 to $20,000,000,000 of railroad property in the United States.

The case arose under that provision of the transportation act of 1920, which requires a railroad to turn over to the government one-half of its net income in any year which exceeds 6 per cent of the value of its property. In fixing the value of railroads for rate making and for the application of this provision of the transportation act, the commission started with the cost of reproduction as of June, 1914. This figure was brought down to 1919 by adding or subtracting all additions and betterments subsequent to 1914, less depreciation, but making no adjustments for changing construction cost levels between 1914 and 1919 on the property valued as of 1914. Since 1920, the railroads had been required to submit to the commission data which permitted these figures to be brought down to date in any year.

Counsel for the O'Fallon Railroad insisted that the commission did not determine the actual value of the railroad by considering all relevant facts and circumstances, and with the exception of valuing the lands, had based its valuation on the prudent investment theory. The central point of the Supreme Court's decision is that it held that the Interstate Commerce Commission must take into consideration as one of the factors in value, cost of reproduction; and that it had failed to do so in the method which it had followed.

Thus it is apparent that cost of reproduction becomes a factor of increased importance in the determination of value for rate-making purposes. This does not mean, of course, that reproduction cost at current price levels is the sole basis of valuation. It has been repeatedly pointed out by economists that such a theory is as unsound as is that of original cost, for it would introduce a speculative element into value that would have as disastrous an effect upon utilities during a period of falling prices as it would be advantageous when prices are rising. But the Supreme Court has said in this case that reproduction cost is one factor, that with others must be considered. Obviously the day when valuation for rate-making purposes can be reduced to a formula is still a considerable way off.

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No Cars Available?

ANTICIPATING an extensive car improvement program, the Louisville Railway has purchased three sample cars from three different car manufacturers. Of course, no outstanding interest can be attached to a mere order for new equipment, but the conditions surrounding the Louisville purchase and the method of ordering the sample cars raise this order above the level of the ordinary. At the present time the railway is in the throes of securing a fare adjustment. Negotiations are under way to determine a rate which will yield a reasonable return on the fair value of the property. But along with its request for higher rates, the railway plans to offer the public a maximum of service compatible with its earnings.

With this objective in view, the railway requested the manufacturers to build that type of car, seating approximately 50 persons, which in their estimation would best meet the present-day street railway needs. All other details were left to the manufacturers, so that each might produce the car which in his estimation was the vehicle having the greatest merchandising attractiveness.

As was to be expected, no cars were available! The manufacturers have not in the past followed the practice of building standard models to deliver when an order is received. But this raises the old question: "Could the manufacturers dispose of standard models successfully, just as the bus manufacturers do?" It is still a matter of conjecture, and one that can be decided only by overcoming the inertia of following old practice adhered to by both railways and manufacturers. Certainly the manufacturers would welcome any move to bring about mass production with its resulting savings.

The real problem seems to be whether or not the railways would buy standard models in sufficient quantity if they were available. The Louisville Railway has answered indirectly in the affirmative, and there is every reason to believe that many companies would welcome a ready source of new cars. The final answer will be determined by price and performance. If the manufacturers offer a standard product from their individual plants at less cost than that of special designs, and if these manufactured cars outpoint the special designs in appearance and performance; that is to say, if they attract passengers and can be run at less cost, there will be no question as to what future car buying practice will be.

Accomplishments Reflected by 80 Operating Statements

CONCRETE evidence of the stability of the electric railway industry is furnished in a digest of the financial reports of 80 individual companies published elsewhere in this issue. These reports, representing nearly three-fourths the total gross revenue of all the electric railways in this country, show that the amount of gross business done by the lines included is almost identical with that done in 1927, while in general expenses have been reduced. Since small, medium-sized and large properties are all incorporated in the list, it presents a fair picture of the industry.

The information given by individual reports is quite different from that found in the industry totals published last month. There the figures were grouped together, so that only averages could be discussed. Individual reports make it possible to see which properties are making satisfactory progress as compared with the averages. It is notable that size alone is not a measure of the financial success to be expected.

Of course, one property cannot truly be measured in terms of another. Still, the fundamentals are the same. The ideal is to get as much gross business as possible and to keep the expense as low as it may be. These are not considerations that are opposed. It is true that if the effort to keep operating costs low is allowed to degenerate into parsimony the very means defeat the object. There is no general formula which will get the best results. Rather do they follow from a wise policy which, while it always takes into account the need for care in the matter of expenditures, does all that is consistent with keeping the service to a standard that attracts the maximum of business. And this is not all a matter of the physical side. Of course cars must be attractive and the track good. But if the schedules are not carefully arranged and the fare structure nicely fitted to the business possibilities of the territory, unsatisfactory results are bound to follow.

It would indeed be fortunate if experience in the past had furnished a criterion for the scheme of fares under which every company might be expected to make the best possible showing. But unfortunately there has been little progress made in the determination of the principles upon which to base a scientific fare structure. The process of establishing fares has been that of cut-and-try. But even that crude process has been productive of beneficial results when intelligently applied, as the figures in this compilation attest. These figures indicate also that only a relatively small proportion increase in gross with present expenses would put many properties well along the road of satisfactory earnings and financial stability.

Cleveland Mobilizes Its Maintenance Ideas

INTEREST in maintenance practice is increasing steadily. Alert executives realize that during this period of readjustment in the industry maximum efficiency in maintenance is of more importance than ever in determining the color of the net figures for the year's operations.

The maintenance contest conducted by ELECTRIC RAILWAY JOURNAL was conceived with the idea of stimulating interest in better maintenance methods and practices. Winners of departmental prizes in the second period of this year's contest are announced elsewhere in this issue and the contest now enters its final phase. The results of the contest, as indicated by the character of ideas submitted by men from a wide range of properties, have shown beyond all question that it has been very much worth while. It is of particular interest to note that the best showing by individual companies so far has been a direct reflection of the effort made by the managements of various properties to arouse interest in improved methods among their rank and file.

Organized participation by the Cleveland Railway during the period which closed April 15 resulted in the submission from that one company of eighteen ideas out of a total of 43 turned in from thirteen different companies. This illustrates in a striking way the spirit that can be aroused among maintenance forces. But an even more important fact is that these entries from Cleveland won three out of the four department prizes awarded during this period of the contest.

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Do *High Buildings* Cause TRAFFIC CONGESTION?

By

E. J. McILRAITH

Staff Engineer Chicago Surface Lines

Neither arbitrary limitation of building heights, nor wholesale street widening offer panaceas for congestion. Automobile usage, not high buildings, is the primary cause of present-day congestion. Analysis of the traffic to various classes of buildings indicates that the character of occupancy has a greater bearing on traffic than has the building height. The remedy for congestion lies in the separation of various classes of traffic. This is entirely practicable in the modern city provided the economic burden is properly distributed.

ONE hundred and fifteen years ago the traffic problem was troubling London. A very notable decision at that time expressed the rights of the community to control street use and to prevent parking where standing vehicles become a hindrance to general public convenience in movement along a street. The case involved the right of a stage to stand on the street beside Charing Cross Station while waiting for time to make its return trip. Lord Ellenborough, one of the most noted judges of the King's Bench, in sustaining a conviction against the operators, stated in May, 1812:

> Every unauthorized obstruction of a highway to the annoyance of the King's subjects is an indictable offense. Upon the evidence given, I think the defendant ought clearly be found guilty. The King's highway is not to be used as a stable yard. It is immaterial how long the practice may have prevailed, for no length of time will legitimate a nuisance. A stage coach may set down or take up passengers in the street, this being necessary for public convenience; but it must be done in a reasonable time, and private premises must be procured for the coach to stop in during the interval between the end of one journey and the commencement of another. No one can make a stable yard of the King's highway.

This decision, so often quoted, is not to be considered as an isolated case of that period, but is an effective illustration coming from one of the outstanding English jurists of his time, of the necessity then recognized for regulation of street use in order to retain for the public the principle "that the primary object of the street is for the free passage of the public."

We are still seriously concerned with the working out of that same problem, but it is only in very recent years that the intensity of street use in American cities has given us the threatening difficulty that we call "The Traffic Problem."

It has become a commonplace today to speak of vehicular movements on the street as "traffic." The older meanings of the word referred to business or commerce, or to the movement of goods by railways. It is already a term so generally used that it scarcely needs definition, for it can be applied without misunderstanding to the discussion of movements of vehicles and street cars or even of pedestrians.

Freedom of Movement Is Limited

The "traffic problem" that is constantly under discussion or, to put it more accurately, is continually mentioned in conversation and print, is truly a problem with tremendous bearing upon the costs and comforts of modern life. Each citizen is confronted with definite evidence of the growing intensity of use of streets and highways. The freedom of his movements is limited, whether in town or country, but perhaps few have fully realized the specific reasons for this sudden sense of the inability to go when and where one pleases, quickly and conveniently.

The usual casual answer would be expressed as "too many automobiles" or "too few roads." Both are evidences of the basic reason, "we want to go somewhere and we want to do it in our own automobile." Here is a sudden burst of enthusiasm for automobile travel which has developed within a very few years into a great extravagance in our every-day life.

Of course, it is not the only extravagance that has become an accepted necessity in the American standard of living. Silk clothing, elaborate amusements, costly homes and furnishings, extensive travel, and expensive foods are all considered present-day commonplaces.

That such standards are possible is a remarkable tribute to American methods. There seems every reason to expect even a higher standard of luxury in living for the people of this country, and no arbitrary barriers should be put in the way of developing the best educated and happiest people on the earth with the maximum enjoyment of the best the world affords.

Yet, we must recognize that this enormous growth in automobile use has taxed seriously the capacity of our streets and highways, and must admit that the traffic problem is a direct result of this sudden development of luxury travel in individual vehicles. The improvement of streets and highways should proceed as fast as the

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Airplane view of lower Manhattan

Within this small district in New York, the massive, towering buildings constitute the financial capital of the nation. Ten of New York's largest banks have been concentrated in an area of a few square blocks. These institutions represent resources of $10,300,000,000 out of a total of $14,696,000,000 for all New York City banks. This concentration is a natural economic trend and indicates the tendency of similar lines of business to group closely together. According to announcement by one of these banks that has recently completed a new towering headquarters building in the financial district indicated, the faster tempo of modern business demands quick clearance of financial transactions and information, which is facilitated by physical proximity.

people can afford to pay for them, and yet it is quite obvious that there will always remain a restraint on the speed and convenience of automobile operation in cities because of the frequency of intersections with other streets.

Impossible to Use All Present Autos

The density of population in cities provides an ownership of many automobiles per mile of street, and particularly per mile of through streets or main traffic arteries. The accompanying table illustrates the present situation in several large American cities.

If every fourth street is an important or heavily traveled street (this is a higher proportion than usually exists) then there are in large cities about 800 automobiles available to operate per mile of main routes of travel. If all were out simultaneously there would then be one automobile for each 13 ft. of main route, counting equal traffic in each direction.

The necessities of business require large numbers of commercial vehicles and passenger automobiles to travel about. The luxury of the lives of many people, and the leisure available to enjoy that luxury, creates the habit of traveling by private automobile until the combination of necessary and luxury travel fills the streets beyond a comfortable degree.

Of course, all the world's larger cities have in all ages had some degree of traffic difficulty. The lower speeds of vehicles when horse drawn and the rougher pavements of former periods contributed largely to the congestion in the early days. The faster movement of the vehicles of the present day permits an enormous increase in the number of vehicles that can move along a street in an hour. Yet, the problem of avoiding congestion that has long been a recognized difficulty is becoming of growing importance.

NUMBER OF AUTOMOBILES—MILES OF STREET—POPULATION

City	Year	Population	Automobiles Registered	Automobiles Per Mile of Paved Streets
Chicago	1928	3,150,000	360,600	135
St. Louis	1928	848,100	131,500	157
Detroit	1928	1,500,000	390,600	283
Baltimore	1928	800,000	185,000†	256
Boston*	1928	799,200	98,028	166
Los Angeles	1928	1,400,000	361,000	270

* City of Boston only. † Approximate.

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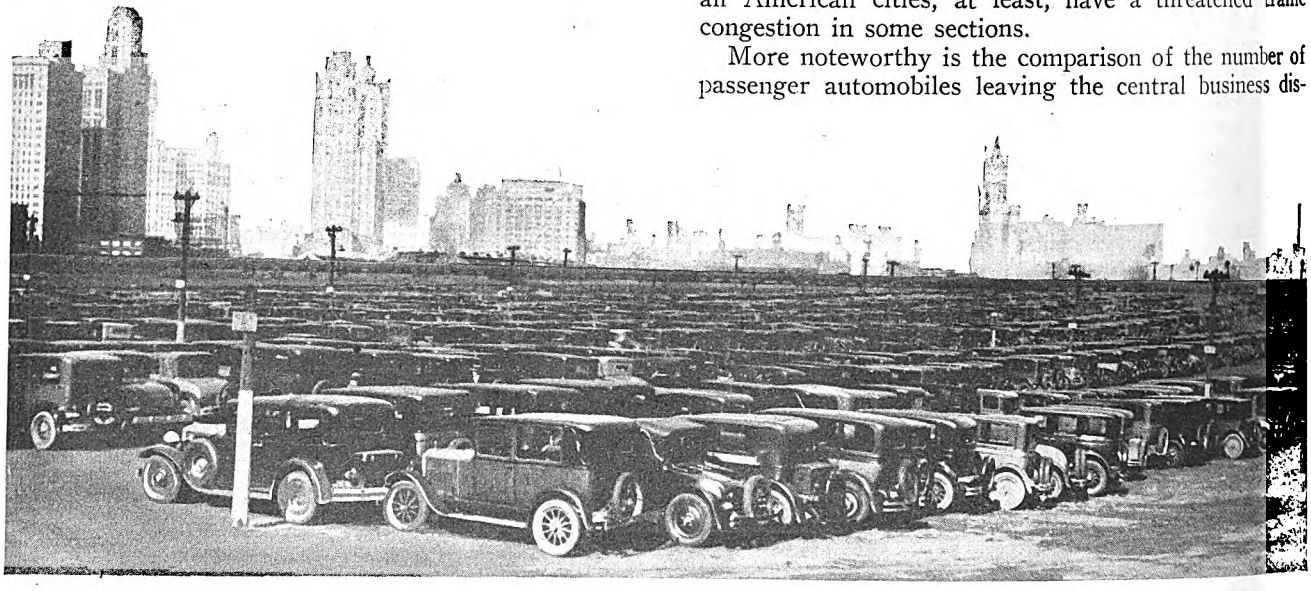
Major L'Enfant planned in 1791 a remarkably competent system of streets of ample width and with very excellent routings for the city of Washington. It must be evident that he knew from experience the difficulties of city traffic. Napoleon ruthlessly opened great new streets through the heart of Paris prior to 1814 to facilitate communication between the different sections of the city and the districts outside.

It was traffic congestion in addition to the slowness of travel that inspired the building of steam-driven elevated railways in New York which began operating in 1871. At that time the average density of population on Manhattan Island was 42,800 people per square mile. Today the density is 102,000 persons per square mile. People in 1870 did not have the habit of traveling about as much as they do today, or the congestion from wagons, carriages and horses would have been intolerable, for there were few public conveyances and these consisted only of the horse cars and horse-drawn omnibuses.

TABLE I—DENSITY OF POPULATION IN FIVE PRINCIPAL CITIES

City	Population Per Square Mile
Manhattan—1880	52,000
Manhattan—1927	102,000
Paris	95,000
Berlin	70,000
London (Inner 117 square miles)	38,300
Chicago (average, 1920)	14,805
Chicago (densest square mile)	58,874
Chicago (average central 51 square miles)	27,219
Average of all cities in the United States having populations between 300,000 and 500,000	6,912
Average of all cities in the United States having populations from 500,000 up	11,872



Chicago parked autos

Literally thousands of Chicagoans park their cars at Monroe Street in Grant Park on Chicago's lake front. Acres of ground are covered with autos, the lineup extending as far as the eye can see. In the background of this great parking station is a portion of the rapidly mounting skyline of the Chicago "Loop" district and the newer developments north along the lake front.

In 1880 the rides per year per capita on surface cars and rapid transit lines in New York were 150, while with the different habits and standards of living the riding today on public carriers reaches 480 per capita per year. This is some indication of the change in people's ways. Today the citizens of New York use public facilities more than three times as much per capita as in 1880, despite the greatly improved private vehicles and the enormous use made of private automobiles.

Density of population or even the size of the city are not the only factors to be considered in judging the degree of traffic congestion to be expected. It is true that congestion seems most acute in the larger American cities, yet note the relatively low densities of population as shown in Table I.

Automobile Ownership, Not Population Density, Cause of Congestion

European cities are not like the cities of the United States because the ownership of automobiles is not so general in Europe. Berlin, with a population of 4,000,000, has but 60,000 automotive vehicles including motorcycles, as compared with 414,685 in Chicago, which has a population of about 3,150,000. So it is easily apparent that size of city or density of population do not create congestion, but that it is the American desire to use automobiles and the financial ability to realize the desire that creates the present-day degree of traffic intensity. It is striking to note the wide divergence in density of population in various cities, yet all American cities, at least, have a threatened traffic congestion in some sections.

More noteworthy is the comparison of the number of passenger automobiles leaving the central business district in each of several large cities for the hour of maximum travel as shown in Table II.

Analysis is not available for each city to show where these vehicles came from or what proportion is traveling through the central district rather than coming from the garages, street parking spaces or other storage areas in or near the business center.

In Chicago the garage and storage space within or in the immediate neighborhood of the central business district will accommodate at one time 15,981 cars.

TABLE II—COMPARISON OF UTILIZATION OF CENTRAL DISTRICT VARIOUS CITIES

City	Year	Area of Central District	Total Population	—Maximum Hour Outbound— Service Vehicles	Total Vehicles	Per Cent of People Leaving by Private Auto
St. Louis	1925	0.99	831,800	2,722	12,253	20.1
Detroit	1924	0.58	1,290,000	1,399	12,876	24.2
Baltimore	1925	0.49	790,600	1,707	8,774	18.1
Boston	1927	0.88	*1,187,800	.....	12,436	.....
Chicago	1926	0.58	3,048,000	2,562	15,742	9.5
Chicago†	1928	0.58	3,156,400	2,442	17,670	11.2

* Includes seven adjacent communities. † Street parking prohibited after Jan. 10, 1928.

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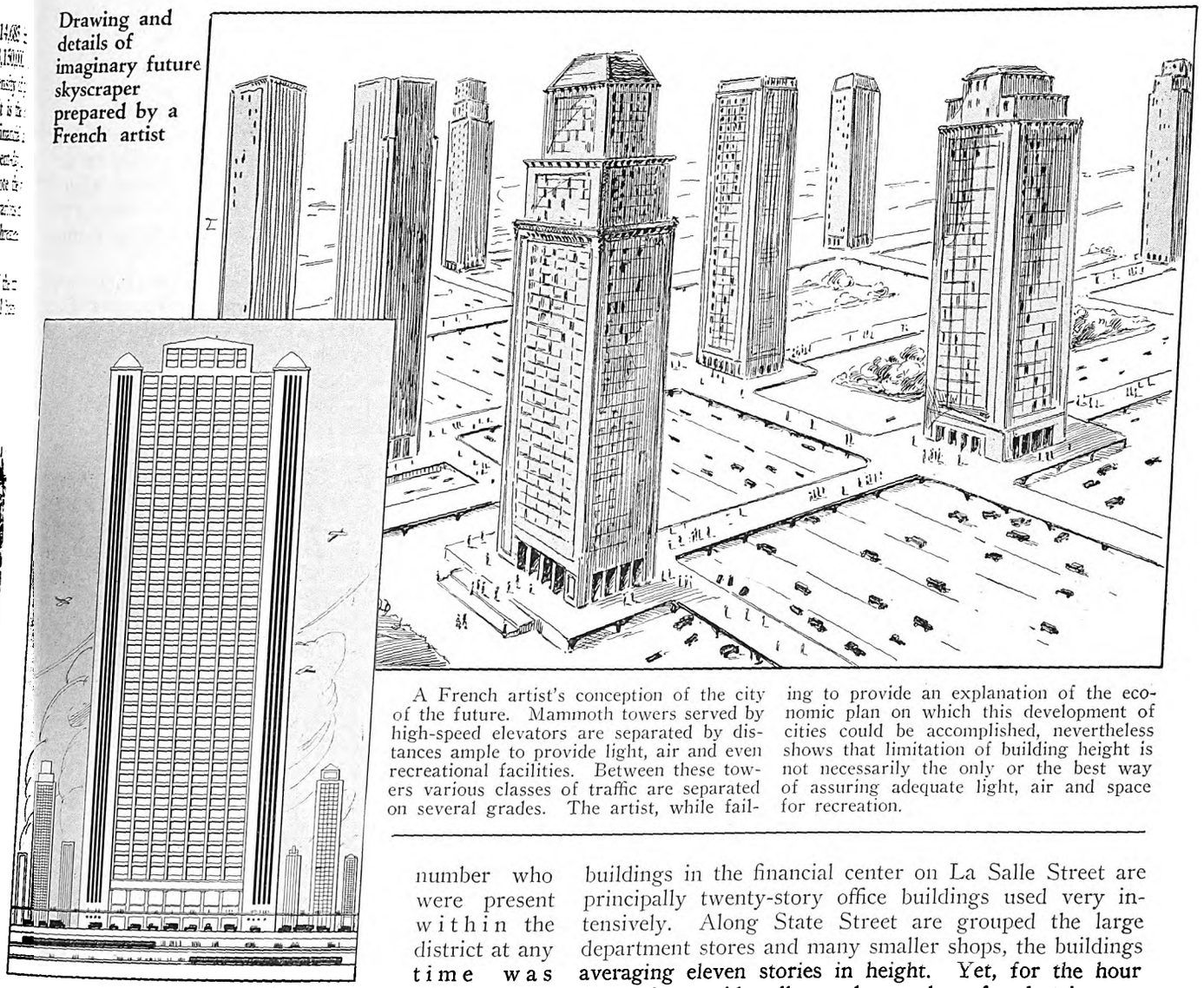
Before the no-parking regulation was placed in effect, Jan. 10, 1928, the curb parking spaces in this district legally open to parking would serve only 1,157 vehicles at one time.

However, checks in 1926 show a rather striking condition as indicated by an accompanying chart. The accumulated number of people within the business district is shown by the higher curve, while the lower curve is a record of that portion of the accumulated people who come by automobile. The maximum number who were present within the district at any time was 360,000, of which only 7 per cent came by automobile. For the twelve-hour period the average percentage of those present who came by automobile was but 6.5 per cent. Yet, 19.1 per cent of those counted crossing the boundary line when entering the district were in automobiles. So then the majority of those in automobiles entering the district were only passing through to go somewhere else.

Drawing and details of imaginary future skyscraper prepared by a French artist



A French artist's conception of the city of the future. Mammoth towers served by high-speed elevators are separated by distances ample to provide light, air and even recreational facilities. Between these towers various classes of traffic are separated on several grades. The artist, while failing to provide an explanation of the economic plan on which this development of cities could be accomplished, nevertheless shows that limitation of building height is not necessarily the only or the best way of assuring adequate light, air and space for recreation.

TABLE III—AUTOMOBILE STORAGE CAPACITY OF THE CENTRAL DISTRICT, CHICAGO

(February 1928)

Garages	7,281 Cars
Parking lots	3,000 Cars
Grant Park (pay space)	3,200 Cars
Grant Park (free space)	500 Cars
Wacker Drive (both levels)	2,000 Cars
Total	15,981 Cars

The most of the street traffic was an unnecessary hindrance to the vehicles and pedestrians wanting to do business in that district.

High Buildings Not Necessarily Cause of Congestion

High buildings are not necessarily the cause of the traffic problem. This can be demonstrated by analysis of each city or by analyzing traffic in one city as compared to that in another. In Chicago, for example, the buildings in the financial center on La Salle Street are principally twenty-story office buildings used very intensively. Along State Street are grouped the large department stores and many smaller shops, the buildings averaging eleven stories in height. Yet, for the hour of maximum sidewalk use the number of pedestrians on La Salle is approximately half of that on State Street. Similarly, the vehicular flow in the hour of maximum density is only 57 per cent as great on La Salle as on State Street. The hour of maximum pedestrian movement is between 12 and 1 p.m., and in the evening rush hour the pedestrian movement is usually about 60 per cent of that at noon. The hour of maximum vehicular movement is approximately between 5 and 6 p. m.

It should be pointed out, however, that comparing a retail store having a ground area of 127,000 sq.ft., with a total of thirteen floors above the street with two bank and office buildings having a combined ground area of 110,800 sq.ft. and twenty floors above the street, we find that for the hour of maximum sidewalk use the bank and office buildings contribute proportionately 1.1 per cent more pedestrians per 100,000 sq.ft. of ground area

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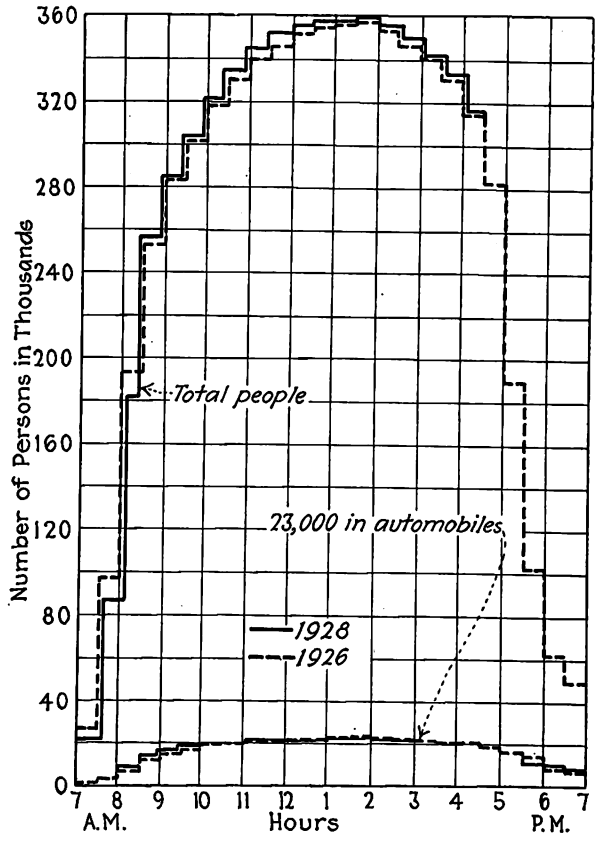
than the store. Based on relative total floor area available in the two classes of buildings the relative number of pedestrians to and from the bank and office buildings is only 79 per cent of that for the store. These figures are for conditions of a typical day in May, 1928.

The store has 7,600 employees, and at the time when the maximum number of people are in the store there are 13,300 persons within the building. The office buildings have a total listed number of tenants and employees of 15,000, but the maximum number of people in the buildings at one time is 10,200. Based on floor area the bank and office space is used at 71 per cent of the intensity of the store space, while based on ground area the bank and office building area is used 88 per cent as intensively as the area occupied by the store. Perhaps conditions would be relatively different if comparing a store selling to a less well-to-do class of patrons. It would be expected that such a store would have more customers per unit of floor area as is indicated from a comparison, described later.



Accumulated people in Chicago Loop district

Comparison of total persons within the central business district of Chicago for half-hour periods throughout the business day, with number carried by automobiles. Observations made on typical business days in May, 1926, and May, 1928, indicate relative small economic importance of automobiles in the business life of America's second largest city, though they are primary causes of the congestion problem. Additional facts available indicate that a considerable proportion of the automobiles which came into the district were merely passing through and had no business in the central area. With adequate by-pass routes available, they could have been rerouted. The chart does not include people walking into the district, which would still further reduce the proportion transported by automobiles.

Here we have the strange circumstance that the high office buildings use the land less intensively, but provide more pedestrians in the hour of maximum pedestrian movement, and yet the sidewalks alongside have only half the volume that occurs on the shopping street. The answer probably is that State Street is a popular street for wandering, for window shopping and for people to use as a highway because they like to go where it is busy.

Class of Business More Important Than Height of Building

The sidewalk on the west side of State Street between Madison and Monroe has a greater number of pedestrians for the business day, and also for the maximum hour, which is at noon, than is found on any other block of sidewalk in the central district. Yet, the buildings on this side of this block are largely Class C type and the active floor space in the buildings is very low. The average number of active floors for merchandising along this block is only 2.4 as compared with an average of eleven stories over twelve blocks adjacent on State Street. One building with offices has an entrance on this sidewalk and attracts 3.8 per cent of the persons entering buildings in this block. Yet the total of all persons entering all buildings along this block of sidewalk was 89.9 per cent of the number entering on this sidewalk from the ends of the block.

More interesting is the fact that 75 per cent of all the persons entering all buildings in the block were concentrated in two stores with a total floor area of about 43,000 sq.ft., which sell merchandise ranging in price from 5 cents to $1. In the same period the high-grade department store building previously referred to, having thirteen floors above the street and more than 2,000,000 sq.ft. of total floor area, had only 1¼ times as many people entering. Of course, the money value of the trade involved must be enormously different, yet the pedestrian traffic to these two establishments was in the ratio of 1 to 1¼, which is in striking contrast to a floor area ratio of approximately 1 to 50. From these facts it seems obvious that hasty or offhand conclusions as to the causes of traffic congestion are extremely dangerous. Generalizations on this important and complicated problem may be very misleading.

In St. Louis the densest ½ square mile of the central business district has an average building height of 3.8 stories. In Chicago the 0.58 square mile of the central business district averages 7.7 stories in height. The number of automobiles passing outbound from the larger area of St. Louis business district that covers 0.99 square mile is 12,253, in the heaviest evening rush hour, while for the central district of Chicago the number is only 15,742, although the latter city has 3.7 times the population of the former. Analysis shows that under present street arrangements the maximum capacity outbound in Chicago is 65 per cent greater than the number now moving outbound in the rush hour, so that the present conditions do not represent serious congestion.

Traffic Concentration Despite Building Limitation

Boston has had a building height limitation of 155 ft. for many years. The average building height for a distance of 1,600 ft. on the busiest street, Washington, is 6.6 stories compared with an average of 11.3 stories for the same distance on State Street, Chicago. The number of pedestrians passing the middle of the busiest block in central Boston between 12 and 1 p.m. was 24,797 for a typical day of 1928. In the busiest block in central Chicago the number of pedestrians was only 23,906 for the same hour, although the city of Chicago has 2.6 times the population of the Boston metropolitan district, consisting of the city proper and seven towns

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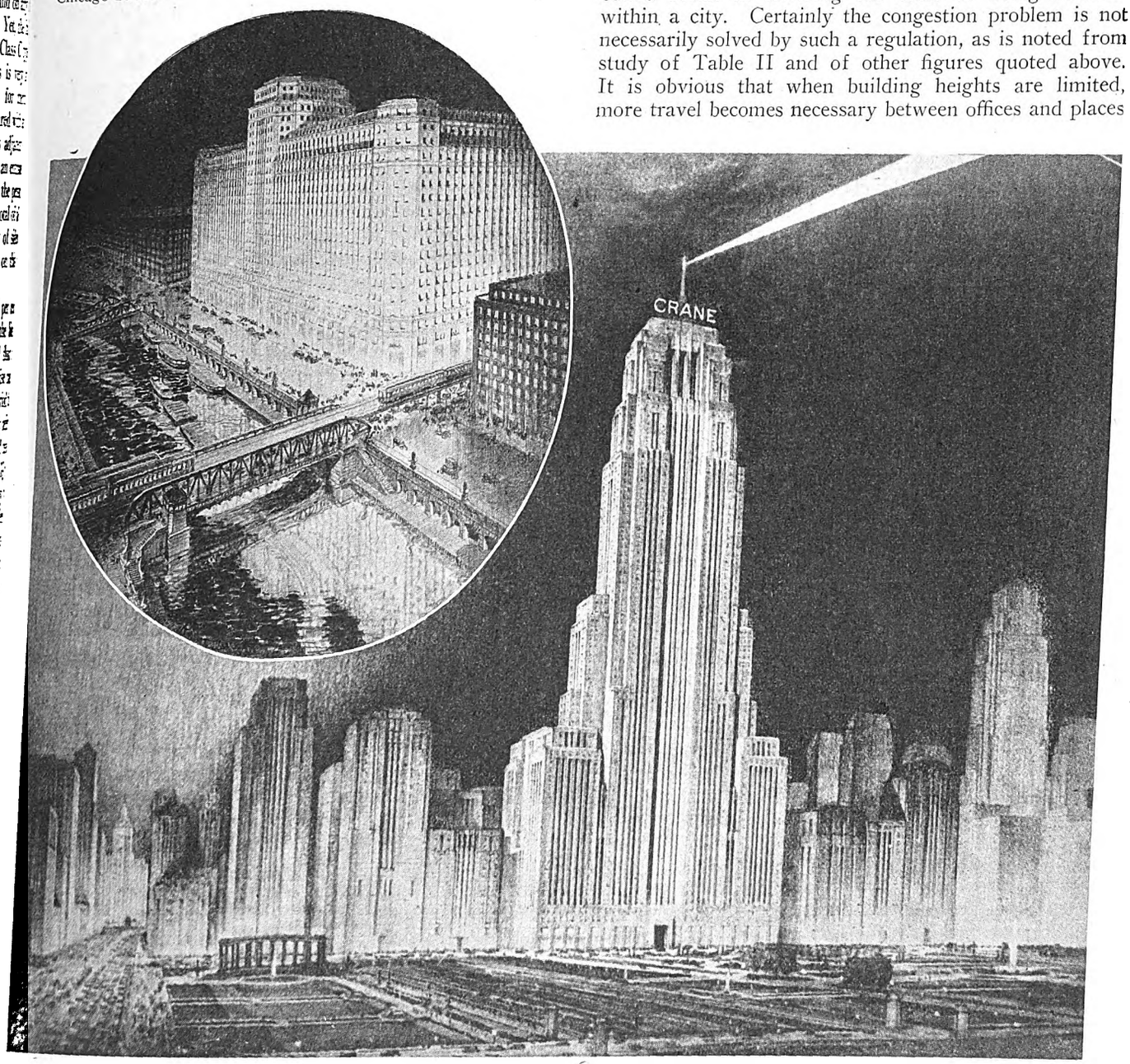
Marshall Field Merchandising Mart

The Marshall Field Merchandising Mart to be erected in Chicago, which will be by far the largest building in the world, with a total floor area of 4,000,000 sq.ft., affords another striking example of the use of air rights for some of the mammoth structures planned for the Western metropolis. This building, in which are to be housed wholesale mercantile and manufacturing organizations, is one of several similar enterprises that reflect the tendency of similar lines of business to group themselves in close physical proximity. The merchandise mart will be erected over a freight terminal in the district immediately north of the Chicago River.



immediately adjacent. The area of the central business district in Boston is practically the same as in Chicago, and the number of automobiles outbound in the maximum rush hour is 12,436 in Boston and 15,742 in Chicago.

Height limitation may not even place a limitation on land values, and of course if lower buildings occupy expensive land the cost of the land has a greater influence on the costs of business than if larger buildings having more occupants can utilize the expensive area. In Boston the most expensive land averages $18,500 per front foot, exclusive of corner influence. In New York, with many times the tributary population and all the high buildings and great concentration, the highest price on Fifth Avenue is $25,000 per front foot and on Broadway near Wall Street it is $21,000. In Chicago the most expensive frontage averages $20,000 per front foot. All of these figures are for 100 ft. in depth and eliminating corner influence.

It should be evident that the artificial limitation on the height of buildings may not produce an economically sound result in lowering the costs of doing business within a city. Certainly the congestion problem is not necessarily solved by such a regulation, as is noted from study of Table II and of other figures quoted above. It is obvious that when building heights are limited, more travel becomes necessary between offices and places

Chicago to Have 75 Story Skyscraper

Chicago is planning a 75-story tower building that illustrates the new note in the architecture of lofty structures providing ample ground area to insure adequate light and air, even when adjacent plots are developed with high buildings. This Crane tower, named for the plumbing company that is planning this monument to its business, is expected to cost $23,000,000. It is to be erected on air rights over the newly electrified Illinois Central Railroad at Randolph Street, and is expected to exceed in height the famous Eiffel Tower of Paris. The artist has sketched in an imaginary skyline of adjacent structures as they may look in the near future. Michigan Avenue is at the left of the illustration, in which the view is looking north from a position in Grant Park on Chicago's lake front.

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of business scattered over a greater area, thus actually tending to increase the demand upon street and transit facilities.

High Building Can Support Adequate Transit

Higher buildings, with increased floor areas available for renting, can afford to support more intensive development of the streets, which permits the segregation of various classes of traffic so as to bring about much better transportation and traffic conditions. For example, Chicago can afford and is likely to build in the streets of the central district, levels for three separate classes of traffic. The present level will ultimately be given over almost entirely to vehicles. Immediately below will be a complete street width lined with shops and show windows where the pedestrians will have no interference from traffic nor from weather. The pedestrians can walk directly across the street from shop to shop or from building to building by the shortest route. Immediately below there will be the subway tubes at a minimum distance down, although there will be one level for north and south lines and a lower level for the east and west routes.

Such a system of development will make the present street widths more than ample for whatever height of buildings may ever be found to be economically desirable. Of course, this statement takes into consideration the greater volume of vehicular flow possible when pedestrians are not a source of interference at intersections and when the public carriers are operating on a level by themselves. Then the excellent system of transportation to be provided by the proposed rapid transit lines and the proposed street car subways will probably reduce the proportion of rubber-tired vehicles operating in this central district to a smaller percentage even than exists at present.

Cost Only 2 Per Cent of Present Value

Can such a system be justified from the viewpoint of economics? Let us consider this in the light of present values in the principal shopping section on State Street, which is eight blocks long. Assume that this section is a mile in length, for purposes of easy comparison. The proposed subway development would cost at the rate of nearly $12,000,000 per mile in the central business district. Land on State Street, where the first unit would be built, has an average present value of at least $20,000 per front foot for a half block of depth, and if the benefits were considered to reach only one block or 400 ft. on each side of the subway the land so closely adjacent to a mile of such street would be worth at least $308,000,000. The value of the buildings at present on the land is at the rate of $250,000,000 per mile. What would it be worth to this $558,000,000 worth of property to improve its accessibility to the extent that would be effected by the several streets and subway levels proposed? What would it be worth to the city as a whole? The cost of the subway and sub-street would be only 2 per cent of the value of the property within 400 ft. of it, and this takes no account whatever of the proportion of the cost which should be assessed against the community as a whole as a general property benefit.

If it were possible to produce the same degree of accessibility by widening of surface streets alone the land value taken for streets would be at least $475,000,000, and this land would be withdrawn from use for buildings. The reduction in taxable value would then be at least $900,000,000. In addition to this serious reduction in taxable value, there would be no adequate method of avoiding serious interference at intersections. It is quite probable that such wide streets would even increase the hazards of traffic movement while offering at best a very poor remedy for one of the primary causes of congestion; namely, interference of various classes of traffic. No system of surface streets can equal the effectiveness in moving traffic that is obtainable by separating traffic on several levels without intersectional interference. No reduction in usable land is necessary for such development, and intensive use of land can be attained with a desirable standard of convenience and accessibility by the use of subways, sub-streets, and separation of intersecting lines of travel.

The Problem Is Complicated But Not Hopeless

Automobiles operating as they must on the surface of the streets provide a great convenience, but introduce a serious problem when their use is not regulated. Cities cannot hope to create sufficient street capacity so as to permit each owner to use his automobile for all his movements. The principal streets in cities of all sizes are already more crowded than is comfortable with only a small percentage of the people using automobiles. The limitation on the development of such streets is not only that of prohibitive cost for the community, but also the reduction in land area remaining for buildings in the central district and along major thoroughfares. In fact, the artist's dream of a central district entirely given over to streets would be the result, and then, of course, the city itself would be destroyed.

So we come inevitably to the conclusion that the traffic problem, and the broader problem of outlining a sound policy of city planning and development that shall provide adequate facilities for convenient movement of people and commodities, are neither simple nor yet hopeless. There are many influences, many seemingly opposite points of view, much mis-information and much misdirected effort. Yet the traffic problem will not cause fundamental upsets in the scheme of city growth and development. It will cause changes that are important and developments that are costly, but such is the history of all our thousands of years of growth into the present state of civilization and comfort. New methods or processes, new equipment, new standards, new producing efficiency have all been operating to create changes and cause adjustments that are sometimes very difficult. But through it all the general good has been steadily promoted.

Modern traffic conditions present a situation to be remedied, a problem to be solved in the interests of the public. If we do not fall into the folly of thinking that it is a disease to be cured by some panacea we may make orderly progress through careful investigation and cumulative adjustments. Systematic relief measures may be undertaken as conditions warrant them, so that a reasonably adequate system of communication may be maintained everywhere. It is a growing, changing problem on individual streets and in individual cities; but the basic principles and practices involved apply universally with proper adjustment to special conditions. Better understanding of these principles and practices will be developed and present mistakes in thinking will be corrected as experience increases. At the present time, however, engineering knowledge of the subject is far in advance of the practices in general use.

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Sample Cars for Louisville

Designed to Win Public

Three new cars secured as preliminary step in extensive equipment improvement program. Manufacturers given free hand in effort to stimulate off-peak riding, to effect operating economies and to cultivate good will

PROMPTED by the merchandising philosophy that if modern, comfortable and pleasant equipment is operated during the off-peak hours, additional riding will be encouraged and economies effected, the Louisville Railway has secured three experimental cars, anticipatory of an extensive car improvement and replacement program. In addition to stimulating riding during the base hours and reducing operating expenses, the railway hopes to cultivate public good will by offering the maximum of service compatible with its earnings. The three cars were furnished by the St. Louis Car Company, the G. C. Kuhlman plant of the J. G. Brill Company and the Cincinnati Car Corporation. One of the railway's regular cars will be rehabilitated and mounted on new Timken-Detroit model 52-A trucks with high-speed motors, making four experimental cars in all.

The three manufacturers were requested to build that type of car which, in their estimation, would best provide modern street railway service in Louisville. The cars were to be of light construction, to be mounted on 26-in. wheels, to have comfortable seats and to be built for one-man, two-man operation. In placing the orders the railway made a particular point of giving the manufacturers as free a hand as possible—unhampered by detailed specifications—in the development of designs best suited to the requirements of modern transportation conditions.

The orders were placed during the latter part of February and the deliveries were made on April 1 and April 13 for the St. Louis and Brill cars, respectively. The Cincinnati car has not been delivered at this writing, but is expected daily. All three cars are of the builders' latest designs and represent their conceptions of a vehicle having the greatest merchandising attractiveness. It is the purpose of the Louisville Railway, as soon as it is financially able, to purchase approximately 90 new cars, and to base the specifications for these on the best points of the four experimental cars.

At the present time the railway is in the midst of a fare adjustment, the preparatory work of which has covered a period of eight or nine years. In 1920 this company was seriously handicapped by the limitation of a 5-cent fare. Under the protection of the court, however, a straight 7-cent fare was instituted. In the litigation arising from the company's injunction proceedings, the city offered a compromise in the form of a barometer fund operation based on a predetermined return on the outstanding securities of the company. While not agreeing to the economic soundness of this plan, the railway accepted it as a measure of expediency and operated under it for a period of three years. At the end of this time both parties were dissatisfied with the difficulties of administration, and the city adopted a new ordinance requiring that a valuation be made and that a fare be fixed subsequently which would yield a reasonable return on the fair value of property used and useful in the public service. An evaluation was made by the Beeler Organization and the present negotiations with the city are the final phase of the interpretation and enforcement of the terms of this ordinance. Negotiations were proceeding more slowly than the railway had hoped, so it was decided to anticipate a new car program by the immediate purchase and demonstration in service of a few modern equipments.

New Cars Effectively Introduced

When the first car, the St. Louis unit, was delivered, it was placed on exhibition for a day. Then it was tested in service for two days, and placed in regular operation on Sunday, April 7. On Monday morning, between 8 and 9 o'clock, the company instituted a "lucky hour," carrying all passengers free. Those who boarded the car were asked to give their comments on the effectiveness, comfort and general desirability of the new type of vehicle. As the patrons stepped aboard they were greeted cheerily by the conductor and inspector, who informed the customers, all ready to pay: "Friend, this is your lucky day! This ride is free with the compliments of the company. Look the car over and let us know any suggestions you have for improving it for your convenience." The company received a large and pleasant response, justifying almost immediately the belief that the new type of car would reawaken public interest in street car transportation.

The new car was rotated on the various lines in the city, keeping it on each line for three or four days and getting as completely as possible the reaction of the public to it. The same procedure was followed on the second car when delivered, and will be followed when the other two cars are ready for service. By this means the railway hopes to learn from the public which features in all four cars it most desires.

While demonstrating the new vehicles, the railway let it be known that as soon as its financial house is in order, arrangements will be made to equip all-day schedule service with new cars. Another important factor made known was that the fare adjustment would be needed either before, or concurrently with, arrangements for

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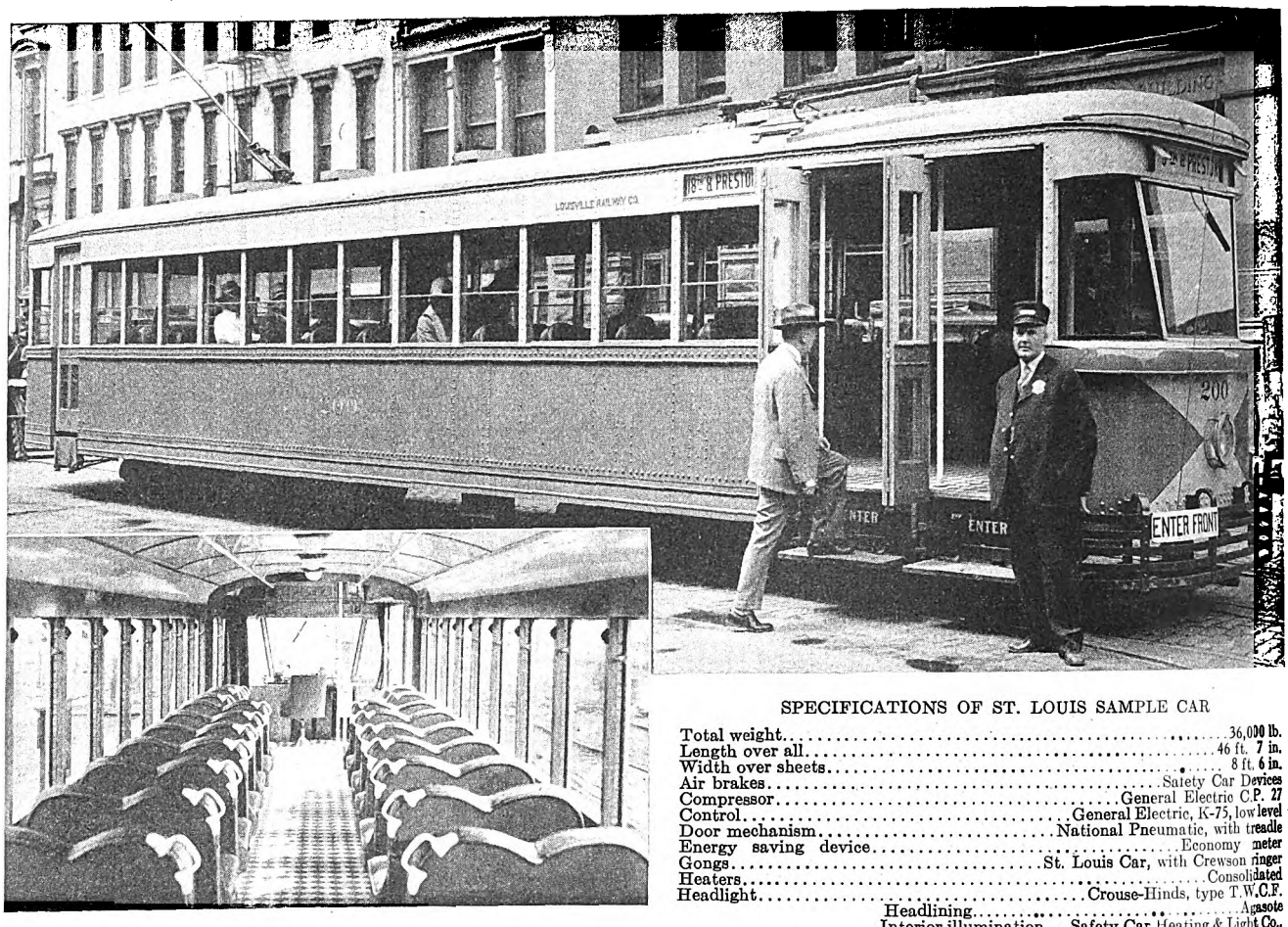
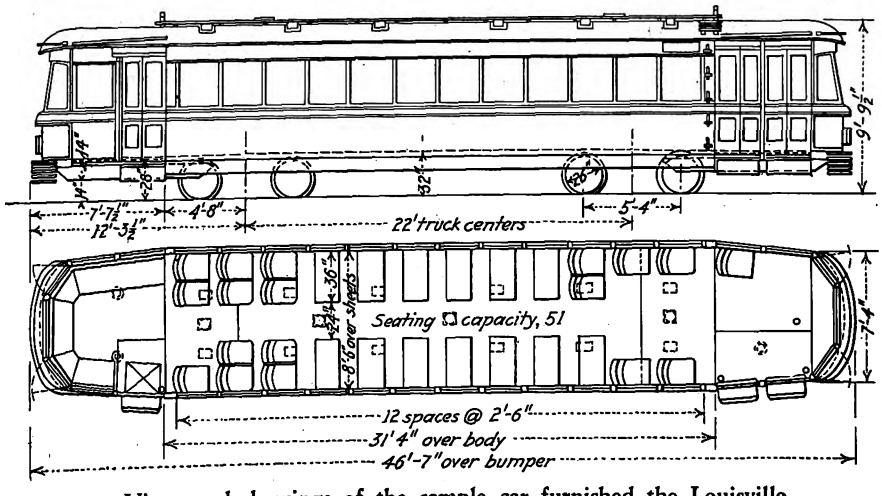


SPECIFICATIONS OF ST. LOUIS SAMPLE CAR

Total weight	36,000 lb.
Length over all	46 ft. 7 in.
Width over sheets	8 ft. 6 in.
Air brakes	Safety Car Devices
Compressor	General Electric C.P. 27
Control	General Electric, K-75, low level
Door mechanism	National Pneumatic, with treadle
Energy saving device	Economy meter
Gongs	St. Louis Car, with Crewson ringer
Heaters	Consolidated
Headlight	Crouse-Hinds, type T.W.C.F.
Headlining	Agasote
Interior illumination	Safety Car Heating & Light Co., center dome fixtures
Motors	Four G. E. 35-hp., No. 265
Seats	St. Louis Car
Signal system	Faraday buzzer
Stop and exit lights	Oskelite
Trolley base	Ohio Brass, form B
Trolley catcher	Ohio Brass No. 13141
Trucks	St. Louis Car, E.I.B.-64
Ventilators	Nichols-Lintern



Views and drawings of the sample car furnished the Louisville Railway by the St. Louis Car Company

refunding the first mortgage bond issue, which matures in the summer of 1930, to insure proper financial adjustment. Fundamentally, the railway believes that if all the equipment used during the base hours is strictly modern, and a large proportion of the cars used in the rush-hour service are new, it can build up its off-peak riding and reduce its operating costs sufficiently to carry the cost of the equipment, so that no increment of increased fare would be required for the modernization of all-day service.

Appearance Stressed in St. Louis Design

The car furnished by the St. Louis Car Company is a single-end, double-truck car with a seating capacity of 51 and is mounted on the company's standard E.I.B. trucks. In the design, particular attention was given to the appearance and a stream line, racy effect was obtained. An insulated skirt was placed around the car below the body, stream lined with the steps to eliminate the breaks and angles encountered in the older designs, to obscure, as far as possible, the equipment underneath, and to deaden the running noise. The painting scheme is a combination of blue for the body and skirts, ivory for the center work and letterboard, tan for the roof and black striping on the skirts, belt rail and letterboard. The car front has a wide, sloping window and an automotive type bumper.

The interior finish of the car is natural ash with light straw ceiling. The seats, furnished by the car company, are of the deep overstuffed type with spring cushions and backs, and are upholstered in genuine leather with Hyoline grain. There are nineteen cross seats, six single seats, and seats in the rear to accommodate seven.

The car is designed for single-end operation and all apparatus at the front end is inclosed in a special control cabinet. The flooring throughout is of blue and white rubber tiling. The platform and body floors are continuous, a 2-in. ramp extending from the bolster centers to the body corner posts. A second 2-in. ramp extends across the platform transversely, making the step height 14 in. for both front and rear. Folding

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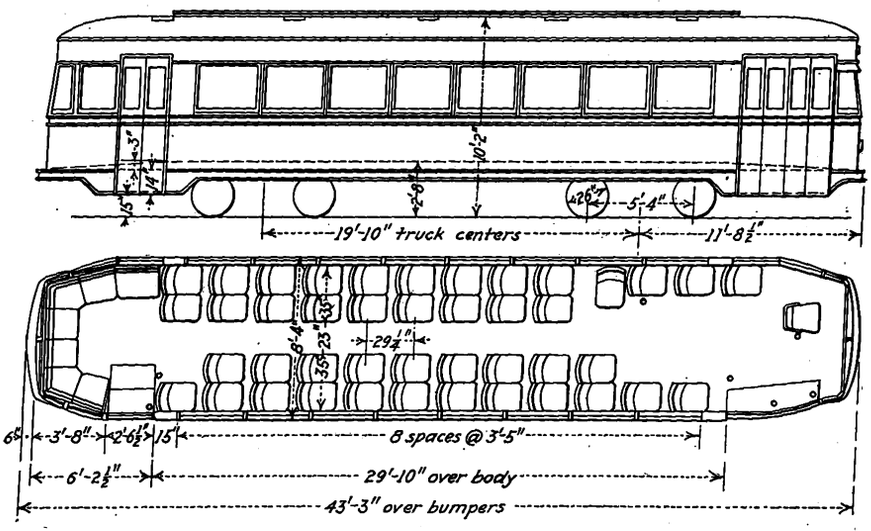
steps are used at both doors, and an automatic treadle controls the rear exit door. The operation of the front door is selective through a valve attached to the M-28 brake valve. A secondary valve gives the motorman further control over the rear exit door.

The car is 46 ft. 7 in. overall, 31 ft. 4 in. over body corner posts, 8 ft. 6 in. wide over side sheets, 9 ft. 9½ in. from rail to top of roof and 6 ft. 10 in. from floor to ceiling. It weighs 36,000 lb., completely equipped.

Two vestibule cab heaters are installed at the front end and 26 cross-seat heaters are distributed under the body and rear vestibule seats. Five double-lamp center-dome fixtures are located in the center of the body, with smaller dome fixtures in the vestibule. An illuminated "exit at rear" sign is carried in the interior on the header at the front and a stop light is mounted in the center of the rear dash. The trolley bases are a new light type, mounted on rubber seats.

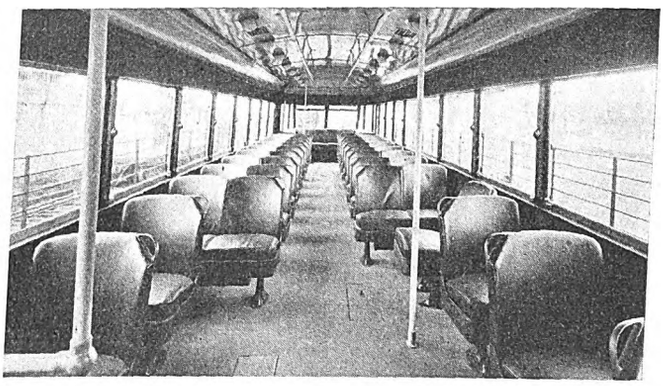
St. Louis Car Company type E.I.B.-64 trucks with cast-steel equalizers having a special feature in the mounting of the detachable journal boxes are used. This feature accommodates both a plain friction journal bearing or an anti-friction bearing. The side frames are of cast steel with gussets and brackets for transoms, brake and bolster suspensions cast integral. The transoms are rolled-steel bulb beams. There are only four joints in the entire truck frame. All wearing surfaces are fitted with renewable heat-treated high-carbon steel wear-plates and bushings. The truck is equipped with a fully graduated system of springs, consisting of a combination of full elliptic and helical springs, which afford an easy riding truck under all loads. Brake gearing is inside hung and fitted with anti-rattle devices.

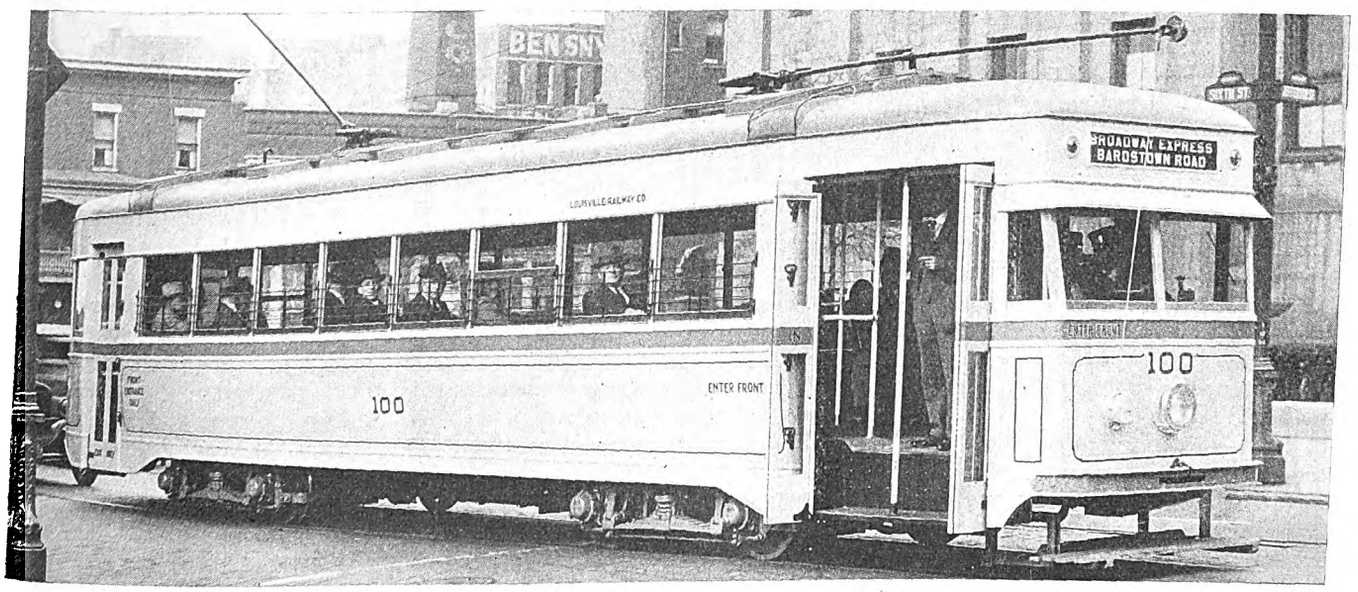
Four General Electric 35-hp. No. 265 motors, inside hung, are installed. The control is General Electric



SPECIFICATIONS OF BRILL SAMPLE CAR

Total weight	34,000 lb.
Length over all	43 ft. 3 in.
Width over all	8 ft. 4 in.
Air brakes	Westinghouse Air Brake
Car signal system	Faraday
Compressors	Westinghouse Air Brake
Control	General Electric K-75
Destination signs	Hunter
Door mechanism	National Pneumatic
Energy saving device	Economy meter
Governor	Westinghouse, R-4
Heaters	Railway Utility
Headlight	Crouse-Hinds, Smith lens
Motors	Four G. E. 35 hp., No. 265
Seats	Brill, type 301
Signals	Westinghouse air horn, Crewson gong ringer
Trolley catchers	Ohio Brass
Trolley base	U. S. No. 20
Trucks	Brill 177E, Timken bearings
Ventilators	Brill





Details of the car built in the G. C. Kuhlman plant of the J. G. Brill Company are shown in this group of illustrations

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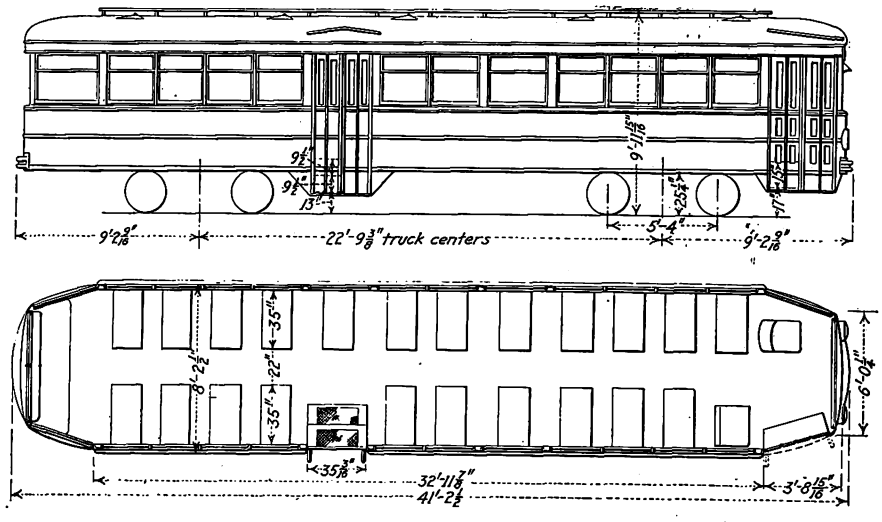
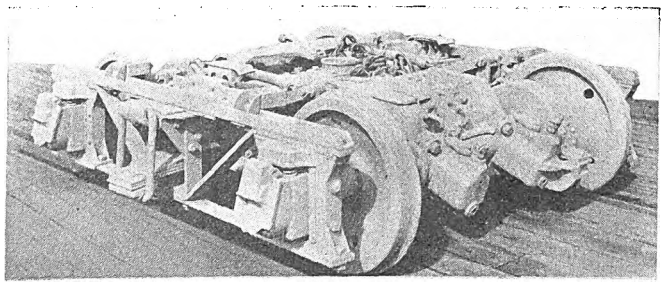
K-75, low level. The car also is equipped with silent gears, in which a hollow web is filled with noise absorbing material.

Brill Car One of Standard Units

The car built in the G. C. Kuhlman Car Company plant of the J. G. Brill Company is a single-end, double-truck car, with a total seating capacity of fifty. It is designed in accordance with the company's new standardized line of cars, described in the January 26 issue of Electric Railway Journal, and is the first car of this type built with these specifications. The principal features of the car are its distinctive architecture with curved sides below the belt rail, the sloping windshield type of vestibule in two parts, the wide single metal side sash, the well-type stationary step and the all-steel interior finish, painted brown to harmonize with the leather-upholstered seats.



Floor plan and side elevation of the car furnished by the Cincinnati Car Corporation



The trucks under the Cincinnati car are the company's standard type with aluminum diamond frames, gusset plates and transom angles

The length of the car over bumpers is 43 ft. 3 in., the length over body corner posts 29 ft. 10 in., the truck wheel base 5 ft. 4 in., the truck centers 19 ft. 10 in., the width over posts at belt rail 8 ft. 4 in., the width overall 8 ft. 5½ in. and the height from rail over trolley boards 10 ft. 5⅜ in. The height of the first step is 15 in. and that of the second 14 in. The total weight is approximately 34,000 lb.

Wide side windows and the brown color scheme, harmonizing with the seats, give the interior a pleasing appearance. The car has eighteen cross seats, seven single seats and a circle of seats in the rear accommodating seven, giving a total seating capacity of fifty. The cross seats are all of the semi-bucket, deep-cushioned type, upholstered in deep buff, genuine leather.

Full vision is afforded the rider by the eight large windows on each side of the car body proper. In addition to these windows there are two single stationary sash, slightly inclined, located in each vestibule end, four smaller stationary windows in the vestibule corners, two windows on the left side of each vestibule and one on the right side of the rear vestibule.

Equipped with 26-in. diameter wheels, the car floor is only 2 ft. 8 in. above the rail. Access to the car is afforded by two steps, one 15 in. above the rail and the other 14 in. to the platform floor. A 3-in. ramp extends to a point between the end sills and the body bolster. A stationary well step is provided at each of the two doorways. The folding doors are hung on ball bearings with metal shafts and are joined by ball-bearing hinges.

Brill No. 177-E-1-X four-wheel pivotal type trucks with a 5-ft. 4-in. wheel base are used. Journals are Timken anti-friction bearing type. The truck has swinging bolsters with guides to control their movement and a graduated spring system of combination coil and plate springs. The motor equipment consists of four 35-hp. General Electric motors, type 265. They are axle mounted and have single reduction drive.

Cincinnati Car of Aluminum

The car being furnished the Louisville Railway by the Cincinnati Car Corporation is a single-end, double-truck car, with a seating capacity of 53. The trucks, as well as the car body, are all aluminum, giving a light weight for the unit. The car also varies from the other two in another important feature; the exit door is located to the rear of center, instead of at the rear. Both the front and side doors are of the double folding type.

The car has a total length of 41 ft. 2½ in. and measures 32 ft. 11⅞ in. over the body corner posts. The width at the belt rail is 8 ft. 2½ in., and the height is 9 ft. 11 5/16 in. The trucks have a wheel base of 5 ft. 4 in., and the truck centers are 22 ft. 9⅜ in.

The front of the car with its two-piece window, sun visor, two headlights and automotive type bumper has an attractive appearance. The rear of the car also is fitted with two large windows, with a side window on each side of the rear vestibule. A similar side window is located at the left of the operator's seat in the front vestibule. On the left, or devil strip side of the car, are twelve windows, while on the right side there are eleven, the twelfth space being used for the treadle-operated side door.

The seats, which are of the semi-bucket type, are upholstered in brown, genuine Spanish grain leather. The car has twenty-two double cross seats, a single seat near the front and a long seat in the rear. The motorman's seat is of the adjustable type and is upholstered in the same leather as the other seats. Ample ventilation is afforded by ten ventilators in the roof and four louvers, two on the front and two on the rear of the car. The car heaters are of the panel type.

Trucks for the car are the standard Cincinnati type with aluminum diamond frames, gusset plates and transom angles. Wheel bearings are of the roller type. The motors, which are inside hung, were supplied by the General Electric Company and are the No. 265 type

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Annual Reports of

80 Electric Railways Reviewed

Financial results for nearly three-quarters of the industry show continued progress, with gross revenues equal to those of the previous year. Operating ratios are lower on many properties. Operating net is up more than $1,000,000 for the year 1928 over 1927

FINANCIAL reports covering operations for the calendar year 1928 have been made public by many of the electric railway systems. While these reports differ somewhat in form, being prepared in some instances for security holders, in others for the state utility commissions, and in still others for the city authorities, they are fairly comparable. Together they give a picture of the results obtained by the industry during the past year. In general, also, they make comparisons with the year 1927. Where comparisons are not included in the pamphlet reports they nearly always are available in the published reports of the preceding year.

In the past it has been the practice of this paper to publish such reports from time to time, as they appear, treating each one individually. This year it has been considered of greater value to the reader to group as many of them as possible, so as to permit comparisons, not only of one year with the previous one for an individual property, but of properties one with another.

In all, information has been collected covering 80 properties. While not every item in the standard form is given in every instance, the relatively few omissions do not reduce to any great extent the value of the information. A considerable number of other railways do not publish separate reports, and their operating results are included only in the reports of larger utilities or holding companies of which they are subsidiaries. It is not possible to include reports of this type, because of the meager information available relative to the railway system. Companies usually do not separate railway expenses and taxes, and even when the gross income after taxes is given, its distribution seldom is shown separately.

The 80 properties included in the survey, however, have prepared reports that are sufficiently complete to

TABLE I—RANGE OF OPERATING RATIOS IN 1928, ARRANGED ACCORDING TO SIZE OF PROPERTIES

	Annual Gross Revenue			
	Less Than $1,000,000	$1,000,000 to $10,000,000	More Than $10,000,000	Grand Total
Total number of companies	18	41	21	80
Range of operating ratios in per cent:				
Above 100	2	1	0	3
90–100	4	1	0	5
80–90	7	8	3	18
70–80	3	18	11	32
Below 70	2	5	4	11
Figures not available	0	8	3	11

TABLE II—SIGNIFICANT CHANGES IN OPERATION, CLASSIFIED ACCORDING TO SIZE OF PROPERTIES, 1927–1928

	Annual Gross Revenue			
	Less Than $1,000,000	$1,000,000 to $10,000,000	More Than $10,000,000	Grand Total
Total number of companies	18	41	21	80
Gross revenue:				
Increased in 1928	5	8	9	22
Decreased in 1928	12	33	12	57
Figures not available	1	0	0	1
Operating expenses:				
Increased in 1928	2	10	9	21
Decreased in 1928	15	23	9	47
Figures not available	1	8	3	12
Net revenue:				
Increased in 1928	10	15	6	31
Decreased in 1928	7	18	12	37
Figures not available	1	8	3	12

TABLE III—DIVIDENDS PAID IN 1928 BY COMPANIES INCLUDED IN SURVEY

Name of Company	Class of Stock	Rate, Per Cent	Amount
Denver Tramway	Pfd.	3	$313,236
Capital Traction Company, Washington, D. C.	Common	7	840,000
Washington Railway & Electric Company	Pfd.	...	425,000
	Common	...	455,000
Chicago Rapid Transit Company	.....	...	489,484
Chicago, North Shore & Milwaukee Railroad	Pfd. N. C.	6	373,422
	Prior lien	7	490,000
Gary Railways	Pfd. A & B	...	67,514
	Common	...	14,533
Louisville Railway	Pfd.	5	175,000
	Common	2	166,472
Androscoggin & Kennebec Railway	Pfd.	...	88,110
Boston Elevated Railway	Common	...	3,145,726
Holyoke Street Railway	.....	...	26,840
Union Street Railway, New Bedford	.....	3	73,125
Springfield Street Railway, Springfield, Mass.	.....	...	186,188
Grand Rapids Railroad	Pfd.	7	10,276
Duluth Street Railway	Pfd.	7	35,000
Duluth-Superior Traction Company	Pfd.	4	60,000
Twin City Rapid Transit Company, Minneapolis, Minn.	Pfd.	7	210,000
	Common	2	440,000
Brooklyn City Railroad	Common	1	160,000
Brooklyn-Manhattan Transit Corporation	Pfd.	6	1,496,808
	Common	4	3,079,644
Hudson & Manhattan Railroad	.....	1	999,888
Cincinnati Street Railway	Common	5½	1,227,700
Cleveland Railway	Common	6	1,972,986
Community Traction Company, Toledo, Ohio	Pfd.	...	87,955
Philadelphia Rapid Transit Company	Pfd.	7	2,100,000
	Common	8	2,305,182
Montreal Tramways	.....	10	550,000
Honolulu Rapid Transit Company	.....	7	175,000
Total for 24 companies			$22,240,089

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Table IV—Condensed Financial Reports of Electric Railway Properties, 1927-1928

	Fort Smith Traction Co. Fort Smith, Ark.		Fresno Traction Co. Fresno, Cal.		Los Angeles Ry. Los Angeles, Cal.		Pacific Electric Ry. Los Angeles, Cal.		San Fran'co, Napa & Calistoga Ry. Napa, Cal.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$180,310	$206,230	$311,897	$324,071	$13,175,162	$13,287,601	$18,310,987	$19,614,541	$215,481	$221,320
Railway operating expenses	158,683	198,557	300,561	313,268	11,002,575	11,062,013	15,876,041	16,351,454	157,789	161,291
Net revenue, railway oper.	$21,627	$7,673	$11,335	$11,802	$2,172,587	$2,225,588	$2,434,946	$3,263,086	$57,691	$60,028
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	.....	.....	19,053	19,729	833,675	814,347	1,138,742	1,113,665	12,098	12,782
Operating income	.....	.....	*$7,718*	*$8,927*	$1,338,912	$1,411,240	$1,296,204	$2,149,421	$45,592	$47,245
Non-operating income	.....	.....	.....	10,214	*180,949*	*206,136*	384,523	243,797	*13,168*	*9,165*
Gross income	.....	.....	.....	$1,287	$1,157,963	$1,205,104	$1,680,727	$2,393,218	$32,449	$38,080
Deductions from gross income	.....	.....	.....	51,196	.....	.....	2,913,780	3,990,021	.....	.....
Net income	.....	.....	.....	*$49,909*	.....	.....	*$1,133,053*	*$596,703*	.....	.....
Operating ratio, per cent	88.0	96.3	96.4	96.4	83.5	83.2	86.7	83.4	73.2	72.9

	Key System Transit Co. Oakland, Cal.		Petaluma & Santa Rosa R.R. Petaluma, Cal.		San Diego Electric Ry. San Diego, Cal.		California St. Cable R.R. San Francisco, Cal.		Market Street Ry. San Francisco, Cal.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$7,227,958	$7,452,821	$624,037	$594,199	$1,659,767	$1,676,501	$514,109	$521,905	$9,754,460	$9,819,570
Railway operating expenses	5,647,612	5,852,550	462,440	446,033	1,384,800	1,381,324	442,734	539,594	7,746,612	7,640,858
Net revenue, railway oper.	$1,580,346	$1,600,271	$161,596	$148,165	$274,967	$295,176	$71,375	*$17,689*	$2,007,848	$2,178,712
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	33,431	40,283	.....	.....
Taxes	464,684	432,335	38,313	32,746	120,086	124,387	.....	.....	607,000	605,000
Operating income	$1,115,661	$1,167,936	$123,283	$115,418	$154,880	$170,789	$37,943	*$57,972*	$1,400,848	$1,573,712
Non-operating income	123,403	146,453	15,261	10,596	96,944	92,266	.....	.....	25,924	40,881
Gross income	$1,239,065	$1,314,389	$138,544	$126,014	$251,824	$263,055	.....	.....	$1,426,772	$1,614,593
Deductions from gross income	.....	.....	.....	.....	.....	.....	.....	.....	1,296,994	1,356,435
Net income	*$808,385*	*$579,017*	.....	.....	.....	.....	.....	.....	$129,778	$258,158
Operating ratio, per cent	78.2	78.6	74.1	75.1	83.4	82.4	86.1	103.1	79.4	77.9

	San Francisco-Sacramento R.R. San Francisco, Cal.		San Jose Railroads San Jose, Cal.		Santa Barbara & Suburban Ry. Santa Barbara, Cal.		Denver Tramway Denver, Colo.		Fort Collins Municipal Ry. Fort Collins, Colo.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$844,090	$908,936	$359,326	$366,881	$132,937	$124,658	$4,310,040	$4,390,016	$19,106	.....
Railway operating expenses	887,184	919,666	295,035	306,613	124,476	123,949	2,852,496	2,940,084	30,388	.....
Net revenue, railway oper.	*$43,094*	*$10,729*	$64,290	$60,267	$8,461	$709	$1,457,544	$1,449,932	*$11,281*	.....
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	47,543	45,309	24,231	24,943	$8,339	8,332	506,504	523,460	.....	.....
Operating income	*$90,637*	*$56,039*	$40,058	35,324	$122	*$7,623*	$951,040	$926,472	.....	.....
Non-operating income	.....	.....	1,912	1,461	.....	.....	39,077	41,413	.....	.....
Gross income	.....	.....	$41,970	$36,785	.....	.....	$990,118	$967,885	.....	.....
Deductions from gross income	.....	.....	.....	.....	.....	.....	$529,158	$485,720	.....	.....
Net income	.....	.....	.....	.....	.....	.....	$460,960	$482,165	.....	.....
Operating ratio, per cent	105.1	101.2	82.1	83.5	93.6	99.5	66.1	67.0	158.9	.....

	Connecticut Co. New Haven, Conn.		Capital Traction Co. Washington, D. C.		Washington Ry. & Elec. Co. Washington, D. C.		Jacksonville Traction Co. Jacksonville, Fla.		Chicago, Aurora & Elgin R.R. Aurora, Ill.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$13,734,222	$14,185,034	$4,344,148	$4,479,099	$5,783,826	$5,865,430	$1,199,516	$1,378,181	$2,802,845	$2,813,486
Railway operating expenses	10,759,127	11,563,166	3,054,981	3,099,574	4,731,042[1]	4,846,613[1]	1,077,925[1]	1,228,688[1]	2,447,298	12,560,753
Net revenue, railway oper.	$2,975,095	$2,621,868	$1,289,167	$1,379,525	$1,052,784	$1,018,817	$121,591	$149,493	$355,546	.....
Net revenue, auxiliary oper.	.....	.....	.....	.....	1,431,367	1,300,683	.....	.....	*6,397*	.....
Taxes	725,357	698,934	346,965	370,789	.....	.....	6,437[2]	8,765[2]	121,294	.....
Operating income	$2,249,738	$1,922,939	$942,202	$1,009,236	$2,484,151	$2,319,594	$115,154	$140,728	$227,853	$252,733
Non-operating income	154,641	56,984	31,924	43,033	.....	.....	.....	.....	249,265	170,521
Gross income	$2,404,380	$1,979,918	$974,126	$1,052,269	$2,484,151	$2,319,594	$115,154	$140,728	$477,119	$423,254
Deductions from gross income	1,373,431	1,451,901	353,720	344,814	750,196	746,429	164,018	173,090	439,072	380,505
Net income	$1,030,948	$528,017	$620,406	$707,454	$1,733,967	$1,573,065	*$48,864*	*$32,362*	$38,047	$42,749
Operating ratio, per cent	78.4	81.5	70.3	69.1	.....	.....	.....	.....	87.3	.....

	Chicago Rapid Transit Co. Chicago, Ill.		Chicago Surface Lines[3] Chicago, Ill.		East St. Louis & Suburban Co.[6] East St. Louis, Ill.		Chicago North Shore & Milwaukee R.R. Highwood, Ill.		Union Traction Co. of Indiana Anderson, Ind.	
	1928	1927	1928	1927[3]	1928	1927	1928	1927	1928	1297
Railway operating revenue	$19,995,276	$20,011,911	$62,391,622	$61,624,752	$4,358,457	$4,397,045	$7,967,186	$7,829,591	$2,805,320	$2,951,206
Railway operating expenses	14,238,630	14,189,150	45,401,067	45,331,496	2,977,474	3,093,267	5,928,424	5,740,867	2,504,517	2,708,360
Net revenue, railway oper.	$5,756,646	$5,822,760	$16,990,555	$16,293,256	$1,380,983	$1,303,778	$2,038,761	$2,088,724	$300,803	$242,846
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	59,601	68,477	.....	.....
Taxes	$1,843,112	$1,767,948	$3,560,000	$2,900,000	$334,100	$287,950	$395,596	$420,084	$102,694	$98,000
Operating income	$3,913,534	$4,054,812	$13,430,555	$13,393,256	$1,046,883	$1,015,872	$1,702,767	$1,737,116	$198,108	$144,846
Non-operating income	268,974	332,840	*2,805,722*[4]	*3,050,264*[5]	181,871	238,710	426,467	57,287	24,066	24,593
Gross income	$4,182,508	$4,387,652	$10,624,833	$10,342,992	$1,228,754	$1,254,538	$2,129,234	$1,794,404	$222,175	$169,439
Deductions from gross income	3,540,194	3,571,556	6,985,843	6,908,131	1,000,006	920,002	1,347,513	1,298,360	.....	.....
Net income	$642,313	$816,096	$3,638,990	$3,434,861	$228,747	$334,536	$781,721	$496,044	.....	.....
Operating ratio per cent	71.2	71.0	72.7	73.5	68.3	70.4	74.4	73.3	89.3	91.8

Italic figures indicate deficit or entries opposite the general account.

[1]Includes taxes.

[2]City of South Jacksonville proportion.

[3]Combined statements of Chicago Railways and South Side Lines for distribution of income; years ended Jan. 31.

[4]Includes city's 55 per cent of divisible net receipts, $2,556,245.

[5]Includes city's 55 per cent of divisible net receipts, $2,100,224.

[6]Includes subsidiary companies.

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Table IV (Continued)—Condensed Financial Reports of Electric Railway Properties, 1927-1928

	Indiana Gary Railways Gary, Ind.		Indianapolis Street Ry. Indianapolis, Ind.		Terre Haute, Ind'p'l's & Eastern Trac. Co. Indianapolis, Ind.		Waterloo, Cedar Falls & Northern Ry. Waterloo, Iowa		Louisville Railway Louisville, Ky.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$1,240,522	$1,275,769	$5,213,776	$5,414,671	$5,122,184	$5,674,386	$1,123,437	$980,910	$4,749,361	$4,812,195
Railway operating expenses	970,534	1,010,563	3,857,221	4,177,977	4,119,917[1]	4,629,231[1]	882,682	834,009	3,334,341	3,260,563
Net revenue, railway oper.	$269,988	$265,206	$1,356,555	$1,236,694	.....	.....	$240,755	$146,901	$1,415,020	$1,551,632
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	*64,043*	*85,977*
Taxes	63,113[7]	84,206[7]	289,303	295,924	.....	.....	37,021	39,991	461,000	461,000
Operating income	$206,875	$181,000	$1,067,252	$940,770	$1,002,267	$1,045,155	$203,734	$107,020	$889,977	$1,004,654
Non-operating income	2,416	.....	.....	.....	.....	.....	.....	.....	86,107	83,518
Gross income	$209,291	$181,000	$1,067,252	$940,770	$1,002,267	$1,045,155	.....	.....	$976,084	$1,088,172
Deductions from gross income	118,609	84,282	663,839	639,914	1,128,518	1,125,651	.....	.....	643,033	656,679
Net income	$90,682	$96,718	$403,413	$300,856	*$126,251*	*$80,496*	.....	.....	$333,051	$431,493
Operating ratio, per cent	78.2	79.2	74.0	77.2	.....	.....	78.6	85.0	70.2	67.8

	Portland Railroad Portland, Me.		Androscoggin & Kennebec Ry. Lewiston, Me.		United Railways & Electric Co. Baltimore, Md.		Wash'n, Balto. & Annapolis El. Ry. Baltimore, Md.		Boston Elevated Ry. Boston, Mass.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$1,272,900	$1,296,429	$822,922	$921,941	$16,273,806	$16,189,741	$2,488,236	$2,601,366	$34,742,656	$35,095,876
Railway operating expenses	1,047,118[1]	1,035,013	680,943	744,580	10,873,921	10,624,326	1,864,024	1,915,685	24,900,189	25,132,333
Net revenue, railway oper.	.....	$261,411	$141,979	$177,361	$5,399,884	$5,565,415	$624,212	$685,681	$9,842,467	$9,963,543
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	.....	85,716	29,356	37,684	1,578,782	1,593,143	131,271	131,882	1,721,678	1,864,136
Operating income	$225,783	$175,695	$112,623	$139,677	$3,821,102	$3,972,271	$419,940	$553,799	$8,120,789	$8,099,407
Non-operating income	.....	.....	.....	.....	150,823	159,230	11,009	19,190	100,491	97,534
Gross income	$225,783	$175,695	$112,623	$139,677	$3,971,926	$4,131,502	$503,950	$572,989	$8,221,280	$8,196,941
Deductions from gross income	347,548	347,548	68,561	68,832	3,413,532	3,449,315	561,279	556,351	8,181,229[8]	[9]7,974,126
Net income	*$121,765*	*$171,853*	$44,062	$70,845	$558,394	$682,187	*$57,329*	$16,638	$40,051	$222,815
Operating ratio, per cent	.....	80.0	82.7	80.7	66.8	65.6	74.9	73.7	71.7	71.6

	Eastern Massachusetts St. Ry. Boston, Mass.		Holyoke Street Ry. Holyoke, Mass.		Union Street Railway New Bedford, Mass.		Berkshire Street Railway Pittsfield, Mass.		Springfield Street Ry. Springfield, Mass.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$9,005,759	$9,343,196	$759,104	$820,730	$1,286,624	$1,493,337	$739,215	$798,696	$2,789,846	$2,891,431
Railway operating expenses	6,714,404	7,272,782	652,234	736,001	1,165,964	1,255,327	610,286	749,780	2,197,844	2,414,846
Net revenue railway oper.	$2,291,355	$2,060,414	$106,870	$84,729	$120,660	$238,010	$128,929	$48,916	$592,002	$476,585
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	364,759	358,894	14,134	17,853	58,713	74,689	30,434	31,022	31,330	57,611
Operating income	$1,926,596	$1,601,520	$92,736	$66,876	$61,947	$163,321	$98,495	$17,894	$560,672	$418,974
Non-operating income	242,361	282,238	24,120	10,863	1,251	1,370	1,857	2,240	6,348	15,116
Gross income	$2,168,956	$1,993,758	$116,856	$77,739	$63,198	$164,691	$100,352	$20,134	$567,020	$434,090
Deductions from gross income	1,176,167	1,221,698	83,313	82,833	12,465	14,252	296,324	313,569	284,916	242,739
Net income	$992,789	$772,060	$33,543	*$5,093*	$50,733	$150,438	*$195,972*	*$293,435*	$282,104	$191,350
Operating ratio, per cent	74.6	77.9	85.9	89.7	90.6	84.1	82.6	93.9	78.8	83.6

Italic figures indicate deficit or entries opposite the general account.

[1]Includes taxes.

[7]Taxes and other charges.

[8]Includes rent of leased roads and guaranteed dividends, $3,145,726.

[9]Includes rent of leased roads and guaranteed dividends, $3,152,432.

permit comparisons. The most of these can be presented in standard form. They represent a total gross revenue from railway operation in 1928 amounting, in round figures, to $730,000,000. This is between two-thirds and three-quarters of the total business done by the electric railway industry. Of the 80 properties, 21 had a gross revenue for the year of more than $10,000,000, and 18 had a gross revenue of less than $1,000,000. The remaining 41 were between the limits of $1,000,000 and $10,000,000 gross. The sizes of the companies are thus typical, and show what can be expected in the range of small, medium, and large properties.

Results of operation naturally vary over a wide range. In general the operating ratios of the smaller companies averaged higher than those in the medium-sized and large groups, although some of the small properties were run at comparatively small cost. The operating ratios for the greatest number of companies fell in the range between 70 and 80 per cent, there being 32 in this classification. The largest companies which had operating ratios below 70 are the United Railways & Electric Company of Baltimore, the Brooklyn-Manhattan Transit Corporation, the Interborough Rapid Transit Company and the Philadelphia Rapid Transit Company. All of these except the first have extensive subway and elevated systems, on which the fixed charges are far greater than for surface lines.

In the group of companies which had gross revenues in 1928 between $1,000,000 and $10,000,000, the companies whose operating ratios were below 70 per cent are the Denver Tramway Corporation, the East St. Louis & Suburban Railway, the Grand Rapids Railroad, the New York, Westchester & Boston Railway and the Honolulu Rapid Transit Company. The Westchester is a high-speed rapid transit line and the others are street railways. Labor conditions undoubtedly had much to do with the good showing in Honolulu. In the class of small companies, the Beaver Valley Traction Company and the Galveston-Houston Electric Railway operated at less than 70 per cent. Both are interurban lines, although the former, running through an intensely developed industrial district, has little to differentiate it from a city line. Eleven of the companies did not separate taxes in their financial statements, so that the operating ratio could not be computed for them. The range of operating ratios for all of the other companies is given in Table I.

Comparisons between results in 1928 and in 1927 indicate the progress being made in improving the financial status of the properties. The total revenues of the entire group were almost identical in the two years, there

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Table IV (Continued)—Condensed Financial Reports of Electric Railway Properties, 1927-1928

	Worcester Consolidated St. Ry. Worcester, Mass.		Department of St. Rys.[10] Detroit, Mich.		Grand Rapids Railroad Grand Rapids, Mich.		Duluth-Superior Traction Co. Duluth, Minn.		Twin City Rapid Transit Co. Minneapolis, Minn.	
	1928	1927	1928	1927	1928	1927[13]	1928	1927	1928	1927
Railway operating revenue	$3,116,623	$3,189,041	$24,668,175	$23,507,972	$1,574,171	$1,675,352	$1,873,330	$1,965,489	$13,053,353	$13,425,643
Railway operating expenses	2,443,856	2,738,337	19,283,497	17,980,836	957,625	1,005,643	1,535,169	1,570,441	9,950,552	9,959,972
Net revenue, railway oper.	$672,767	$450,704	$5,384,678	$5,527,136	$616,546	$669,709	$338,160	$395,047	$3,054,801	$3,465,671
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	74,284	85,980	783,013	753,047	133,617	133,496	153,561	156,659	1,098,849	1,254,793
Operating income	$598,483	$364,723	$4,601,665	$4,774,089	$482,929	$536,213	$184,599	$238,388	$1,955,952	$2,210,878
Non-operating income	21,831	25,066	245,586	249,762	.....	.....	33,794	38,723	99,281	63,930
Gross income	$620,314	$389,789	$4,847,251	$5,023,851	$482,929	$536,213	$218,393	$277,112	$2,055,233	$2,274,808
Deductions from gross income	420,277	387,881	4,821,781[11]	5,020,397[12]	240,915	.....	169,171	169,446	1,221,643	1,002,208
Net income	$150,036	$1,908	$25,470	$3,454	$242,014	.....	$49,222	$107,645	$833,590	$1,272,600
Operating ratio, per cent	78.4	85.9	78.2	76.5	60.7	60.0	82.0	80.0	76.6	74.2

	Kansas City Public Service Co. Kansas City, Mo.		St. Louis Public Service Co. St. Louis, Mo.		Omaha & Council Bluffs St. Ry. Omaha, Neb.		Public Service Co-ord. Transport.[16] Newark, N. J.		International Ry. Buffalo, N. Y.	
	1928	1927	1928	1927[15]	1928	1927	1928	1927	1928	1927
Railway operating revenue	$8,490,282	$9,351,456	$19,862,058	$19,533,261	$3,217,383	$3,352,916	$37,985,112	$35,369,607	$11,116,653	$11,192,908
Railway operating expenses	6,242,470	7,756,601[1]	15,080,238	15,298,210	2,331,946	2,119,625	28,758,820	27,083,918	8,336,905	8,853,657
Net revenue, railway oper.	$2,247,812	$1,594,855	$4,781,820	$4,235,051	$885,437	$1,233,291	$9,226,292	$8,285,689	$2,779,748	$2,339,251
Net revenue, auxiliary oper.	*120,828*[14]	.....	.....	.....	441,118	366,927	.....	.....	.....	.....
Taxes	505,530	.....	1,889,825	1,851,139	377,197	548,147	3,031,718	3,087,839	749,918	780,140
Operating income	$1,621,456	$1,594,855	$2,891,995	$2,383,912	$949,358	$1,152,061	$6,194,574	$5,197,850	$2,029,830	$1,459,111
Non-operating income	.....	17,859	.....	.....	39,937	.....	207,831	227,880	56,913	50,138
Gross income	$1,621,456	$1,612,714	$2,891,995	$2,383,912	$989,296	$1,152,061	$6,402,405	$5,425,730	$2,086,743	$1,509,249
Deductions from gross income	875,973	758,174	1,919,800	2,492,104	787,812	852,673	5,910,003	5,466,535	1,352,998	1,440,341
Net income	$745,452	$854,540	$972,195	*$108,192*	$201,483	$299,388	$492,402	*$40,805*	$733,745	$68,908
Operating ratio, per cent	73.6	.....	75.9	78.3	72.6	63.3	75.7	76.6	75.0	79.1

	Brooklyn City Railroad New York, N. Y.		Brooklyn-Manhattan Transit Corp. New York, N. Y.		Hudson & Manhattan R.R. New York, N. Y.		Interborough Rapid Transit Co. New York, N. Y.		New York Railways New York, N. Y.	
	1928[17]	1927[17]	1928[17]	1927[17]	1928	1927	1928[17]	1927[17]	1928	1927
Railway operating revenue	$5,725,093	$5,765,300	$24,135,351	$23,617,381	$12,388,927	$12,549,897	$33,662,344	$32,764,556	$6,550,683	$6,907,920
Railway operating expenses	4,966,154[1]	4,942,424[1]	15,710,730	15,378,210	6,425,643[1]	6,384,451[1]	21,018,119	19,249,050	5,215,648	5,421,255
Net revenue, railway oper.	.....	.....	$8,424,621	$8,239,170	.....	.....	$12,580,225	$13,515,505	$1,335,035	$1,486,665
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	.....	.....	1,652,834	1,646 462	.....	.....	1,199,094	1,798,633	466,452	478,191
Operating income	$758,839	$822,876	$6,771,786	$6,592,708	$5,963,284	$6,165,446	$11,381,130	$11,716,872	$868,583	$1,008,475
Non-operating income	.....	.....	491,559	508,320	.....	.....	.....	.....	130,987	102,923
Gross income	$758,839	$822,876	$7,263,345	$7,101,028	$5,963,284	$6,165,446	.....	.....	$999,570	$1,111,398
Deductions from gross income	249,464	264,495	4,157,203	3,977,722	4,022,226	4,027,564	10,805,530	10,802,012	872,768	982,613
Net income	$509,475	$558,381	$3,106,141	$3,123,306	$1,941,057	$2,137,882	$575,600	$896,860	$126,784	$128,785
Operating ratio, per cent	.....	.....	65.1	65.1	.....	.....	62.6	58.7	79.6	78.5

	Third Avenue Ry. System New York, N. Y.		N. Y., Westchester & Boston Ry. New York, N. Y.		New York State Rys. Rochester, N. Y.		Stark Electric Railway Alliance, Ohio		Cincinnati Street Railway Cincinnati, Ohio	
	1928[17]	1927[17]	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$7,791,188	$7,753,665	$2,390,399	$2,151,428	$9,658,535	$9,879,150	$328,631	$323,475	$8,819,116	$8,700,257
Railway operating expenses	5,999,131	5,953,306	1,622,858	1,498,972	6,945,011	7,058,067	297,532	312,751	6,320,173	6,332,429
Net revenue, railway oper.	$1,792,056	$1,800,358	$767,541	$652,456	$2,713,523	$2,821,083	$31,099	$10,724	$2,498,943	$2,367,828
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	555,167	560,401	239,672	229,150	583,732	596,565	10,659	.....	747,318	771,369
Operating income	$1,236,888	$1,239,957	$527,868	$423,305	$2,129,791	$2,224,517	$20,439	.....	$1,751,625	$1,596,459
Non-operating income	114,371	103,929	12,653	15,187	31,665	122,955	5,196	.....	27,549	48,021
Gross income	$1,351,260	$1,343,886	$540,522	$438,492	$2,161,456	$2,347,472	$25,635	.....	$1,779,174	$1,644,480
Deductions from gross income	1,506,571	1,377,575	2,448,950	2,303,493	1,501,899	1,508,381	68,605	.....	1,764,381	1,624,141
Net income	*$155,311*	*$33,688*	*$1,908,428*	*$1,864,999*	$659,556	$839,090	*$42,970*	.....	14,793	$20,339
Operating ratio, per cent	77.0	76.7	67.9	69.8	71.8	71.5	90.6	96.8	71.8	72.8

	Cleveland Railway Cleveland, Ohio		Cincinnati, Hamilton & Dayton Ry. Dayton, Ohio		Community Traction Co. Toledo, Ohio		Portland Elec. Power Co. Portland, Ore.[18]		Lehigh Valley Transit Co. Allentown, Pa.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$18,272,040	$18,706,290	$1,151,905	$1,065,056	$3,670,337	$3,408,387	$4,523,475	$4,630,431	$4,314,937	$4,590,261
Railway operating expenses	15,065,214	14,806,631	951,496†	934,359†	2,565,163	2,615,183	3,789,850	3,729,749	3 199,996[1]	-3,367,094
Net revenue, railway oper.	$3,206,826	$3,899,659	.....	.....	$1,105,174	$793,204	$733,625	$900,683	.....	.....
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	*91,496*	*94,645*	.....	.....
Taxes	1,261,527	1,388,602	.....	.....	230,356	209,524	379,218	358,045	.....	.....
Operating income	$1,945,299	$2,511,057	$200,409	$130,697	$874,818	$583,680	$262,909	$447,992	$1,114,941	$1,223,167
Non-operating income	275,708	214,363	19,379	2,271	20,734	23,396	.....	.....	143,610	128,934
Gross income	$2,221,007	$2,725,420	$219,789	$132,968	$895,549	$607,074	.....	.....	$1,258,551	$1,352,100
Deductions from gross income	2,530,953	2,138,156	144,249	109,447	697,443	881,182	.....	.....	834,176	832,054
Net income	*$309,946*	$587,264	$75,539	$23,521	$198,106	*$274,108*	.....	.....	$424,375	$520,047
Operating ratio, per cent	82.5	79.2	.....	.....	70.0	76.8	83.8	80.5	.....	.....

Italic figures indicate deficit or entries opposite the general account.

[1]Includes taxes.

[10]As computed by the city's auditor.

[11]Includes $2,579,119 sinking fund for bonds and purchase contract.

[12]Includes $2,600,228 sinking fund for bonds and purchase contract.

[13]Present company formed May, 1927.

[14]Bus revenue, $540,006; bus operating expenses, $660,834.

[15]Operated by receiver to Nov. 30, 1927.

[16]Includes Public Service Railroad and other affiliated companies.

[17]Six months ended Dec. 31.

[18]Railway division only.

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Table IV (Continued)—Condensed Financial Reports of Electric Railway Properties, 1927-1928

	Beaver Valley Traction Co.[19] New Brighton, Pa.		Philadelphia Rapid Transit System Philadelphia, Pa.		Pittsburgh Railways Pittsburgh, Pa.		Scranton Railway Scranton, Pa.		United Electric Railways Providence, R. I.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$538,205	$552,950	$55,835,521	$56,928,146	$20,576,466	$21,365,543	$1,976,940	$2,092,046	$7,423,475	$7,876,423
Railway operating expenses	369,300	408,525	38,935,149	40,014,659	15,627,144	16,311,911	1,382,279	1,510,837[1]	6,088,608	6,388,099
Net revenue, railway oper.	$168,905	$144,425	$16,900,372	$16,913,487	$4,949,322	$5,053,632	$594,660	.....	$1,334,867	$1,488,324
Net revenue, auxiliary oper.	*143*	*664*	.....	.....	1,279	13,850	.....	.....	.....	.....
Taxes	7,466	10,404	3,402,066	3,306,762	569,624	608,137	45,757	.....	361,850	396,383
Operating income	161,295	133,357	13,498,306	13,606,724	4,380,977	4,459,346	548,903	581,209	973,017	1,091,941
Non-operating income	4,215	2,569	1,390,208	980,917	117,339	165,658	4,291	.....	86,559	83,559
Gross income	$165,510	$135,926	$14,888,514	$14,587,642	$4,498,316	$4,625,004	$553,194	$581,209	$1,059,576	$1,175,500
Deductions from gross income	163,006	145,251	11,361,425	10,805,457	4,487,830	4,583,721	491,145	520,237	626,374	664,531
Net income	$2,504	*$9,326*	$3,527,089	$3,782,185	$10,486	$41,283	$62,049	$60,972	$433,202	$510,969
Operating ratio, per cent	68.6	73.8	69.7	70.3	75.9	76.3	70.0	.....	82.0	81.1

	Texas Electric Railway Dallas, Texas		Gal.-Houston El. Ry. Houston, Texas		Bamberger Elec. R.R. Salt Lake City, Utah		Pac. Nor'west Trac. Co. Seattle, Wash.		Seattle Mun. St. Ry.[20] Seattle, Wash.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$1,821,057	$1,865,000	$643,800	$696,860	$559,796	$559,230	$881,076	$878,482	$5,627,099	$5,703,873
Railway operating expenses	1,187,294[1]	11,189,380[1]	373,360	404,881	438,624	444,711	736,776	688,830	4,793,341	4,765,846
Net revenue, railway oper.	.....	.....	$270,440	$291,978	$121,171	$114,518	$144,300	$189,652	$833,758	$938,027
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	24,937	26,598
Taxes	.....	.....	31,768	30,684	37,065	.....	51,644	45,420	.....	.....
Operating income	$633,762	$675,620	$238,671	$261,293	$84,106	.....	$92,654	$144,231	.....	.....
Non-operating income	4,696	2,063	.....	.....	18,017	.....	.....	.....	.....	.....
Gross income	$638,459	$677,683	$238,671	$261,293	$102,213	.....	$92,654	$144,231	$858,695	$964,625
Deductions from gross income	588,809	506,532	269,808	265,759	92,082	.....	155,255	170,357	647,083	698,104
Net income	$49,650	$171,151	*$31,138*	*$4,466*	$10,131	*$6,642*	*$62,601*	*$26,126*	$211,612	$266,521
Operating ratio, per cent	.....	.....	58.0	58.1	78.3	79.5	83.6	78.5	85.2	83.5

	Spokane United Rys. Spokane, Wash.		London Street Ry. London, Ont.		Montreal Tramways Montreal, Que.		Havana Electric Ry. Havana, Cuba		Hono. Rap. Trans. Co. Honolulu, Hawaii	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$1,301,455	$1,301,971	$618,961	$638,519	$14,938,678	$13,728,153	$5,415,175	$6,020,680	$1,089,963	$1,019,245
Railway operating expenses	1,350,872	1,327,981	519,690	531,598	11,503,314[1]	9,296,067[1]	4,494,473[1]	4,814,609[1]	630,341	626,453
Net revenue, railway oper.	*$49,417*	*$26,010*	$99,271	$106,921	.....	.....	.....	.....	$459,621	$392,792
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	64,231	61,738	.....	.....	.....	.....	.....	.....	147,282	123,801
Operating income	*$113,648*	*$87,748*	.....	.....	$3,435,364	$4,432,086	$920,702	$1,206,071	$312,340	$268,991
Non-operating income	.....	.....	.....	.....	.....	.....	39,171	52,225	.....	.....
Gross income	.....	.....	$99,271	$106,921	.....	.....	$959,873	$1,258,296	$312,340	$268,991
Deductions from gross income	123,634	123,634	92,789[1]	93,872[1]	2,935,364	2,879,141	643,951	643,893	135,199	84,480
Net income	*$237,382*	*$211,481*	$6,482	$13,048	$500,000[21]	$1,552,945[21]	$315,922	$614,403	$177,141	$184,511
Operating ratio, per cent	103.8	102.0	84.0	83.3	.....	.....	.....	.....	57.8	61.5

Italic figures indicate deficit or entries opposite the general account.

[1]Includes taxes.

[19]Includes Pittsburgh & Beaver Street Railway.

[20]As given in income statement.

[21]Of this amount, $500,000 is paid to the city of Montreal when earned.

being a drop of 0.1 per cent in 1928. This showing for the 80 properties is probably more favorable than the total for the entire industry, as most of the large city properties are included in the statistics published in this article. However, comparisons of the results for the individual properties show that nearly half of them increased their net last year. Reference to Table II shows that while only 22 companies reported gains in gross revenue, 47 of them were able to reduce operating expenses. As a result 31 of them had a gain of net revenue for the year.

It is worthy of note that in the classification of small companies, the relative improvement in operation was the greatest, as ten of them were able to show an increase in net as against seven showing a decrease. In the middle-sized group, fifteen companies gained net, while eighteen showed less net at the end of the year. The large companies made, relatively, the poorest showing, as only six of them increased their net revenue, although nine showed greater gross receipts than in 1927.

According to the figures available, 24 companies in the list paid dividends on all or a portion of the capital stock during 1928. The companies doing so are listed in Table III. Since some of the companies pay inter-company dividends to holding companies that are not reported, it is possible that other dividends may have been declared. In a few instances the dividends are virtually guaranteed as part of a service-at-cost plan. Examples of this are the Boston Elevated Railway, the Cincinnati Street Railway and the Cleveland Railway.

British Tramways Improve Position

INCREASED revenue and decreased operating expenses, as shown in the annual report of the Ministry of Transport, have resulted in a material improvement in the financial condition of British Tramways. There was a slight reduction in the route-mileage, due to the substitution of trackless trolleys and buses. The average fare per passenger decreased slightly, but the number of passengers carried increased. Combined figures for all tramways in Great Britain are given in the accompanying table.

SUMMARY OF BRITISH TRAMWAY OPERATIONS

	Last Year	Previous Year	Net Change
Number of tramway systems	233	235	2*
Miles of route	2,514	2,554	40*
Gross receipts	£27,751,504	£26,916,535	£834,969
Operating expenses	£21,943,147	£22,128,461	£185,314*
Average fare	1.39d.	1.42d.	0.03d.*

Note:—These figures are based on returns of 66 privately-owned tramways for the year ended Dec. 31, 1927, and 167 municipal tramways for the year ended March 31, 1928.

*Decrease.

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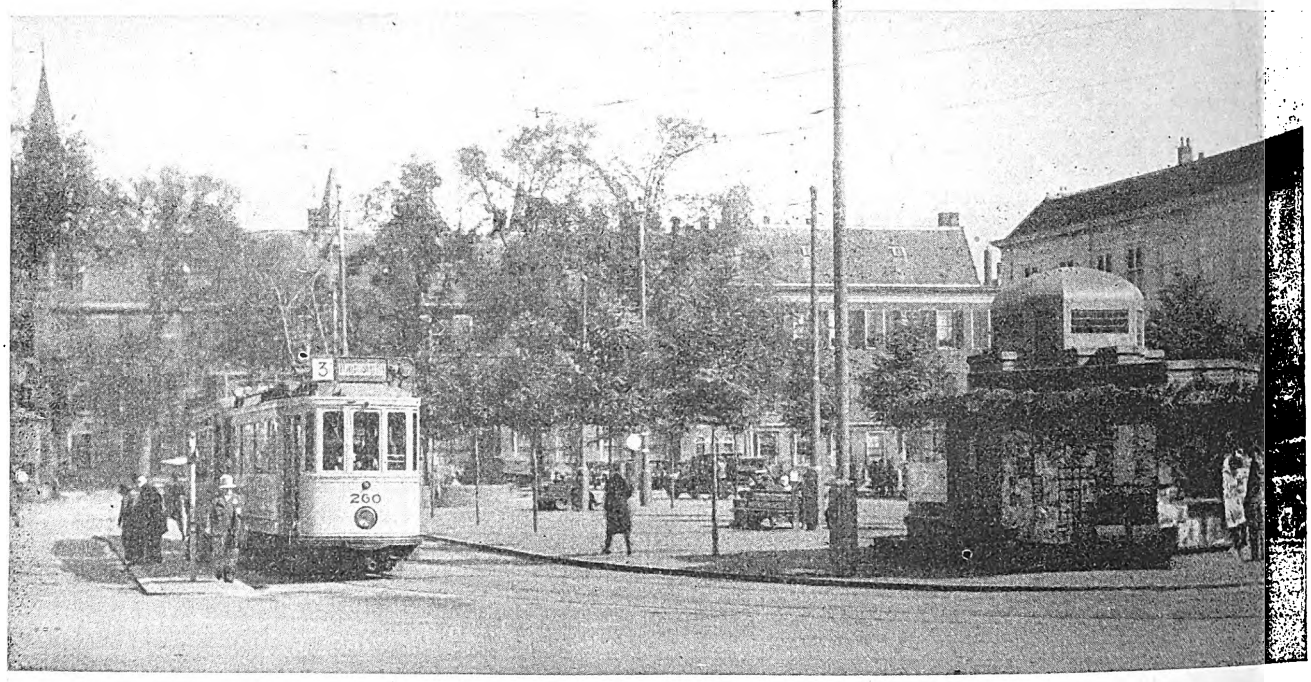
Mass Transportation Service

By
MARQUIS FERDINANDO C. CUSANI
Milan, Italy



Modern two-car train in The Hague, Holland. The bow collector, as used on this car, is losing favor with European tramway operators

MARQUIS CUSANI *recently returned from an extended trip through Germany, The Netherlands, Denmark, Norway, Sweden and Finland. This article tells of his observations of the local transportation situation in these countries, supplemented by previous observations in other European countries. The author's familiarity with American practice enables him to present these views in an extremely interesting manner.*—EDITOR.

CASUAL observation of transportation systems in European cities reveals the fact that the electric railway is still very much alive, no matter to what degree it may have been maltreated, and that nearly everywhere it is still considered the backbone of mass transportation. While it must be admitted that bus service is increasing rapidly all over Europe, the general feeling of the public is that electric railways are preferable, because of their greater cleanliness and less noise, and also because of the stability of this form of transportation, assured by the presence of track and overhead.

Considering the rolling stock and operating improvements which have been made in America in the last two decades, European city transit as a whole is fairly obsolete. From a technical standpoint, it offers extensive possibilities for modernization. One of the favorite theories of European management seems to be that paint represents the utmost in progressiveness and efficiency. The writer does not hold any brief against a clean and well-painted car, but when painting is used simply to camouflage an old piece of rolling stock, which should have been consigned to the scrap heap long ago, he feels that it is a somewhat far-fetched application of the "Save-the-surface and you-save-all" slogan. It is a mistake in most cases to "save the surface" at all.

The habit of trying to reclaim obsolete equipment has brought about a condition whereby, in the present day, cars of the early Vandepoele period are found in service as sound as if they had been built a year ago. Not one original part is to be found in them, and the replacements, without improvement, have brought about total reconstruction at a cost which might have paid for better and more modern cars, had the earlier ones been scrapped sooner.

In Continental Europe only a very few urban electric railways have been willing to profit from American experience. In fact, the only ones which have come to the writer's notice are located as far apart as Spain, Italy and Finland. Everywhere else improvements seem to have been made principally in minor details of car construction, in the development of mercury-arc rectifier substations and in the design of track, carhouses and shops. The idea of adopting radical changes in operating methods and introducing greater safety and speed seems to have found its way only in Milan, Italy, where the adoption of the American "pay-as-you-pass" system is making great strides. Other European managements

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Expanding in Europe

Electric railways are much alive despite increasing use of buses. Enormous possibilities for modernization exist in most cities. Single truck cars and trailers continue to be used widely, although large double-truck units are being introduced on some systems. Numerous improvements in electrical and mechanical equipment are being tried

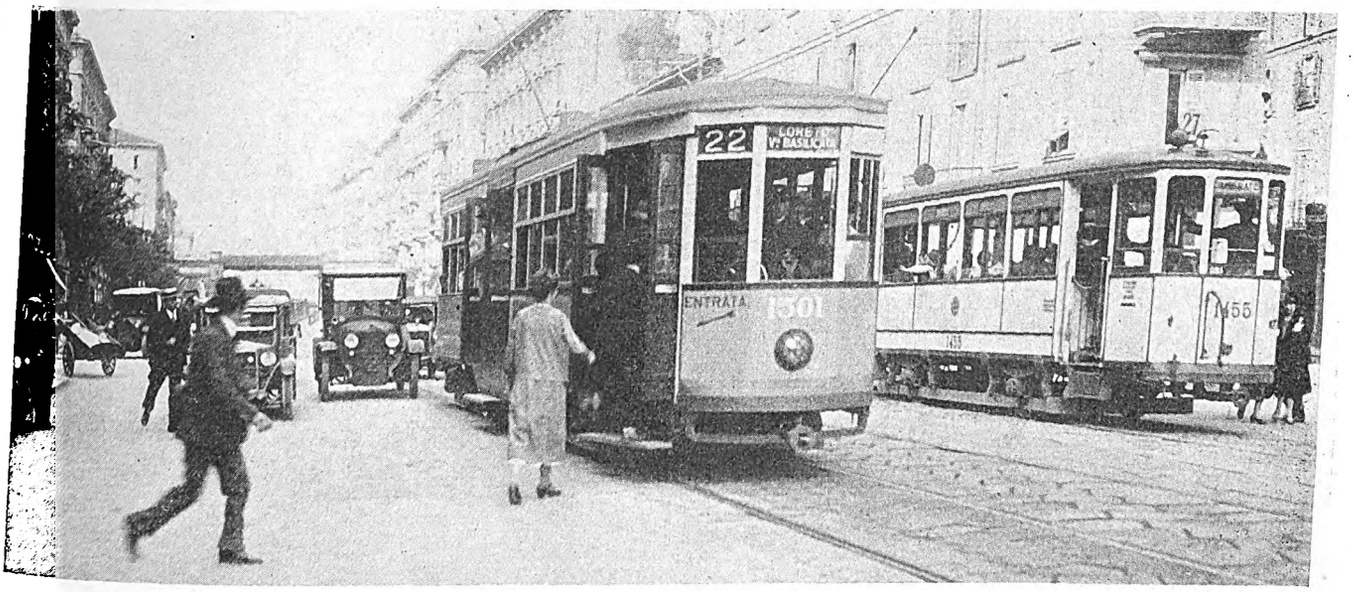
seem to be contented at present with elaborate traffic signs, route maps and freakish car designs, which either do not come out of the experimental stage, or if they ever do, prove that they should never have done so.

The economic and monetary disturbances caused by the World War are generally considered responsible for this state of affairs, but to the technical man it appears very clearly that it is due rather to the lack of technical enterprise, a peculiar condition which does not seem to have any particular connection with the great struggle. The European public does not as yet consider the private automobile as a common household accessory, and still clings to tramways, rapid transit and buses as its principal means of transportation. It is, therefore, easily understood why managements have lacked the incentive to follow any definite and clearly-defined improvement policy, and have given more attention to easily solved particulars than to drastic redesigning along the lines which had already been proved right by American practice.

A large number of European systems are either municipally owned or operated by corporations whose shares are mainly held by city or state governments. Most private companies are nearing the end of their franchise terms and do not feel like making any unnecessary capital expenditures. Traffic is increasing generally, though slowly. In the case of public-owned utilities, competition is carefully "nipped in the bud," and the public compelled to avail itself of the existing carriers. A slightly modernized version of the "public-be-damned" policy is still in full swing, a number of petty improvements being considered as of sufficient value to satisfy the riders fully.

There is a general tendency to speed up schedules in greater and medium-sized cities through rerouting, the adoption of more powerful motors, the use of more appropriate gear ratios and the introduction of better brakes. Cars in some of the German cities have a high accelerating rate, which often is made useless in the congested areas by the existence of old-fashioned automobiles and taxicabs which slow up all traffic. In the medium-sized cities, horse-drawn trucks often impede progress, while in some parts of Northern Europe bicycles, during the warmer months, are a serious nuisance. In Copenhagen, Denmark, for instance, there are more than 450,000 bicycles for a total population of approximately 900,000.

The growth of the automobile has brought about the same traffic problem that all American cities are facing, although to a somewhat lesser degree. Barring London and other British cities where traffic regulation has been developed from long experience into a simple and understandable system of signals, the vehicle driver in Continental Europe is always facing something new, not only when going to another city, but when coming back to his own after a few days absence. Frequent "improvements" in signals, traffic signs and policemen's gesticulations leave him in a quandary as to the right thing to do.



Milan, Italy, is one of the few Continental cities that have profited from American practice. The new pay-as-you-enter cars are of distinctly modern design and have many American features

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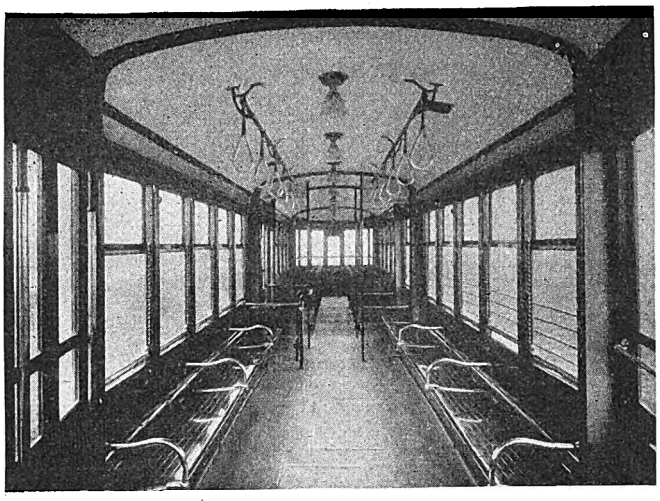


Interior view of one of the new Milan cars. The seating arrangement and the front-entrance, center-exit plan are proving popular with the public

In some instances it is even worse, for certain gestures of the German *Schupo* (*Schutzpolizei*) have a meaning exactly contrary to the same gestures made by the *Vigile* of Milan.

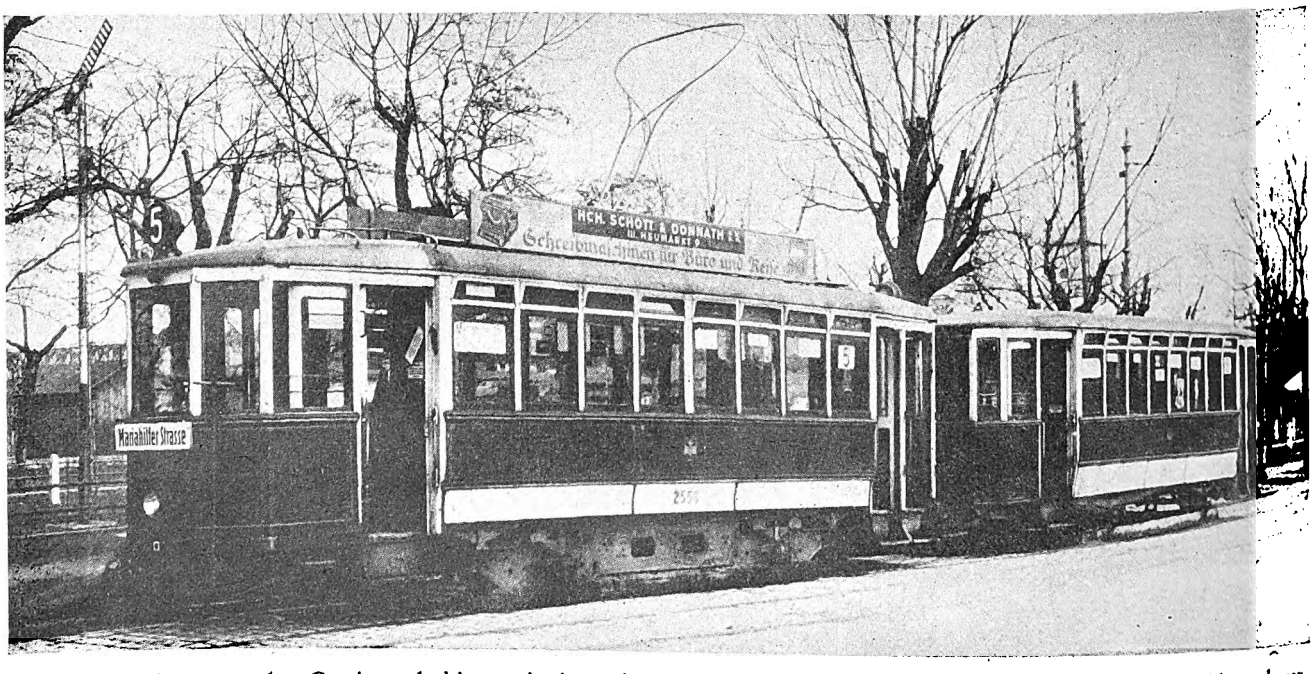
The only city where traffic signals are almost similar to those used in America is Amsterdam, Holland, where an extensive use is made of the "Go" and "Stop" semaphore, and where policemen are dressed almost like American officers. When one considers the narrowness and the complicated layout of the many streets, the heavy traffic, the omnipresence of bicycles and the extreme reluctance of Dutch automobilists to shift from high gear, one must pay a high tribute to the efficiency of the Amsterdam traffic police.

Train Operation Very General

It can be stated without fear of error that every tramway service in Continental Europe is making extensive use of trailers. It is difficult to understand why the unsoundness of such a policy has not been apparent to the companies. Trailers were adopted when it was found that the small two-axle motor cars were insufficient to cope with the increasing traffic. The step was considered as very economical inasmuch as a new trailer required only one additional conductor instead of two new trainmen for a motor car. The thought of discarding the old car in favor of a new double-truck unit seems to have been considered very seldom. A far-fetched justification may be found in the fact that the complicated system of fare zones and tickets being used in many cities was already putting a strain on conductors of small-sized cars. The writer well remembers having seen double-deckers in Rome, Italy, of smaller capacity than those operated by the London County Council and served by two conductors, who were punching away to their heart's content duplex tickets looking like Pythagorean tables. Some German cities, like Cologne, Dresden and Karlsruhe, have brought the idea one step further, and have added a second trailer and, therefore, a third conductor. It is interesting, indeed, to stand in the *Marktplatz* of the very quiet city of Karlsruhe and see three-car trains, passing by in the slack hours, carrying two or three passengers and a crew of four men. The interest increases a hundred-fold when it is discovered that the headway is such that even on the very long and straight thoroughfares of this city, the "one-car-always-in-sight" theory is relegated to the discard.

Single-Truck Cars Predominate on the Continent

Barring the British Isles, where the double-deckers are still holding sway and maximum traction trucks are extensively used, the single-truck car is still predominant in European city service. The only exceptions to this rule seem to be Barcelona, Spain; Munich, Germany, which is still building double-truck city cars; Rome, Italy, where all new cars are double-truck; and Milan, Italy, where by the end of 1929, 500 Peter Witt cars will be in service, to be followed by many more in 1930. Berlin, which was one of the earliest cities to use double-truck cars, has gone over to units made up of two single-truck, jumper-cable cars, somewhat similar in arrangement to the older types, now discarded, of the New South Wales Tramways in Sydney, Australia. A few all-steel, center-entrance, double-truck trailers, with inside jour-



In Vienna, as in many other Continental cities, a single-truck motor car with trailer is used instead of one larger double-truck car

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nal trucks, have appeared in the German capital, but it is still too early to draw any conclusions about their performance.

To provide sufficient stability on a short wheelbase, it is necessary to have a very heavy weight of the truck and underframe, and it is not unusual to find single-truck cars, seating eighteen to twenty passengers, weighing as much as 12.5 metric tons (about 27,500 lb.), and trailers of the same size weighing about half as much. It is interesting to note that the standard car used previously in Milan, having a capacity of 24 seats and 26 standees, weighs approximately 12.8 metric tons, while the new all-steel, four-motor pay-pass cars, having a capacity of 47 seats and 54 standees, weigh about 13.5 metric tons, a difference of about 0.7 metric tons (1,540 lb.) for a car accommodating twice as many passengers.

Fixed-point fare collection is almost exclusively limited to a few Italian operations and to a number of Dutch cities running one-man cars. The Lombard Electric Traction Company, of Milan, operates all of its suburban lines with double-truck, pay-within, rear-entrance, front-exit cars. The Milan Municipal Tramways is operating a number of double-truck, pay-pass cars with Ohmer registers and Johnson fare boxes, and is adding to its fleet about 50 new cars each month.

One-man operation is in effect in a number of German, Dutch and Italian cities, and varies in completeness from Bolzano and Merano, Italy, where cars with semi-enclosed platforms are operated by the motorman alone, who takes in fares and issues tickets, to the all-electric one-man car of the 1-cent line around the Central Station at Amsterdam, where the latest type of fare box (*bus* as they call it in Dutch) is used. All the one-man cars in Holland (Arnhem, Haarlem, Amsterdam, Utrecht, etc.) have controlled doors and steps. The cars of Arnhem have a manual control which extends to the rear door and takes the place of the American treadle.

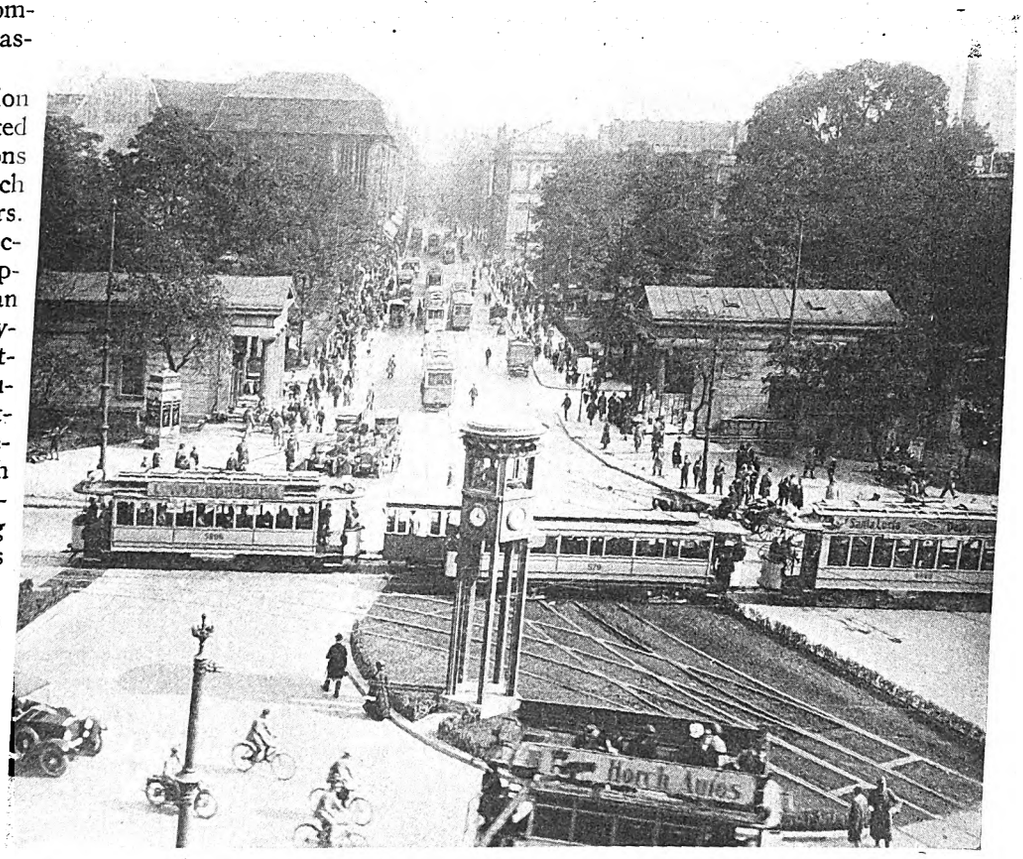
Barring the Italian cities and the Dutch operations already mentioned, the only city using door and step control rather extensively is Helsingfors, Finland. This city has a number of single-truck motor cars and trailers of Brill manufacture, delivered about the close of the war, having manually-controlled folding doors. All the more recent cars, built along the same general lines in Sweden and Germany, have been equipped with the same apparatus, the trailers being supplied with National Pneumatic door engines. A peculiar feature of the Helsingfors operation is that it employs women conductors, a practice which has disappeared from almost all other European tramways. The pay-within principle could be used easily on these cars, but the company still resorts to hand collection with tickets.

Although not meant for pay-as-you-enter operation, a number of cars in Zurich, Amsterdam, The Hague, and Stockholm have a separate entrance and exit on the rear platform, and another exit on the front platform, under the motorman's control, an arrangement similar to that of the pre-war Montreal cars.

All-Steel Construction Gaining Favor

All-steel, girder-plate car construction, strictly following American practice, can be found at present only in Barcelona, Spain, where much pioneering work has been done; in and around Milan, Italy, both on the Lombard Electric and on the Municipal lines; and in Helsingfors, Finland, where all-steel cars built by the General Swedish Electric Manufacturing Company, of Västeras, Sweden, and by the "Nordwaggon," of Bremen, Germany, are in service. Many German companies are operating all-steel cars of a somewhat heavier and more complicated design, built by such firms as Van der Zypen & Charlier, Linke-Hoffman-Busch, "HAWA" and Saxon Car Works. The all-steel type of construction has been pushed much further on trunk line railroads where there is more interest in the anti-telescoping feature.

Pressed-steel side frames, both for single and double trucks, are used very extensively. In some places, especially in single trucks, deep channels, bent at the pedestals to clear the journal boxes, are substituted. The fashion of forged sideframe trucks of American pattern seems to be somewhat declining. However, it is interesting to note that about 200 single trucks of the Copenhagen Tramways and 1,035 of the Milan Tramways are of the single-piece, cast-steel type, designed by the Commonwealth Steel Company, of St. Louis.



Street scene in Berlin, showing traffic signal tower, street cars, a double-deck bus and bicycles

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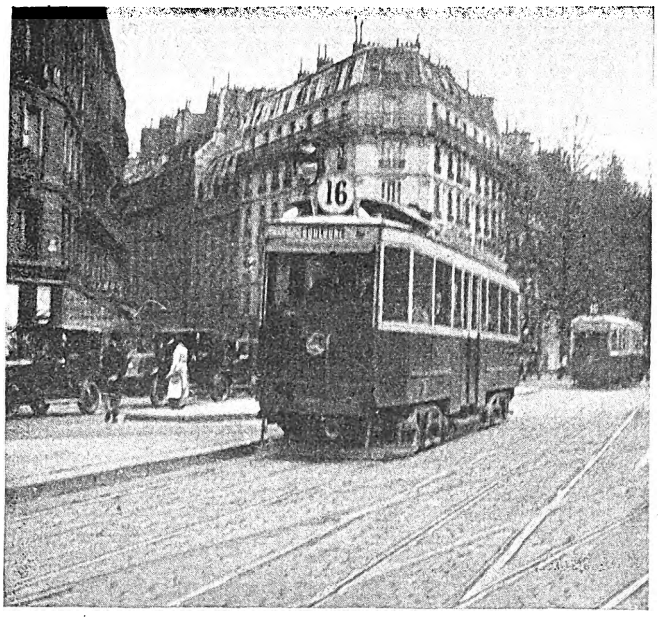


In Paris the center slot trackage has been extended recently, but underground current collection on the Continent is still limited to this city, Budapest and Brussels

Some years ago it looked as though the Cardan drive were going to take Europe by storm, and experiments in France, Germany, Belgium and Switzerland were carefully watched. Because most of these were combinations of common rolling stock and automotive designs, they were not satisfactory enough to cause large-scale imitation. A casual observer looking at the cars of the Paris municipal transportation system, by far the largest user of Cardan-drive street cars, will notice that single trucks, which were sturdily built for inside-hung motors and very long center-entrance bodies, are now seriously bent down at the ends. A closer examination will disclose the fact that this is caused by the Cardan-drive motors being hung at the extreme ends of the truck frames. The German cars, being mostly of new construction, have not experienced this trouble. However, it does not appear that many cities have followed in the wake of these properties.

Serious attention is being paid by a number of lines to the adoption of ball and roller bearings, not only for armature shafts but also for axle journals. The firms which, after long pioneering and research work, seem to have met with the most success are the Swedish Ball-bearing works, the German Arms Company, the Fichtel & Sachs Company, of Germany, and the Villarperosa-RIV. Company, of Italy. The improvement in design, manufacture and materials of these bearings, brought about in the last few years by the expansion of the automotive industry, offer a guarantee that this will be a step in the right direction.

Although experiments are continually being made with new ideas on the electrical control of cars, none seems as yet to have come out of the experimental stage into widespread adoption. Companies using equipment of American type or following American designs have adopted remote control and line switches. Important installations of this kind are being made in Milan and in Rome. The refinements which are being adopted in America, such as cabinet control, have not been given serious consideration as yet. Safety car control, of the Bergmann all-electric type, has been adopted only on a fleet of one-man cars in Amsterdam, the other Continental one-man cars being more or less in the "Toonerville-trolley" class.

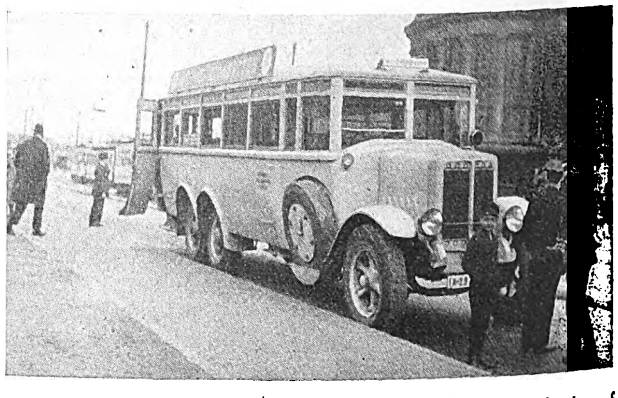
Until now the combination of electric and solenoid braking for two-car trains has been confined to Germany and other countries of Northern Europe, while Latin Europe has leaned more toward the air brake. It is interesting to note that for a number of years Italy has required by law that air brakes be installed in all new or fully-rebuilt passenger rolling stock of both steam and electric railways. The widespread use of air brakes on the latest types of heavy motor buses in Germany has caused a revival of their use in street railway work. Basel, Switzerland, is installing air brakes on cars which formerly were equipped with solenoid brakes, and Genoa, Italy, has already discarded all its solenoid brakes in favor of air. A number of Belgian and Italian cars have been equipped with various types of regenerative braking. At the last International Congress in Rome regenerative brakes were discussed extensively, the consensus of opinion being that, although these designs are worked out well and give satisfactory performance, the brakes are not adapted to city service where fast schedules are to be maintained in the heavy traffic congestion. The Milan municipal lines, which in 1927-28 equipped a number of their newer cars with these brakes as an experiment, have adopted the Westinghouse variable load brake for the first lot of 502 double-truck cars which will be put in service in 1929.

A new magnetic brake, in which a solenoid by means of a piston, forces oil out of a compressing cylinder into a brake cylinder, was originated in Belgium and is being tested in various countries. Experiments have not lasted long enough to draw any definite conclusions.

Current Collecting Devices

Underground current collection is still limited to the three original Continental installations, namely, Budapest, Hungary; Brussels, Belgium, and Paris. This last city, however, has extended very substantially its center slot trackage, trolley wires having been removed from all the central zone of the city. The Siemens bow collector, with the aluminum "U" section contact piece, seems to be losing favor. In many places it is claimed that the frequent sparking, which it occasions, greatly disturbs radio programs. In Arnhem, Holland, the local radio amateur league paid for the replacement of all the bow collectors of the city tramways to eliminate interference.

A pressed-steel shoe collector, originating in Budapest, is gaining widespread attention in many Central European



German manufacturers are taking the lead in the production of modern bus chassis and bodies. Six-wheelers, similar to this bus in Hamburg, are popular, although rather cumbersome for heavy traffic

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properties, while the pantograph is being adopted on a number of new cars in Germany and on most of the cars in Sweden and Finland. This change seems to be prompted both by the rather low current-collecting capacity of the bow and to its instability against strong winds.

The wheel trolley is still holding its own. Very large cities, such as Berlin, Paris, Brussels, Copenhagen, Lyons and Milan, have not changed their current collectors, even in the face of heavy overhead and car reconstruction programs. A noteworthy example of a return to the wheel trolley is found in Turin, Italy. After the merger of the Turin Tramways Company, using the trolley, with the Municipal Tramways, using the bow collector, the latter management decided to equip all municipal cars with trolley poles and to discard bow collectors.

Eight Continental cities are served by more or less extensive rapid transit systems. Of these the largest by far is the Metropolitan-North-South network in Paris. A heavy amount of new construction work is under way in the French capital, the subway lines having been authorized to extend beyond the *octroi* (city customs) line. The next in importance is the Berlin Underground where extensions to five lines are under way. The other six rapid transit services are of a much lesser size: Madrid, Hamburg, Barcelona, Naples and Oslo. The latter two are to be considered more as underground stubs serving as terminals of outside lines than as city subways.

Two steam railroad electrifications of suburban lines of great interest are the Berlin belt and suburban lines of the State Railways, which form a very up-to-date system of elevated and open-cut, third-rail rapid transit, equipped with modern all-steel, multiple-unit cars, and the suburban electrification of the French State Railways which operate out of the Saint Lazare Station in Paris.

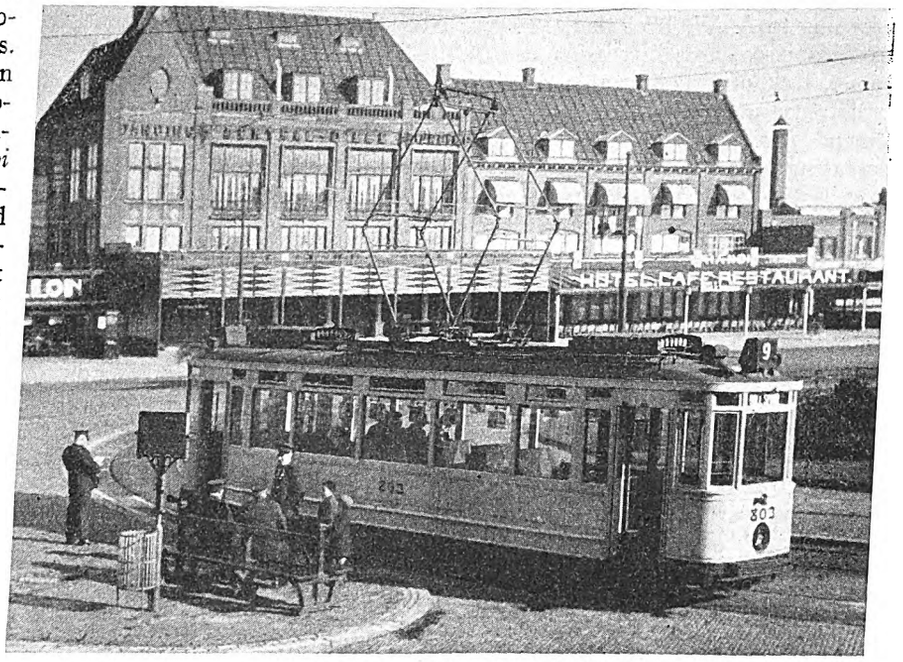
A good example of excellent service to the public of large-sized cities is given by the high-speed interurban electrification of the Dutch State Railways, connecting the cities of Amsterdam, Haarlem, Leyden, The Hague, Delft and Rotterdam. Frequent, fast and comfortable trains are operated with a high degree of safety and compare favorably with such American services as those of the Long Island Railroad and the Philadelphia suburban system of the Pennsylvania. To the writer's knowledge, the Amsterdam-Rotterdam is the only European interurban high-speed line where dining car service is regularly operated.

Bus Operations Vary Widely

A complete analysis of the motor bus operations in Europe would require a volume, the differences in vehicles and in operating methods being much greater than in North America. A lesson which can be learned from a cursory examination is that large city operations, while rather successfully meeting the traffic burdens imposed upon them, do not seem to be very successful business ventures. It is a common remark of transportation men that the motor buses of the two largest Continental cities have been merged with the surface lines so that electric street cars can carry the burden of both.

From a technical standpoint it may be safely asserted that, at present, German manufacturers are ahead of all other Continental makers in the production of up-to-date chassis and bodies, although some of the latest six-wheelers seem to be rather cumbersome for heavy traffic. Steel bodies are almost universal, but serious thought is being given to light-weight alloys.

The double-decker is losing favor, the only large system which uses them being the "ABOAG" in Berlin. The Rome and Genoa municipal bus lines have completely discarded the double-decker in favor of larger but more flexible rear-entrance, front-exit single-deckers. Many of the latest motor buses are arranged for one-man operation and are equipped with folding doors. Air brakes are also common on the larger German units.



Pantographs are being used on new cars in a number of European cities. This is a modern interurban car of The Hague Street Railway Company at a resort near The Hague

In a few cities fleets of American buses are used: in Oslo, Norway, all buses operated by the Tramway and Omnibus Company are A.C.F.'s, equipped for one-man operation with Johnson electric fare boxes and registers. At the time of the writer's last visit, an A.C.F. Metropolitan Coach was being operated in experimental service. The Helsingfors (Finland) Tramway and Omnibus Company is operating a large fleet of Reo buses, while the Amsterdam municipal bus lines have a large number of Brockway omnibuses.

Jitney competition is practically unheard of on the Continent. The only example seems to be in Rotterdam, where the tramways are operated by a private company using very obsolete, but neatly-painted, equipment, and where all sorts of vehicles are being used to compete with the electric railway. Old Ford model T's, French Latils and Renaults, Italian Lancias, German Büssings and even some defunct Holland Spijkers have compelled the Rotterdam Electric Railway Company to turn bus operator. The up-to-date and smartly-built Krupp buses, which it has put in service, do great credit to the company and help to dispel the bad impression left on the public by the obsolete rail rolling stock.

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California Railway Men Study Ways to Increase Riding

PROBLEMS of increasing the traffic of the electric railway industry held the attention of 150 delegates who attended the annual meeting of the California Electric Railway Association in Los Angeles May 9-11. At the first day's meetings a symposium of papers was presented dealing with the many aspects of regaining patronage lost to the private automobile. George Baker Anderson, Los Angeles Railway, said that the public is willing to spend money freely for almost everything but complains about street car fares. The chief problem of his property is coping with traffic congestion and endeavoring to increase average car speed. Among the factors tending to cause loss of patronage, according to A. W. Brohman, Market Street Railway of San Francisco, are: increasing use of the private automobile, lack of proper traffic regulations, popularity of community moving picture houses and shopping centers, demand for increased speed and greater comfort and increasing fares. His company has made notable progress in retaining the street car rider by providing more attractive cars with more comfortable seats. Lines with so-called comfort cars show the falling off less than others, and increased speed has improved revenue per car-hour. The average operating speed for city lines in San Francisco is now 10.5 m.p.h. It has been interesting to note that increased speed has not increased accidents. An employee training department is largely responsible for reducing labor turnover from 40 per cent in 1925 to 20 per cent in 1928.

"The traffic department is the sales department of a railway property," declared O. A. Smith, Pacific Electric Railway. "Sales methods must be applied and the product must be of such a quality that it will compete with the market. The private automobile is the chief competitor and it behooves railway operating men to study the situation and provide more comfortable seats and equipment and do everything to compete with the railway's competitor." On his property $100,000 spent on reseating 50 interurban cars with soft leather seats has produced a favorable public reaction. Mr. Smith told of results of replacing some older 25-passenger buses with modern 41-passenger coaches on a crosstown line. Operating costs excluding taxes and interest were reduced from 25-26 cents per bus-mile to 20-21 cents per bus-mile, headway was increased from eight to ten minutes, yet patronage increased more than 15 per cent, all as a result of the new equipment. Average speed for the line is 11.2 m.p.h. and average revenue per passenger is 5½ cents.

E. A. Simon, Westinghouse Electric & Manufacturing Company, pointed out the necessity of transportation agencies, traffic commissions and every civic agency making a serious study of the street problem and making a concerted effort to increase speed of every moving vehicle. The street railways will then benefit equally with all other users of the streets. In discussing equipment design he stated that the mechanical and engineering departments have had too much to say in the past about equipment and rolling stock. This he feels should be the province of the transportation department because it is this department that has the best idea of what is needed. At his suggestion a committee was appointed of three operating men and two engineers to study California car needs and types of equipment looking toward establishment of a general standard that will meet the needs of a majority of the properties.

The second day was given over to meetings of the several committees of the association at which a number of interesting papers were presented and discussed. At a joint meeting of the purchase and stores committee and the engineering committee the subject of disposition of obsolete equipment came up for discussion. It was mutually agreed that the storekeeper and the engineering and operating departments must work more closely in deciding when and what to scrap in order to reduce the large and expensive stocks of obsolete equipment on most properties.

Middle Atlantic Equipment Men Meet at Wilmington

WITH the Delaware Electric Power Company acting as host a well-attended meeting of the Middle Atlantic States Association of Railway Equipment Men was held in Wilmington, May 15 and 16. At the first session, Walter S. Adams, designing engineer J. G. Brill Company, presented a paper on "New and Projected Developments," and discussed numerous features of the new Brill master unit cars, as well as ten cars recently put into service in Wilmington. Discussion was led by D. E. Frame, master mechanic, Delaware Electric Power Company. During the day, an opportunity was presented to inspect these units closely and ride in them.

Another interesting paper was read by L. C. Carter, General Electric Company, reviewing recent developments in street railway equipment. The discussion was led by R. D. Voshall, Washington Railway & Electric Company. A. J. Manson, Westinghouse Electric & Manufacturing Company, also read a paper on developments in the electric railway industry. Mr. H. A. Leonhauser, assistant to the superintendent of equipment United Railways & Electric Company, Baltimore, discussed this paper at considerable length. The pros and cons of the gas-electric bus were also discussed and aroused much interest.

The concluding paper was presented by J. F. Craig, of the Westinghouse Traction Brake Company, in which the various requirements of efficient braking were thoroughly discussed. Mr. Craig explained in detail how certain difficulties should be overcome and emphasized the necessity of faster braking.

Thursday morning was given over to a discussion of questions which were submitted by members of the association previous to the meeting. Various solutions were suggested for the numerous problems considered. During the afternoon, a tour of inspection was made through the shops of the Delaware Electric Power Company.

The meeting was attended by approximately 30 members of the association. On Wednesday evening a dinner tendered by the Delaware Electric Power Company had an attendance of approximately 100.

Election of new officers resulted in the selection of W. H. McCarty, Capital Traction Company, Washington, D. C., as president; D. E. Frame, Delaware Electric Power Company as vice-president, and R. D. Voshall, Washington Railway & Electric Company, as secretary for the ensuing year. The next meeting will be held at Richmond, Va., on Nov. 20 and 21.

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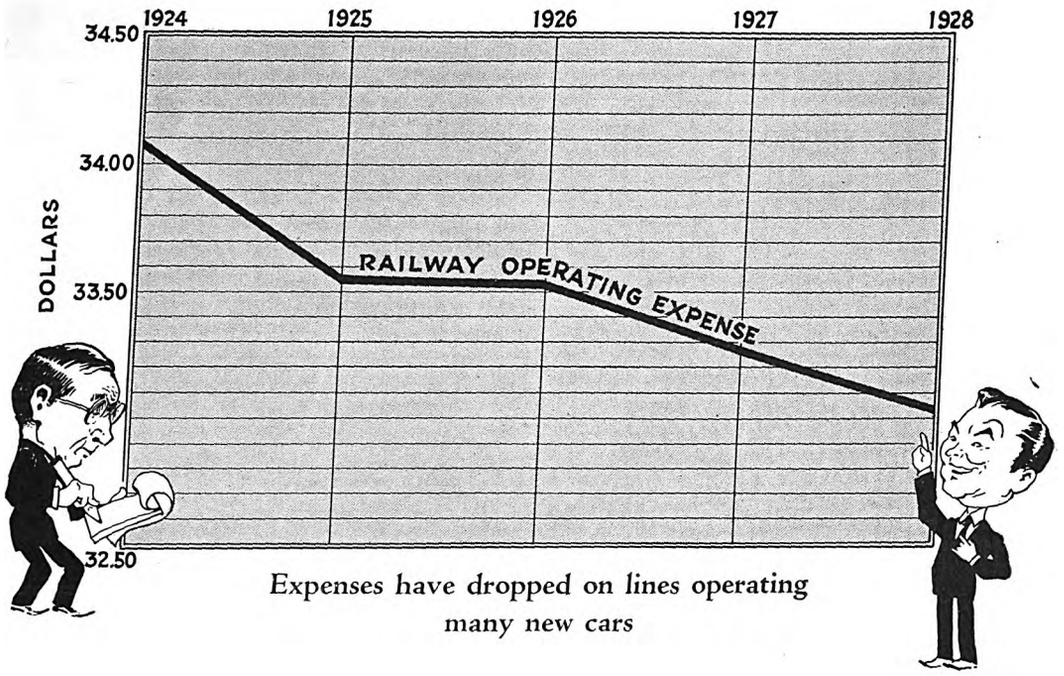

Expenses have dropped on lines operating many new cars

New Cars

Reduce Operating Costs

on Many Properties

By
MORRIS BUCK
Engineering Editor *Electric Railway Journal*

In this, the second of three articles of a survey of properties which have substituted new cars for old, savings of great magnitude are shown. Way and Structures, Equipment, Power and Conducting Transportation expenses have all been substantially reduced during five-year period covered

REDUCTION in operating costs on the properties included in ELECTRIC RAILWAY JOURNAL'S survey of new car experience is clearly shown over a period of five years by the figures submitted by these companies. Totals were published in the May issue, showing that over a period of five years the operating expenses of the 41 companies for which complete figures were available dropped from 34.08 cents in 1924 to 33.02 cents in 1928. That such a result is not accidental or caused by some peculiar combination of circumstances is seen in the continual reduction year after year during this period.

Moreover, this reduction has been obtained on properties where only a relatively small proportion of the cars have been replaced. In the seven years for which the purchases of new cars have been considered, only 5,514 have been bought, as contrasted with 17,488 required to give maximum service. This is 31.5 per cent of the total. Many of the companies have not made an attempt to segregate the cars on separate routes, so that the maximum advantages of the new equipment have not been evident. What is more, the time over which the purchases have extended indicates that at the same rate the time required to replace all the old cars would correspond to an average life of the cars on these properties of about 22 years—much longer than the present need for improvement to keep pace with current developments would dictate.

In this article is given an analysis of the major operating accounts for the 41 properties. A comparison with the remainder of the industry, such as that made for the total revenues and expenses, is not possible, since not all of the companies reporting to the American Electric Railway Association give complete statistics in form for such analysis. Results on the 41 properties over the period 1924-1928, however, show that certain trends are taking place on the properties that have made replacement of obsolete rolling stock a definite objective.

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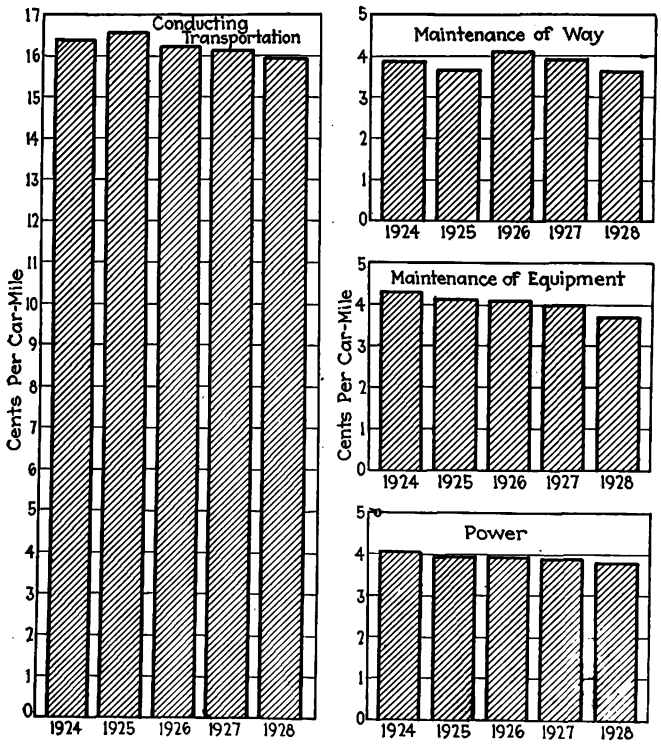

Expenses of the 41 properties have been reduced in the principal operating accounts which could be influenced by new cars, over the five-year period

Few properties separate their maintenance costs for the new cars, so that it is impossible to determine their effect apart from the general reduction in the operating account. The table shows that the total expense for maintenance of equipment has gone down from $26,845,195 in 1924 to $23,723,728 in 1928. The saving is $3,121,467, or 11.6 per cent. On a car-mile basis the reduction has been from 4.29 cents to 3.75 cents, or 12.6 per cent. This higher proportional reduction follows from the increased service that was made possible with the new cars.

This record has been made with cars that were similar to those which they replaced. The reasons for lower cost of maintenance are lighter weight, better construction and newness. Cars built along the lines of recent developments undoubtedly will have still less weight, more rugged construction and higher mechanical efficiency than those considered in the survey. Maintenance costs on such cars reasonably may be expected to be still lower than those in question, and their effect on the system average will be correspondingly greater.

Savings in the maintenance of way account are difficult to determine, particularly where many types of cars run on the same track. It is evident, however, that light weight and better construction decrease the wear and tear on the rails, ties and roadbed. The effect is particularly great on special work and curves. The cumulative possibilities of major savings in the way department loom to proportions that the industry cannot afford to overlook.

REDUCTIONS IN OPERATING RATIO ON PROPERTIES THAT HAVE BEEN CONSISTENT PURCHASERS OF NEW CARS

	Number of Companies				
Reports showing reduced operating ratios:	1928	1927	1926	1925	1924
From that of preceding year	25	27	21	23	13
For two successive years	7	6	9	5	*
For three successive years	3	7	3	*	*
For four successive years	4	1	*	*	*
For five successive years	1	*	*	*	*

*Information not available.

The 41 properties for which group statistics are published show a reduction in maintenance of way for the past three years. Reference to the table shows an increase in 1926, but reductions in the two following years amounting to $3,103,829. While this cannot be credited entirely to the advent of the new cars, they undoubtedly have assisted to some extent in the reduction. What is more significant is that the total cost of track maintenance and the cost per car-mile were less in 1928 than in any preceding year included in this survey.

Power costs reflect directly the energy consumed for car propulsion. Of course, there are miscellaneous uses for power that affect the total cost to some extent, and there are fluctuations in power rates that cannot be counted on. But when a group of 41 companies shows a continuing reduction in power cost from $25,182,778 to $24,032,052 in the five years, while the car mileage is increasing, it is concrete evidence that lighter and more efficient equipment is having an effect. Some of the roads that have made large substitutions of new cars for old have made far greater proportional savings in the power account.

In conducting transportation there has been an opportunity in past years to make a large saving when new one-man cars replaced old two-man cars. There still are many two-man cars in active service which can and should be replaced with one-man cars. The possibility of making a saving in this way is, however, an individual problem of the railway contemplating a change. The 41 properties have shown a reduction in the conducting transportation account of approximately ½ cent per car-mile from costs prevailing in 1924 and 1925, indicating a somewhat greater use of one-man cars in the past year.

In evaluating the results of the new cars, it was deemed important to determine whether the financial advantage obtained from expenditures for modernization continued

COMBINED STATISTICS OF 41 ELECTRIC RAILWAYS WHICH HAVE MADE SUBSTANTIAL PURCHASES OF NEW CARS

	1928	1927	1926	1925	1924
Passenger revenue	$273,837,560	$275,374,350	$279,266,930	$277,041,210	$278,655,440
Railway operating revenue	282,850,910	284,169,950	288,222,930	285,273,910	285,946,740
Operating expenses:					
Way and structures	$23,077,329	$24,665,669	$26,181,158	$23,245,795	$24,235,305
Equipment	23,723,728	25,341,756	26,368,896	26,031,507	26,845,195
Power	24,032,052	24,563,967	25,248,494	24,776,262	25,182,778
Conducting transportation	101,000,235	102,343,496	104,132,084	104,226,560	102,556,668
Traffic and undistributed	7,658,940	6,857,480	6,502,170	5,945,090	7,939,250
General and miscellaneous	28,580,583	27,599,903	26,621,448	26,958,604	26,567,997
Railway operating expenses	$208,087,100	$211,372,270	$215,054,250	$211,183,820	$213,327,200
Net revenue, railway operation	$74,763,810	$72,797,680	$73,168,680	$74,090,090	$72,618,540
Car-miles operated	632,641,880	635,228,290	641,211,010	629,710,370	625,968,150
Total passengers	5,138,800,000	5,167,910,000	5,286,640,000	5,235,550,000	4,842,240,000
Maximum cars operated	17,468	17,236	17,500	16,856	16,611
Cents per car-mile					
Operating revenue	45.14	44.75	44.95	45.30	45.68
Operating expense:					
Way and structures	3.65	3.88	4.08	3.69	3.87
Equipment	3.75	3.99	4.11	4.14	4.29
Power	3.80	3.87	3.94	3.94	4.02
Conducting transportation	15.96	16.11	16.24	16.55	16.38
Traffic and undistributed	1.34	1.08	1.01	0.94	1.27
General and miscellaneous	4.52	4.34	4.15	4.28	4.25
Railway operating expense	33.02	33.27	33.53	33.54	34.08
Net revenue, railway operation	12.12	11.48	11.42	11.76	11.60
Operating ratio, per cent	73.57	74.38	74.62	74.03	74.60

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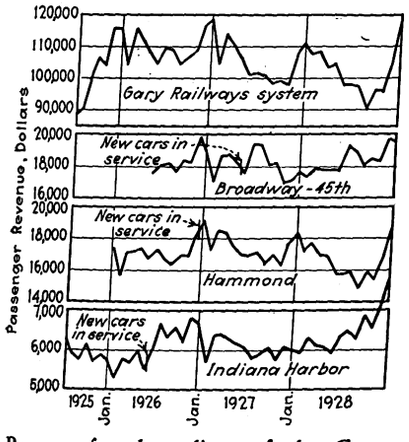
over an extended period. A study of the operating reports of the 41 companies shows definitely that there has been a favorable trend in the operating ratio at one or more times during the five-year period on all but one of them. This one is a large city property whose operating and political situation has been extremely difficult. Of the other 40 companies, one has been able to lower the operating ratio each year for five consecutive years, nine have lowered it four times in the same period, thirteen have lowered the ratio three times, twelve have lowered it twice and only five have showed a reduction in one year alone. Out of a total of 205 comparative annual reports from these 41 companies, 109 statements, or more than half of them, show an improvement in the operating ratio from the previous year. This is the more remarkable, coming at a time when the basic costs of operation on the whole are increasing and while traffic is at best holding its own. It is an indication that not all of the benefit can be obtained in the first year after new cars are installed. The distribution of the reductions in operating ratio is given in the accompanying table.

Further results on individual properties, published in the following brief summaries, indicate the great value the new cars have been in those places where they have been used. Still other reports will be published in the third article in this series.

Many Companies Add Evidence that New Cars Pay

Gary Railways, Gary, Ind.—During the five years 1923-1927 inclusive this company spent $2,500,000 for physical improvements, additional equipment and extensions. Now all the service is given with one-man cars, which handle successfully all the severest peak loads. Operating expenses went down from 34.1 cents per car-mile in 1925 to 29.8 cents in 1927. A further reduction was made in 1928.



Revenue for three lines of the Gary Railways new cars have kept up well. Scales are proportional for comparison

A major part of the rehabilitation program was the purchase of 23 new double-truck one-man cars in 1926 and 1927. Sixteen center-entrance cars were remodeled to bring them in line with the new equipment. Shorter headways were given on all but one line, the service being increased one-third to one-half. The headway on the Hammond division was changed from thirty minutes to twenty minutes, on the Broadway-45th Avenue from fifteen to ten minutes, on the Broadway-26th Avenue from five to three minutes, and on the Ambridge division from ten to five minutes. On the Indiana Harbor division alone the headway was unchanged.

EQUIPMENT MAINTENANCE COSTS, GARY RAILWAYS

Year	Total	Car Miles	Cents per Car-Mile
1926	$94,007	2,891,193	3.25
1927	83,085	2,952,259	2.82
1928	62,783	2,900,685	2.16

Revenues on the lines with new cars have held up better than the system average despite severe automobile competition. This is shown in the charts.

Maintenance costs for cars are not kept separate, but the accompanying table shows the reductions along this line for the system.

Indiana Service Corporation, Fort Wayne, Ind.—This company has been purchasing new cars at frequent intervals over a period of twelve years. The entire equipment was renewed between 1924 and 1928. The management is completely sold on the advisability of operating modern equipment.

Fitchburg & Leominster Street Railway, Leominster, Mass.—During the past two years this property has been getting back some of the credit it once enjoyed when it was one of the seven best-paying street railways in New England. In the fall of 1926 four new cars were purchased, four more were bought in 1927 and two more in 1928. Fourteen of the best of the old cars were reconditioned, making a total of 24 cars available for service.

During the nine months prior to the purchase of the new cars the company ran behind $50,000. During the first nine months of operation with the new cars there was a profit of $41,000, making a total gain of more than $90,000. The receipts increased from 43.4 cents per car-mile to 46.7 cents per car-mile, and the operating expenses were cut down from 47.9 cents per car-mile to 35.2 cents. While not all of the improvement can be attributed to the use of new cars, they are one of the important factors.

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.—This company has been a consistent buyer of new equipment. The largest recent purchases for interurban service were 30 cars in 1920, 19 cars in 1923, 23 cars in 1926 and 18 cars in 1928. At the end of last year 93 cars out of 170 used in interurban passenger service, or 55 per cent, were less than nine years old. In city service 32 cars out of 44 have been purchased in the last ten years, or 73 per cent.

The company is replacing all equipment as it becomes obsolete. The present program calls for the purchase of new steel cars until all wooden cars are replaced, after which equipment will be standard as to weight, motors and control devices. This uniformity is expected to produce operating economies as well as an increased inducement to the passengers to ride.

Chicago & Illinois Valley Railroad, Ottawa, Ill.—In August, 1926, this property secured seventeen one-man cars. The result, by reason of more frequent service and decreased expenses, was quite satisfactory in additional income. After two years automobile competition reduced the revenue. The management is fully satisfied that its net earnings would be much less at this time if it were still operating the heavy two-man equipment.

Chicago, South Shore & South Bend Railroad, Michigan City, Ind.—The present management in July, 1925, began a complete rehabilitation program, a promiment feature being the replacement of the old rolling stock. In August, 1926, 25 new steel cars were placed in service. Each is equipped with four 210-hp. motors and is capable of a speed of 67 m.p.h. In addition, two parlor-observation cars and two diners were purchased. These are trailers.

So rapid was the growth of business that twenty additional passenger cars, ten motors and ten trailers, were ordered six months after the first cars were received, and in 1928 an order for fifteen motor passenger cars

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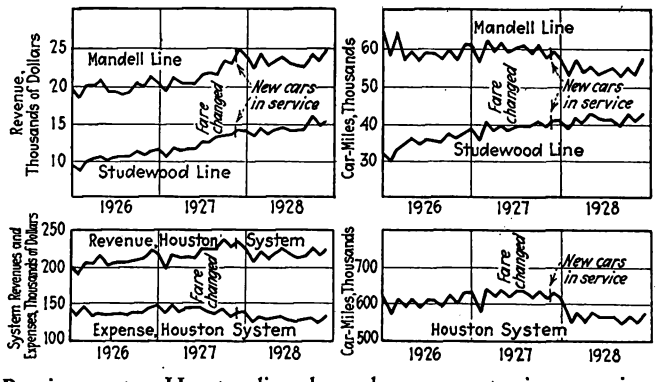
and five trailers was placed. All of these cars are of the same general design. They are of steel and are suitable for high-speed service.

Since the property was badly run down when it was taken over, rehabilitation naturally brought a marked increase in business. It is difficult to ascribe any particular proportion of additional revenue to the new cars. Likewise, the cost of maintaining the old cars had risen to such a point that it required extraordinary care to keep them working at all, so that a marked decrease in maintenance cost for the new equipment was inevitable. The faith of the management in the value of the new cars is indicated by its repeat orders.

Houston Electric Company, Houston, Tex.—This company has recently made several purchases of cars, of which the latest consisted of twenty cars which were assigned in November, 1927, to two lines, the Mandell and the Studewood. The Mandell line now operates approximately 69 per cent of the service with the new cars and the Studewood line approximately 84 per cent.



Receipts on two Houston lines have shown a greater increase since new cars were placed in service on them than they did from an increase in fare. Note that service actually has been decreased on the Mandell line without loss of revenue. Scales are roughly proportional so the relative effects may be compared

On both there has been a substantial increase in business, while the system has had a slight recession. The introduction of the new cars followed a fare increase five months earlier.

Operating costs went down during 1928, although it is difficult to determine what proportion of the reduction is due to the new cars. The cars have been 90 per cent one-man operated for several years, and in 1928 were 93.5 per cent one-man operated. Schedule speeds have been slightly increased.

Placing these new cars in service has caused much favorable comment. There were even a few squabbles as to which lines they should be assigned to for regular operation. They have kept down grumbling relative to the rate of fare.

Kentucky Traction & Terminal Company, Lexington, Ky.—Some five years ago this property was completely equipped with new, light-weight one-man cars. On the city division both the old and new cars had single trucks, but the new ones weigh 8 tons against 13 tons for the old. The amount of service was increased 32 per cent and the property was modernized in every way possible. As a result the revenue went up 17.7 per cent against an increase in operating expense of only 4.6 per cent. The increase in net has been sufficient to pay 7.5 per cent interest on the cost of the new equipment and leave an income 29.7 per cent greater than before.

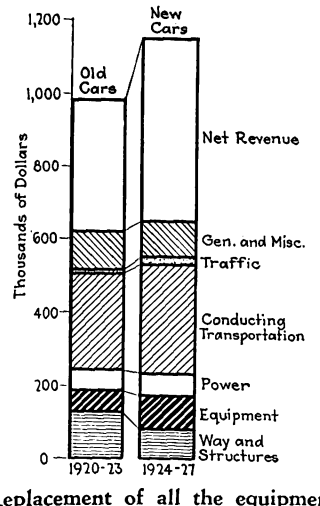
The accompanying tabulation gives a summary of the results for four years prior to the use of new cars on the city division and four years after. On the interurban line new light-weight cars replaced obsolete heavy cars with similar results. It is the belief of the management that the re-equipment of the lines has made an improvement in financial results essential to continued operation of the property.

NUMBER OF CARS AND PURCHASES OF NEW CARS, HOUSTON ELECTRIC COMPANY

Year	Total Cars	Number of Cars Purchased	Amount of Investment
1921	197	0	0
1922	232	35	$274,554
1923	242	10	114,566
1924	251	15	192,193
1925	251	0	0
1926	233	0	0
1927	253	20	312,864
1928	245	0	0

STATISTICS OF RAILWAY LINES, HOUSTON ELECTRIC COMPANY

Revenue:	1926	1927	1928
Mandell line	$239,865	$260,698	$283,573
Per cent of total	9.56	9.77	10.8
Studewood line	$125,685	$149,451	$174,504
Per cent of total	5.0	5.11	5.64
Entire system	$2,513,727	$2,666,251	$2,631,555
Expenses: Entire system	$1,663,219	$1,708,428	$1,566,927
Revenue car-miles:			
Mandell line	715,816	719,000	658,331
Per cent of total	9.85	8.61	9.67
Studewood line	419,922	472,081	492,294
Per cent of total	5.78	6.31	7.26
Entire system	7,261,709	7,485,578	6,805,588



Replacement of all the equipment on the Lexington lines of the Kentucky Traction & Terminal Company saved the property

COMPARATIVE RESULTS WITH OLD AND NEW CARS, LEXINGTON CITY DIVISION KENTUCKY TRACTION & TERMINAL COMPANY

	Four Years with New Cars		Four Years with Old Cars		Increase or *Decrease*	
	Amount	Per Car-Mile	Amount	Per Car-Mile	Amount	Per Car-Mile
Passenger revenue	$1,152,065	0.281	$975,039	0.313	$177,026	*0.032*
Operating expenses:						
Way and structures	$108,772	0.026	$128,208	0.041	*$19,436*	*0.015*
Equipment	64,687	0.016	65,215	0.021	*528*	*0.005*
Power	64,288	0.015	*48,089	0.015	16,199	0.00
Conducting transportation	300,536	0.073	266,615	0.086	33,921	*0.013*
Traffic	15,719	0.005	7,393	0.002	8,326	0.003
General and miscellaneous	94,798	0.023	104,182	0.034	*9,383*	0.011
Total operating expenses	$648,803	0.158	$619,704	0.199	$29,098	*0.041*
Net operating revenue	$503,262	0.123	$355,334	0.114	$147,927	0.009
Taxes, local	79,876	0.020	70,459	0.023	9,416	*0.003*
Gross income	$423,385	0.103	$284,874	0.091	$138,511	0.012
Interest charges on new equipment at 7.5 per cent	53,786	0.013	.....	.....	53,786	0.013
Gross income after interest	$369,599	0.090	$284,874	0.091	$84,724	*0.001*
Average return on investment †	.....		.....		19.3%	
Total car-miles	4,105,368		3,110,222		995,146	
Average car-miles per year	1,026,342		777,556		248,787	

* The Lexington Utilities Company charge to the K. T. & T. Co. is based on actual production cost, and has been applied to the average cost for 1924-28 to the four years 1919-22 as the coal coast was abnormally high in this period.
† Average annual return on the investment of $179,289 in new equipment before interest charges.
Italics denote decrease.

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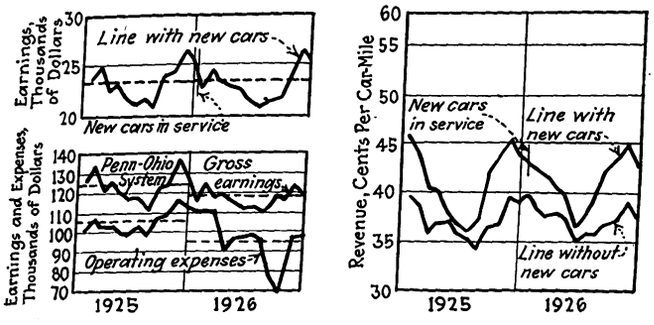


On the Penn-Ohio system the line with new cars showed a gain in gross revenue and in receipts per car-mile while the rest of the system showed a loss. Note that operating expenses fell sharply the year after the new cars were installed

Penn-Ohio System, Youngstown, Ohio.—This system placed thirteen new 44-passenger cars in service in February, 1926, and has kept them almost entirely on one route, known as the Ohio Works-Struthers line. No change was made in headways, routing or fares. The old cars were one-man operated, as are the new ones. The line with new cars showed an actual gain in revenue while the remainder of the system had a decrease of 4.4 per cent. While it is not possible to segregate costs, the entire system showed a reduction of operating expenses of 8.2 per cent.

These cars, of course, are not all of the modern cars in service on this property. When the franchise was granted in 1919 there were 100 cars on the property. Since then cars have been added as follows:

Year	Number Purchased	Cost of New Cars
1920	12	$80,000
1921	17	110,500
1924	10	64,000
1926	13	182,680
Total	52	$437,180

Thus a total of 52 cars has been added, so that at least one-third of the rolling stock is modern.

Many favorable comments have been received, not only from private citizens but also from city officials and many others. The purchase of new cars was one of the many improvements which led up to the granting of an increase in fare which was obtained in February, 1928.

Ottawa Electric Railway, Ottawa, Ont., Canada.—In 1924 this company entered into an agreement with the city of Ottawa under which it was called upon to spend a large sum of money in improvements and extensions. Sixty new one-man, two-man double-truck steel cars were purchased and 34 double-truck cars were rebuilt.

Business reached a peak in 1921 due to the large number of returning soldiers. From this time receipts fell off slightly year by year. It is noteworthy, however, that the winter business is increasing while the summer business is declining. This is attributed to the increase in automobiles, the number of registrations being twice as many in 1927 as in 1921. Despite this competition the total passenger traffic in 1927 was 36,205,095 as compared with 37,902,198 in 1921, when the population was abnormally large. There was a reduction to 33,700,595 passengers in 1928, as the fares were raised from 5 cents to 7 cents with tickets at 6¼ cents.

Toronto Transportation Commission, Toronto, Ont., Canada.—When the Toronto Transportation Commission took over the Toronto Railway in 1921 costs were excessive. There were 830 cars, and in addition 70 cars were taken over from the Toronto Civic Lines. Of these, 483 have been scrapped and the remaining 347 have been completely rehabilitated and reconstructed. The management purchased 575 new cars, including two types of Peter Witt cars and large trailers. When the old system was taken over the average car had a seating capacity of 33.2; the present capacity is 53.7, or 62 per cent greater.

It is not possible to separate maintenance of equipment costs by types, but the following table gives an indication of the effect of modernization:

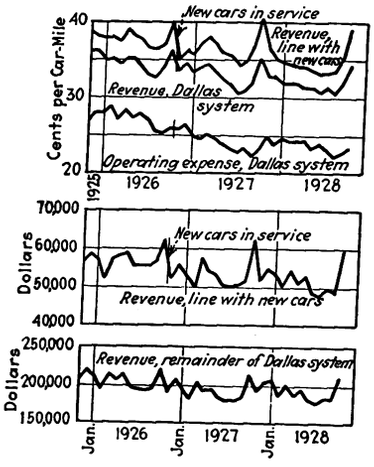
EQUIPMENT MAINTENANCE COSTS, TORONTO TRANSPORTATION COMMISSION

Year	Cents per Car Mile	Per Cent Reduction	Year	Cents per Car Mile	Per Cent Reduction
1920*	4.95	....	1924	3.86	4.9
1922	....	....	1925	3.37	12.7
1923	4.51	....	1926	3.31	1.8
	4.06	9.9	1927 (7 mos.)	2.98	10.0

* Toronto Railway.

The figures for 1920 are from old records of the Toronto Railway. The labor rates are the same as they are today, but the amount of work done was barely sufficient to keep the cars moving, while today the rolling stock is kept in excellent condition and particularly presentable appearance. Savings in maintenance of equipment aggregate nearly $500,000 a year. Part of this figure must be ascribed to the new shops and the complete rebuilding of the track system. As to the service given, the miles per pull-in for the system in 1923 were 2,309. In 1927 this had been increased to 8,244, and in 1928 to more than 11,000.

Dallas Railway & Terminal Company, Dallas, Tex.—Thirty new Peter Witt type cars were put in service on the Sunset-Second Avenue line in November, 1926, with no change in headways or routing. An increase in fares had been made in April, 1926, from 6 to 7 cents with five tokens for 30 cents. While there has been no increase in riding there has been a material decrease in operating expenses. The total expense has decreased from $2,459,971 in 1926 to $2,187,050 in 1928, or more than 11 per cent. This reduction is, of course, due to a combination of elements, of which the new cars are one of the most important. It also has been possible to speed up the system.



Revenue on the Dallas line with new cars has held up well, both in total and on a car-mile basis. Expenses have shown a sharp drop

The company is sure that these new cars have improved its public relations and made the customers better satisfied.

SPEEDS IN DALLAS GO UP WITH NEW CARS

	Years Ended Oct. 31— 1928	1927	1926
Car-miles per car-hour	9.19	9.06	8.92
Per cent of car-miles operated with one man	65.31	60.36	49.09
Maintenance of all cars, cents per car-mile	1.96	1.93	2.71
Total number of passenger cars at end of year	311	311	311
Number of new cars purchased	17	.....	30
Investment in new cars	$243,671	.....	$456,933

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Executives Attend U. S. Chamber Annual Meeting

Many problems of interest to transportation men considered. Traction discussed by executive committee

MANY executives of the electric railway industry attended the annual meeting of the U. S. Chamber of Commerce held in Washington, D. C., during the week of April 29, 1929. In accordance with the custom of the past few years the executive committee meeting of the American Electric Railway Association was held in Washington during the week, the meeting starting with a luncheon on May 2. This arrangement has been adopted to assure adequate representation of electric railway men at this representative annual meeting of American business.

Several features of the U. S. Chamber program, in addition to national business problems and questions of business policy that occupied the attention of the general sessions, were of direct interest to the local transportation industry. The general keynote of the meeting was "The growing responsibilities of business." Paul Shoup, president of the Southern Pacific Railroad, served as toastmaster at the annual dinner of the chamber on Thursday night, at which approximately 100 leaders of American business in the several branches of industry were introduced to the audience. Mr. Shoup, as a preliminary to this ceremony, called attention to the increasing confidence of the American public in business and business leadership. "This places upon business in turn," he said, "a growing responsibility so to conduct its affairs that it may continue to merit that confidence."

President Barnes Speaks at Luncheon

One of the chamber's luncheon conferences was of particular interest to local transportation men. President J. P. Barnes of the American Electric Railway Association was among the speakers listed to participate in the formal discussion. The general topic was "Traffic of the city and its trade area." In addressing the group on this subject Mr. Barnes called attention to the effort being made by electric railways to discharge their full responsibility to the public in the way of providing the most efficient possible transportation service, despite the fact that the public, in failing frequently to understand the fundamentals of its transportation problem, has made it particularly difficult for electric railways to provide that quality of service which they would like to give and which the public has a right to expect. "The streets were not designed for storing automobiles," said Mr. Barnes, and the fact that they are frequently used for that purpose produces a degree of congestion that results in seriously retarding the movement of public transportation vehicles, upon which 75 per cent of the public who use the streets are dependent. This problem is of more direct interest to business men than many of them are inclined to recognize, according to the speaker. As an illustration of this fact, he attributed the rapid development of neighborhood shopping centers in many cities to the delays and dangers of congested traffic conditions in downtown business districts. Since this presents a very serious condition to property owners and business men, it behooves the community and particularly business men themselves to give greater attention to questions of transportation in their cities than they have been inclined to give in the past.

Taxation Discussed at Executive Meeting

An interesting innovation at the executive committee meeting of the American Electric Railway Association was an active and spirited discussion of electric railway taxation, sponsored by the taxation committee of the association and stimulated by the report of the chairman of that committee, H. L. Geisse, vice-president of the Wisconsin Valley Electric Company. After the routine business of the executive committee had been covered, President Barnes announced the plan of devoting part of the time available to a discussion of the fundamental question represented in the assignment to this committee.

Mr. Geisse suggested that one of the benefits which railway men could derive from the U. S. Chamber meeting is a realization that other basic industries, as well as the electric railways, are not in a prosperous condition and have many serious problems to overcome. He suggested further that there is a tendency among electric railway men to magnify in their minds the difficulties of finding solutions to their several basic problems. He held that the industry lacks enthusiasm in meeting these problems, and said that there seems to be more of a tendency to attempt to live down these difficulties by a slow, wearing process, than by a resolute frontal attack inspired by determination to formulate sound principles and provide permanent remedies.

The tax problem of the electric railways, according to Mr. Geisse, is related to that of the entire utility industry. In many instances power and transportation properties are joint enterprises. This may account for the reluctance evidenced by the executives of many of these companies to raise the issue of taxes in a fundamental way. Apparently, he held, there is the fear in the minds of some utility men of disturbing the situation with respect to satisfactory power rates for the sake of remedying a badly confused and unsound situation with respect to the whole question of taxation.

The speaker outlined the confused tax situation in the state of Wisconsin as an example of the need for giving serious attention to this subject. He held that it is important that utility men agree upon principles of equitable taxation in order that they may be in a position to suggest remedial measures which shall provide relief from the present intolerable conditions for the electric railways and at the same time insure a fair distribution of the tax burden in the public interest. In undertaking to secure relief from the present inequitable conditions, he suggested the importance of a proper understanding by utility men of the public's viewpoint with respect to taxation, as well as their own side of the problem. Data gathered by the committee illustrate in a striking way the present confused situation that exists throughout the country and the need for serious study of this problem.

Committee Reports Presented

Following this introduction by Mr. Geisse, there was a spirited discussion in which many of the executives present participated. It seemed to be the consensus of opinion that the work of the taxation committee should continue along the lines on which it has been carried under Mr. Geisse's chairmanship. It was further suggested that there is need for similar studies of many other fundamentals before the industry, and it was

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pointed out that several of the new special committees appointed this year by President Barnes are undertaking similar exhaustive studies of fundamental questions of major importance to the industry.

F. W. Doolittle expressed the opinion that the industry is faced with two alternatives—to seek merely reduction in taxes, which can be obtained by local efforts, or to develop and secure the acceptance of a broad program susceptible of national application. L. S. Storrs spoke briefly in support of the idea of national action in this matter.

Brief reports were presented by the chairmen of the committees on finance, subjects and meetings, depreciation, insurance, industial relations, co-operation with state and sectional associations, convention exhibit, convention transportation, Charles A. Coffin prize, manufacturers, and co-ordination of public transportation. J. W. Welsh presented the reports of the committees on policy, publicity, membership and manufacturers contact.

Announcement was made by President J. P. Barnes of the appointment of the committee on nominations—W. H. Sawyer, L. S. Storrs, Charles Gordon, C. A. Ellicott, B. I. Budd and J. G. Barry.

Comment on the recent regional conference at St. Louis was made by J. N. Shannahan, chairman Advisory Council. Mr. Shannahan also read a resolution expressing appreciation for the work done by Mr. Storrs in the four years during which he served as managing director of the association. In reply, Mr. Storrs gave hearty thanks to all groups comprising the electric railway industry for the assistance they had rendered during his incumbency.

R. H. Dalgleish, representing Frank H. Miller, told of the activities of the engineering association, and W. H. Boyce of the transportation and traffic association. F. G. Buffe, representing the Midwest Electric Railway Association, and W. E. Thompson, representing the New York State Electric Railway Association, also spoke briefly. It was decided to hold the next meeting of the executive committee on Friday, July 12, at New York City.

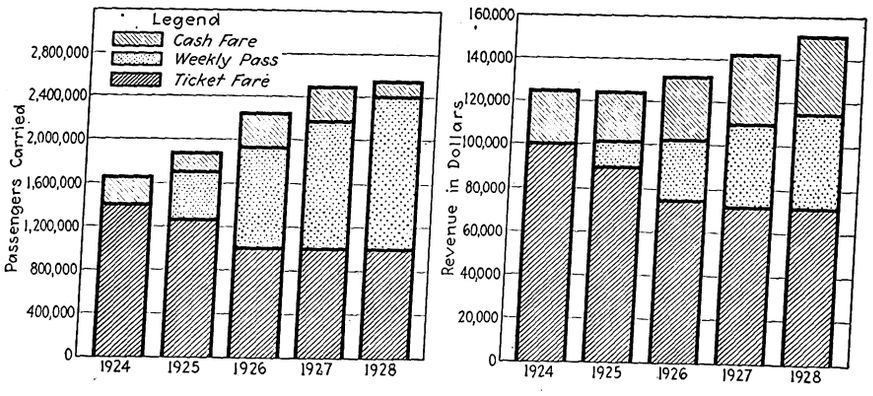
In a Future Issue

TAXATION — not merely a local problem but one with which every electric railway in the country is intimately concerned—to be discussed by a man who for years has given close study to this vital subject.

Traffic and Revenue Increase Continues at Levis

FIGURES for gross revenue and passengers carried during 1928 by the Levis Tramways, Levis, Canada, show a substantial increase over the preceding year. Revenue jumped from $142,584 to $150,814, a gain of 5.8 per cent. The number of passengers increased from 2,506,828 to 2,730,660, an increase of 9 per cent.

Increases occurred in all of the major revenue classifications. The revenue from cash fares increased 6.8 per cent. The revenue from tickets increased slightly, while the revenue from the sale of the weekly pass showed a substantial gain of more than 15 per cent.



Traffic has increased steadily at Levis since 1924

The increase in the number of passengers carried showed about the same trend as the increase in revenue, the largest gain being made in the pass passengers, a moderate gain in cash passengers and a very slight increase in ticket passengers.

Both the revenue and the traffic has been increasing steadily since 1924 although there has been no increase

GROSS REVENUE BY YEARS

Year	Cash	Tickets	Passes	Total
1924	$22,269	$102,291	.....	$124,555
1925	21,642	90,684	$11,956	124,282
1926	29,585	75,475	27,818	132,778
1927	32,478	73,402	36,704	142,584
1928	34,685	73,878	42,251	150,814

PASSENGERS CARRIED BY YEARS

Year	Cash	Tickets	Passes	Total
1924	222,643	1,433,552	.....	1,656,195
1925	216,420	1,287,744	377,047	1,881,311
1926	295,851	1,078,301	853,515	2,227,667
1927	324,781	1,065,182	1,116,865	2,506,828
1928	346,847	1,077,665	1,306,148	2,730,660

Weekly passes started June, 1925. Sale of tickets changed in December, 1925, from strips of four for 25 cents to six for 45 cents.

ANALYSIS OF REVENUE IN PER CENT

	1923	1924	1925	1926	1927	1928
Cash	18.7	17.8	17.4	22.3	22.8	23.0
Tickets	81.3	82.2	73.0	56.9	51.5	49.0
Passes	....	....	*9.6	20.8	27.9	28.0

ANALYSIS OF TRAFFIC IN PER CENT

	1923	1924	1925	1926	1927	1928
Cash	14.0	13.3	11.5	13.3	13	12.7
Tickets	86.0	86.7	68.4	48.4	42.6	39.5
Passes	....	....	*20.0	38.3	40.4	47.8

*Pass in effect seven months only.

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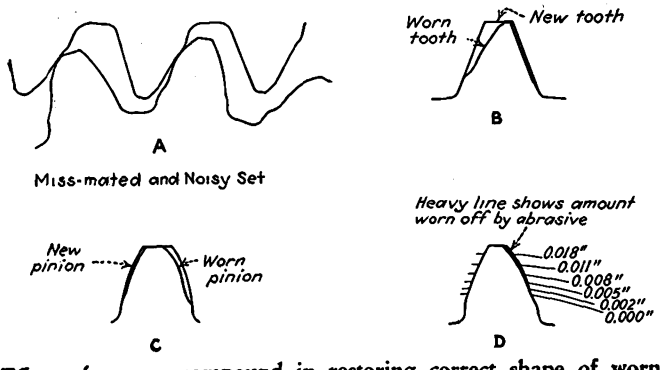
in the population of the territory served. Five years ago 86 per cent of the traffic and 81 per cent of the revenue was derived from the sale of tickets. Weekly passes were first tried in June, 1925. During that year they produced a little less than 10 per cent of the total revenue. The ratio has increased each year, however, reaching 28 per cent last year. In 1925, 20 per cent of the passengers carried used weekly passes, while in 1928 the number was 47.8 per cent of the total. During this period there has been a slight increase in the revenue from cash fares and a considerable reduction in the revenue from the sale of tickets. Figures showing the gross revenue and the number of passengers carried by years are given in accompanying tables, as well as analysis of the sources of revenue and traffic.

Noise Reduced by Improving Fit of Worn Gears

By E. S. Sawtelle

Vice-President and General Manager
Tool Steel Gear & Pinion Company,
Cincinnati, Ohio

GRINDING gears by means of an emery compound to improve their fit, and thereby reduce noise, has recently been tried by the City Railway of Dayton, Ohio, and the Cincinnati Street Railway. By coating a noisy gear with heavy grease, applying about a pint of No. 36 emery powder, and running the car for a



Effect of energy compound in restoring correct shape of worn pinion tooth, as shown by plaster casts made during test on equipment of Cincinnati Street Railway

day, the City Railway has found that the noise can be largely eliminated, and that by cleaning off the gear afterward the emery can be removed completely. The City Railway has used this practice for several years on all cars where gear noise is especially evident. The gear expense has been small, and it has been possible to reduce the noise about 80 to 90 per cent.

Examination of a particularly noisy car in Cincinnati showed that the gear and pinion were both somewhat worn and were considerably shouldered. Plaster of paris casts were made of the teeth, as shown in the accompanying sketch. After the application of emery, the car was run for three trips by which time the noise had died down about 50 per cent. The car was then allowed to make a fourth trip after which the cases were removed, the emery and grease completely cleaned off, new casts made and micrometer measurements taken to indicate the wear since the start of the test.

No wear could be discerned on the gear, either by an examination of the cast or by tooth micrometer measurements that were taken at very close intervals all the way down marked teeth. However, there was a wear of 0.018 on the pinion at the top of the tooth, tapering down gradually to about a negligible wear at and below the pitch line. It was plain in this instance that misshapen gearing was causing interference because the top or "land" of the pinion was too wide to match up with this particular gear. The emery wore away this high spot, developed a curve on the pinion tooth that matched up with its mating gear, and by so doing produced smoother action in the mashing. At the same time the wear on the pinion to produce this smoother action was negligible, and the wear on its pitch line was nil, hence this treatment did not materially reduce the life of the gearing though it did grind out the high spots.

After this test, the gearing was relubricated and put back into service. Two weeks later it was again examined, and the same marked teeth were measured for wear. This was to see if by any chance emery had remained in the mashing and this caused further rapid wear of the gearing. No evidence of this could be detected. During this test a careful check of bearings was also made to see if there was any indication of bearing wear or of emery getting into the bearings. However, nothing of this sort was found.

Less Than One Per Cent of Fifth Avenue Customers Are Parkers

INVESTIGATION made by the sub-committee on parking of the Citizens' Street Traffic Committee of New York, shows that less than 1 per cent of approximately 140,000 customers in the Fifth Avenue shopping district on May 6 availed themselves of the privilege of parking their automobiles in front of these stores. Nearly 3 per cent came by chauffeur-driven automobiles and a somewhat smaller number by taxicab. The great majority, about 94 per cent, were classified as pedestrians. Included in this classification were all users of public transportation vehicles, except taxicab passengers, who were separately classified. The survey was made by stationing checkers at entrances to some 50 representative stores in this district. No questions were asked of the customers, the checkers depending upon their own observations to determine the means of transportation used.

ANALYSIS OF TRANSPORTATION USED BY 5TH AVE. SHOPPERS

	Pedestrians	Self-Driven Automobile	Chauffeur Driven Automobile	Taxi	Total
Department stores	66,541	745	1,786	1,475	70,547
Specialty stores	47,680	241	1,418	1,214	50,553
Ladies' apparel	4,224	187	305	199	4,915
Mens' apparel	1,799	27	99	72	1,997
Banks	1,794	23	30	31	1,878
Miscellaneous	8,294	108	238	135	8,775
Total	130,332	1,331	3,876	3,126	138,665
Per cent of total	93.9	1.0	2.8	2.3	100.0

MAXIMUM HOURLY TRAFFIC

	All Day Total	Number in Maximum Hour	Maximum Hour	Per Cent of Total
Department stores	70,547	14,927	1-2	21.15
Specialty stores	50,553	8,652	3-4	17.2
Ladies' apparel	4,915	772	12-1	15.7
Mens' apparel	1,997	291	2-3	14.6
Banks	1,878	378	2-3	20.1
Miscellaneous	8,775	1,336	12-1	15.2
Combined total	138,665	26,356	1-2	19%

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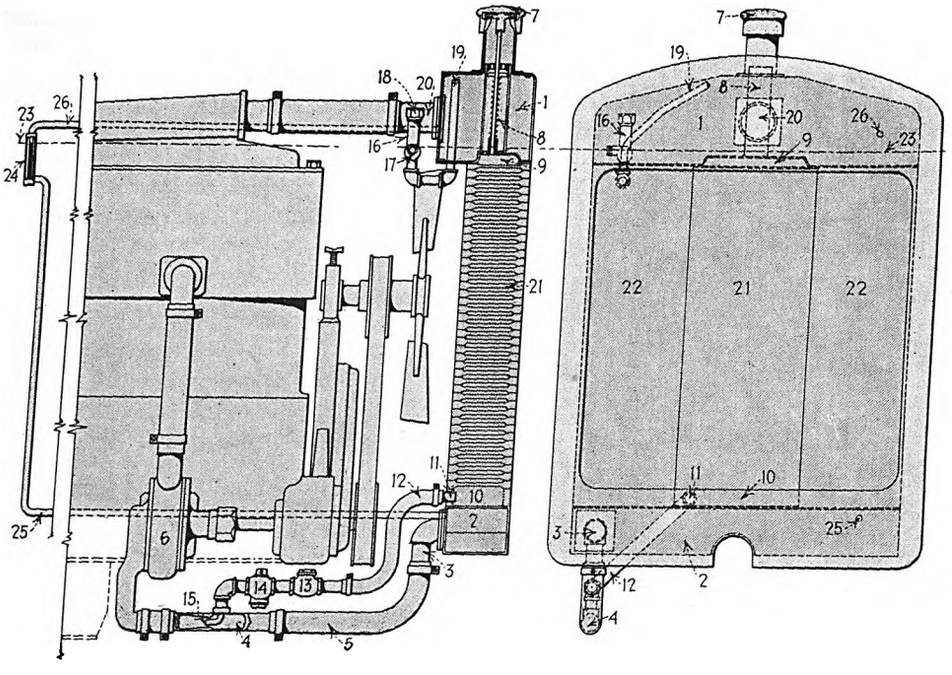

Cross and front sectional plans of the equipment for the Foutz cooling system, showing the location of the various parts

Efficient Cooling System for Bus Engines Developed

System for dissipating the latent heat of vaporization warms engine quickly, maintains high jacket temperature and reduces cylinder heat stress, resulting in more efficient, reliable operation and less wear

By

ADRIAN HUGHES, JR.

Superintendent of Bus Transportation
United Railways & Electric Company
of Baltimore

EVERY bus operator realizes that the engine is a vital and important part of his equipment. The maintenance and operation of the engine is a material part of his expense, and the reliability of the engine is the principal factor in the rendering of satisfactory service. Perhaps it is not fully realized by bus operators to what extent the cooling system affects the operating cost, the maintenance cost and the reliability of the engine. It does affect them to a great extent, and it is surprising that although the gasoline automobile engine has been in use for more than 30 years and has shown a decided advance in design, there has been little or no real advance in the cooling system. An increase in the thermal efficiency of the engine has been impossible with the conventional type of cooling, either thermo-syphon or water circulation by pump.

However, an improved cooling system for internal combustion engines has been evolved, which, after a period of three years of experimenting and testing, has been pronounced satisfactory. The experimentation has been conducted on buses of the Baltimore Coach Company, the bus-operating subsidiary of the United Railways & Electric Company of Baltimore, by Clinton R. Foutz, inventor of the equipment. The new system holds promise of bringing about a decided improvement in the cooling of internal combustion engines, resulting in a higher thermal efficiency, more reliable operation and reduced wear. The improvements, which would be ex-

Key to Illustration at Top of Page

1. Radiator upper water tank.
2. Radiator lower water tank.
3. Radiator water outlet.
4. Venturi tube.
5. Hose connection.
6. Water pump.
7. Radiator filler cap.
8. Specially designed filler device to prevent water entering condenser when filling radiator.
9. Condenser upper tank.
10. Condenser lower tank.
11. Condensate outlet.
12. Condensate suction hose.
13. Check valve.
14. Emergency stop cock.
15. Venturi nozzle.
16. Deaerating and control valve.
17. Blow-off outlet.
18. Valve adjustment nut.
19. Blow-off valve inlet pipe.
20. Radiator inlet.
21. Steam condenser.
22. Water core.
23. Normal water level.
24. Water level gage, mounted on dash.
25. Water level gage lower connection.
26. Water level gage upper connection.

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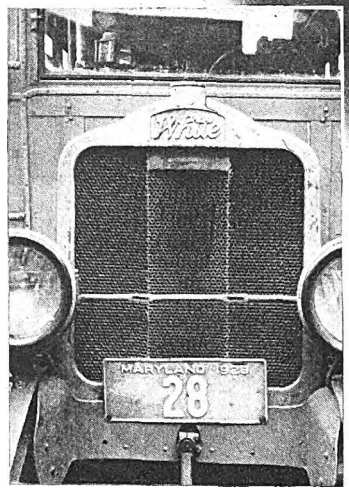
pected from a theoretical consideration of this system, actually have been attained under all operating conditions.

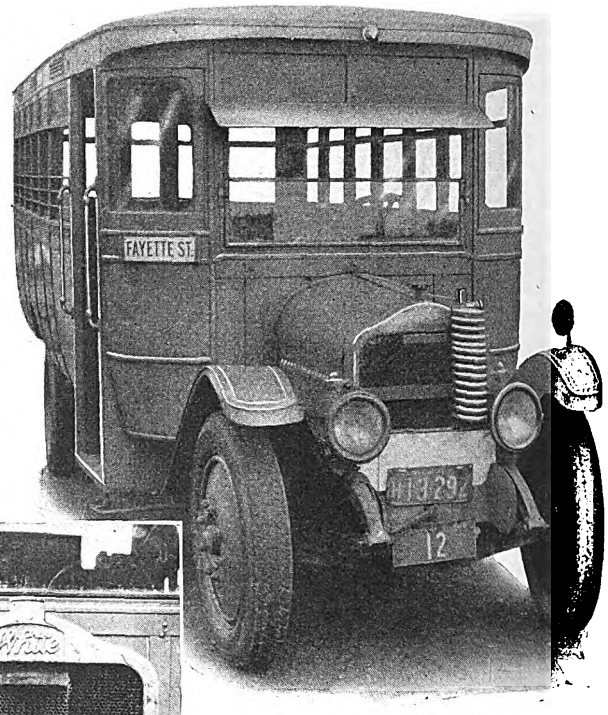
The system uses the simple principles of the old low-pressure steam power plants. Part of the liquid is vaporized when the engine heats up, and this steam is drawn into a condenser in the middle section of the radiator. In the condensation process the vapor gives up its latent heat of vaporization. This enormous dissipation is in addition to the regular loss of heat as the temperature of the water is lowered, so that the capacity of the liquid for giving off heat is greatly increased.

Some of the advantages resulting from the use of this cooling system are:

1. Cools effectively at 212 deg. F. or above, temperatures higher than is now possible with present conventional system.
2. Prevents boiling in hottest weather and eliminates unequal cooling and overheating.
3. Raises water jacket temperatures under light loads to higher degrees (192-220), and maintains them under full loads at sustained speeds for long periods of time. (With vented systems average temperatures are from 90 to 170 deg. F.)
4. Maintains higher water jacket temperatures during rest periods of motor and for longer periods of time.
5. Warms when the motor is cold and gives a quicker warm-up of cooling fluid, establishing water jacket temperatures at normal, above 212 deg. F., in about one-half the time and at three-fourths of maximum engine power.
6. Increases brake-horsepower, as demonstrated on dynamometer test stand, under high temperature conditions.
7. Decreases fuel consumption greatly because of the increase in mean effective pressure directly due to reduction of heat loss and resulting improved combustion.
8. Permits the use of alcohol at atmospheric temperatures of 50 deg. F. and below without loss, and at water jacket terminal temperatures up to about 196 deg. F.
9. Insures the radiator against freezing by maintaining a constant predetermined percentage of alcohol indefinitely without loss by evaporation or boiling away.
10. Cools better at higher altitudes. (Operation is independent of altitude except that the cooling efficiency increases with the height above sea level, and at great altitudes may exceed by 20 per cent the efficiency of conventional types, without considering the change of atmospheric temperature.)
11. Reduces to a minimum the scale formation of lime and other alkaline deposits in the radiator and on the water jacket walls by eliminating evaporation and boiling away of the liquid. (Scale is a non-conductor of heat and deposits irregularly in water jackets and also clogs the radiator.)
12. Improves lubrication because of lessened dilution and uniform high working temperature.



In the latest design, the central portion of the radiator is used as the condenser and the two side portions for the circulation of water



The condenser for one of the first installations consisted merely of a copper coil mounted on the front of the bus

High Temperatures Attained

The primary object of the Foutz system is to operate the engine at very high water jacket temperatures—in fact, the water may be above the boiling point at atmospheric pressure. But even at these temperatures the water inside of the water jacket remains liquid. It does not boil and circulates properly, thus providing the necessary heat dissipation from the cylinder walls and absolutely preventing the engine from overheating. An overheated engine is one in which some part fails to function normally. No matter how high the water jacket temperature may be, an engine is not overheated until the oil is burned from the piston rings and cylinder walls. In the conventional system seizure may occur even though the jacket temperature may be considerably lower than the boiling point of 212 deg. F. when distortion occurs. Overheating usually is the direct result of unequal heat dissipation from wetted surfaces of the combustion spaces, causing some parts to become hotter than others.

In the conventional vented automobile cooling system this overheating occurs before the water reaches its atmospheric boiling point, because no pump can either lift or force water near this temperature and the circulation of water practically ceases. As this occurs the vented system breaks down and overheating results. In the Foutz system the circulation does not decrease at high temperature, but increases. Thus it is evident that the overheating is not caused by temperature of operation but by unequal heat dissipation. By balancing the circulating fluid by the pressure of its vapor, keeping it liquid, at a high predetermined temperature for operation, and utilizing the fundamental principle of the latent of vaporization, this system at temperatures of 220 deg. and 230 deg. F. has a capacity of heat dissipation several times greater than any vented system at 190 deg. F., assuming the vented system could be operated at so high a temperature.

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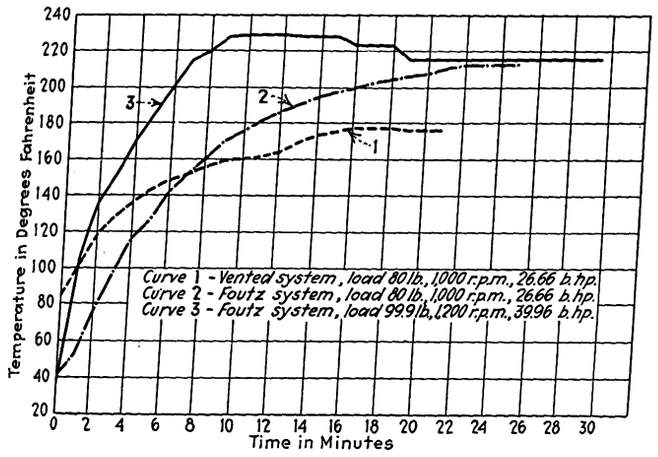
The equipment for this system is surprisingly simple. For application to the usual pump-driven circulating system it consists of four principal parts. The first part is a temperature control valve adjustable to the temperature of operation desired, the second is a Venturi tube with nozzle of special construction, the third is a condenser, and the fourth is a safety blow-off valve set for about 5 lb. In addition to these parts, a water level gage should be mounted on the dash of the bus, and, if desired, temperature indicating instruments also can be installed.

The Venturi tube is placed in the lower suction hose connection from the bottom of the radiator with the nozzle facing the pump. The connection between the Venturi tube and the bottom of the condenser and the connection between the Venturi tube and the pump are made with flexible hose connections, but it is necessary



Comparative warm-up periods for the conventional vented and Foutz systems. Under the same load the vented system required sixteen minutes to reach a temperature of 92 deg. F., while the Foutz system required only 5.5 minutes. Curve No. 3 shows that at a constant load of 39.96 b.hp. a 92-deg. temperature was reached in 1.8 minutes

to insert a piece of brass pipe in the latter connection because of the low pressure which sometimes exists. The condenser is connected between the air space in the upper part of the radiator tank, at a point as high as possible above the water level, and the nozzle of the Venturi tube. The temperature control valve is connected with the top of the radiator.

The radiator and water circulating system must be entirely sealed against admission of air, so that the radiator filler cap must be supplied with a gasket. It is also necessary to reduce the area of the radiator through which the circulating water itself passes from the water jacket of the engine because a considerable cooling is obtained by the condensation of water vapor in the condenser. The safety valve is connected from the air space at the top of the radiator above the water level and is usually set for about 5 lb. pressure, corresponding to 230 deg. F.

In the early experiment the condenser consisted merely of a copper coil mounted on the front of the bus, an arrangement which detracted from the appearance of the bus, and which also obstructed the passage of air through a large area of the radiator. To overcome these objections a radiator was designed, the central portion of which was used as the condenser and the two side portions for the circulation of water. Its appearance is very similar to the ordinary radiator.

When the engine is started cold and water is circulated by the pump a vacuum is produced in the Venturi tube and air is drawn from the condenser. This air is mixed with the water by the impeller blades and forms an emulsion of air and water. This air-water emulsion may become so intimate that the proportion of air entrained may exceed 50 per cent of the water. The specific heat of a 50 per cent mixture of air and water is only 0.62, so that less heat is carried from the engine walls and the warm-up period therefore is shortened.

As the engine warms, the air is driven off until there is finally no air entrained in the water. The average specific heat during the warm-up therefore is the mean difference between 0.62 and 1.00, or 0.81, so that the rate of heat transfer is reduced 19 per cent. In addition to this factor of the reduction of the warm-up period the water capacity of the cooling system is reduced by about one-fifth and the water cooling area of the radiator one-third by the use of the center section of the radiator as the condenser. There is therefore just two-thirds of the water cooling area and four-fifths of the quantity of the water, which would reduce the warm-up period by the product of these two to eight-fifteenths, or 53 per cent. That is practically one-half the time. These factors, combined with the reduction of specific heat of the fluid, gives a warm-up period equal to the product of 53 per cent and 0.81, or about 43 per cent of the usual time.

When the temperature of the fluid approaches the point for which the temperature control valve has been previously set, say 220 deg. F., and sufficient steam is generated, the valve opens and allows the entrained air and a little vapor to escape. During the warm-up period the condenser does not act as a cooling factor except for the detained air.

After the contained air is ejected from the system the second stage of operation starts—the circulation of water under its own saturated vapor pressure. By this process the boiling point is raised 58 deg. above the atmospheric boiling point of 212 deg. At 212 deg. F. in this system the liquid's fluidity is identical with water in a vented system at 100 deg. F.

As the temperature of the circulating water increases, there being no more air present, more and more vapor is formed in the jacket and drawn into the condenser. The cold condensate which forms is returned through the Venturi nozzle and into the pump. The dynamic suction at the Venturi nozzle varies with the speed of the pump and the engine, increasing rapidly with the engine speed. With increased engine speed more heat is generated and absorbed by the water, but this is taken care of by the greater dynamic suction on the condenser which increases the heat dissipation. The condensation thus forced keeps the steam pressure from increasing by reducing the saturated vapor volume. By this means a system of heat dissipation is established which is without limit as to capacity. With proper design an amount of heat dissipation may be procured to meet full load conditions or, under partial or light loads, to maintain approximately the same high temperature necessary for efficient engine performance.

The static vacuum created in the condenser by the Venturi nozzle varies from 2 or 3 in. of mercury to 20 in. or more. Vapor is drawn from the surface of the water in the radiator and condensed, the latent heat of vaporization being dissipated in the change from steam to water. Thus ebullition, or the boiling of water on the surface of the engine jacket, is prevented. Cold water is returned to the pump and to the hot water jacket as fast as formed in the condenser. For every

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pound of steam entering the condenser from the surface of the water in the radiator a pound of cold water is returned. Thus the quantity of vapor given off regulates the volume of water returned both from the condenser and the radiator, and an automatic auxiliary cooling system is established. Since nothing but steam can enter the condenser, this system assures rapid heat dissipation at high temperatures when the engine requires it and a much retarded dissipation of heat until the engine reaches its high normal operating temperature.

Because of the ability of this invention to circulate water at very high temperatures and to maintain it in its liquid state at those temperatures the water capacity of the engine jacket and associated parts can be reduced, and by this reduction in weight of water the warm-up period can be further shortened. By virtue of this the Foutz system will operate under light loads at temperatures from 30 to 50 per cent higher than would be obtained with the conventional cooling system. Above this temperature point the rate of cooling becomes more and more rapid as the temperature rises, but the comparison with the conventional cooling system cannot be carried beyond its breakdown, the limit of which is about 180 deg. in the pump suction and 203 deg. in the jacket.

Experiments Started Three Years Ago

The inventor of the system, Clinton R. Foutz, asked permission to try out his equipment on buses of the Baltimore Coach Company three years ago. The possibility of improvements and savings in the bus operation seemed sufficient to justify the small trouble and expense involved in the demonstration, so Mr. Foutz was permitted to equip two buses. The first equipment was rather crude and naturally many minor difficulties were experienced, but it demonstrated that the principle was absolutely correct.

Despite the crude equipment for the first two installations the results were entirely satisfactory. Consequently, a third and improved equipment was designed. Further installations were made, until a total of ten buses were equipped. These buses have operated a total of more than 662,000 miles. The practical results obtained have been so satisfactory that it has been decided to proceed gradually with the equipping of additional buses.

The improvement in the operation of the buses equipped with the Foutz system has been pronounced. In either cold or warm weather the engines heat up to the maximum temperature in less than two-thirds the time ordinarily required. They are particularly satisfactory in the power obtained, freedom from knocking, etc. They operate continuously in any weather and under ordinary conditions of load at temperatures from 50 per cent or more above temperatures formerly obtained. The reliability of the engines has been increased, very few road calls being necessitated by engine trouble.

In an accompanying illustration curves are reproduced showing the comparative warm-up periods for the Foutz and conventional cooling systems. Curve No. 1 for the conventional vented system at a constant load of 26.66 b.hp., shows a total temperature rise of 92 deg. F. in 16 min. Curve No. 2 for the Foutz system at the same load, shows a 92 deg. F. temperature rise in 5.5 min. The maximum temperature of 212 deg. F. was reached in 22 min. Curve No. 3 for the Foutz system operating at a constant load of 39.96 b.hp. shows a 92 deg. F. temperature rise in 1.8 minutes. The maximum temperature of 228 deg. F. was reached in 9 minutes. When the engine, cooled by the vented system, was operated at 1,800 r.p.m., with the temperature of the water at the outlet of the water jacket at 200 deg. F., it developed 49 hp. and consumed 0.669 lb. of fuel per horsepower-hour. When the engine cooled by the Foutz system was operated at 1,800 r.p.m., with the temperature at the water jacket outlet at 228 deg. F., it developed 51.1 hp. and consumed 0.672 lb of fuel per horsepower-hour. At 1,600 r.p.m. and a temperature at the water jacket outlet of 218 deg. F., the Foutz-cooled engine developed 49.5 hp. and consumed 0.652 lb. of fuel per horsepower-hour.

Because of the quick warm-up and higher operating temperature practically no carbon forms in the cylinders. This reduces the wear on the cylinder walls materially and also decreases an important labor item. Carbon is cleaned from the engines every 20,000 miles instead of every 5,000 miles as formerly, and even at the longer period the carbon formation is merely a soft soot that can be wiped off instead of the hard baked carbon usually found. Cylinder wall wear has been reduced from 0.012 in. to 0.004 in. in 19,000 miles. Also, trouble with sticky, gummed valves and sticky piston rings has been eliminated.

Preservative Treatment Used for Wood in Car Bodies

By Otto Gottschalk
Engineer of Railway Equipment Department
Havana Electric Railway

CONSIDERABLE difficulty was experienced by the Havana Electric Railway in the past from dry rot, and wet rot, particularly at points where water could accumulate but no air could enter to dry up the moisture. Checking of the woodwork of cars also took place where the wood was exposed to the hot sun rays. A native wood called Sabico was used for end sills, corner and window posts. This wood was very hard and was not attacked by the wood borer called "Conejen," but it was subjected to checking and warping, even more than the longleaf yellow pine used elsewhere in the car bodies. To overcome this trouble Saums' preservative has been very satisfactory. The wood in the car stood up very well and no checking or warping took place, and no rot has developed. The "Conejen," or wood borer, has been unable to enter the yellow pine because of the difficulty of penetrating the surface which hardened after the preservative had been applied.

The company now treats all wood boxes, ladders, lockers, bodies, etc., by a brush application. Dipping is not used because the wood becomes too hard and difficulty is experienced with screws or nails. All of the old type cars passing through for general repairs have been treated in this way.

An interesting test was made by tapping a section of Sabico 4 in. x 7 in. x 25 ft., from a dry log. During the cutting a certain amount of warping or bending took place, due to the internal stress being released when the fibers were cut by the saw. A brush application of the preservative was made at once. The section has been lying out in the elements for three years, and no warping or bending has developed and no rot exists. Another piece was cut from the same log, and not treated. This was placed alongside the first. A slight indication of rot has been observed and checking has developed to a point where the section is useless.

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Track Costs Studied at Detroit

Steel ties and monolithic concrete construction have proved advantageous

By F. A. Nolan

Assistant to the General Manager
Department of Street Railways, Detroit, Mich.

AMONG the changes made when the properties of the Detroit United Railways were taken over by the city of Detroit for operation as a municipal project was the introduction of steel twin ties. Prior to 1920 the United was using oak ties on a concrete foundation for the building of all standard paved track. The city of Detroit desired a faster and cheaper method of track construction, and an investigation was authorized to determine how this could be accomplished. Steel twin ties were brought to the attention of those in charge of this investigation and the use of these ties was immediately tried. The first stretch of track of this type was laid in September, 1920. This installation and others made subsequent thereto have been subject to close observation and results have been highly satisfactory. The total length of single track in service at the end of 1928 was 81.85 miles.

SUMMARY OF DETROIT TRACK CONSTRUCTION COSTS

Location	MACK AVENUE		GRAND RIVER AVENUE		MICHIGAN AVENUE	
Type of work done	New Extension		Reconstruction		Reconstruction	
Type of construction	Single Track		Single Track		Single Track	
Total length	16,861.0 Ft.		20,787.0 Ft.		20,112.2 Ft.	
I.C.C. Acct. No. — General Description	Total	Per Track Foot	Total	Per Track Foot	Total	Per Track Foot
504 Grading	$21,338.07	$1.27	$26,856.53	$1.29	$32,602.82	$1.62
505 Ballast	31,528.48	1.87	40,663.59	1.96	30,311.13	1.51
506 Ties	21,077.09	1.25	63,338.30	3.05	28,525.63	1.42
507 Rails, joints, etc.	27,102.07	1.61			33,336.81	1.66
508 Special work	7,894.17	.47	55.12	....	2,890.60	.14
510 Track and roadway	26,378.78	1.56	49,680.10	2.39	37,184.19	1.85
511 Paving	24,014.88	1.42	37,151.06	1.79	39,958.36	1.99
516 Crossings	859.71	.05	394.15	.02	708.12	.03
517 Signals	91.05	.01	.....	....	.....	....
519 Telephone lines	5.31	....	1.00	....	.....	....
521 Distribution system	723.72	.04	403.91	.02	508.26	.02
Totals	$161,013.33	$9.55	$218,543.76	$10.51	$206,025.92	$10.24

The construction using steel twin ties on a concrete foundation with a compressed concrete pavement results in a non-flexing track, and this is considered one of the outstanding advantages of the present construction practice. Tests have convincingly demonstrated the existence of a watertight bond between the rails and the compressed concrete top. This prevents the formation of water pockets and gives permanent assurance against pumping. Several sections of this track have been cut out and it has been found watertight in all instances. The concrete invariably carried such impressions of the rails as to illustrate perfectly the bond which had been achieved. The non-flexing track has never caused any trouble to the rolling equipment.

Some of the electrically welded joints used prior to June, 1926, gave trouble due to lack of sufficient strength, and cracks permitted water to enter. The adoption of the Thermit process for track joints did away with the trouble, however, and there has not been a single failure in a properly made joint in two years.

Reduced cost is another important advantage, an accompanying table gives a summary of three typical track jobs recently completed. Base rates paid for labor averaged 55 cents per hour during the period in which this work was done.

The Mack Avenue extension, a typical all-new job of 16,861-ft. single-track length, required a total of exactly 49 days from the time the first shovelful of dirt was removed until cars were operated over it. This was a winter-time job and special care had to be taken to prevent portions of the concrete from freezing. The total cost was $161,013.33, and the unit cost of $9.55 per track-foot is regarded as a thoroughly satisfactory figure. Similar data are shown for the Grand River Avenue and the Michigan Avenue reconstruction jobs. The first of these was paved with asphalt, for reasons of a special nature at a cost somewhat in excess of that for standard compressed concrete. The total for 20,787 ft. of single track was $218,543.76 and the unit figure $10.51 per foot. The total elapsed time on this job was 48 days. The Michigan Avenue job is detailed in a similar manner. The total cost for 20,112.2 ft. of single track was $206,025.92, equivalent to $10.24 per track-ft. These figures are based on an analysis made by the A. C. Nielsen Company.

Better paving is a third major feature of the present system. The brick pavement formerly used was generally unsatisfactory. The brick themselves were too soft to withstand the heavy vehicular traffic, and it was practically impossible to get a watertight top surface. Sand used under the ties was ultimately washed away by water which seeped down from above. This permitted rails to settle and was the cause of much trouble. Furthermore, the brick top heaved when water froze underneath and the brick which projected was quickly cracked and worn down. This caused low spots when the frost left the ground and patching designed to fill in the low spots was never altogether satisfactory. Asphalt was equally troublesome, principally when the flanges of interurban wheels broke it away from the rails. This permitted water to get under the top surface and heaving and cracking were common.

The compressed concrete pavement has been all that the others were not. Pavement of this type laid nine years ago is in good condition today. Tarvia patches have been found to hold satisfactorily under all conditions and there was no possibility of trouble even in places where other street or excavation work has made extensive patching necessary.

Corrugation has developed on some of this new track design and this was first thought to be the result of non-flexing construction. Investigations, however, have convinced the management that this is not entirely the case. A determination by the Detroit Testing Laboratories showed incipient corrugation in the rail before it was placed in the track and subsequent tests show that this same rail corrugated as quickly in unpaved tracks laid with broken stone ballast as in paved track constructed by the methods herein described.

Long life is another important feature of the new

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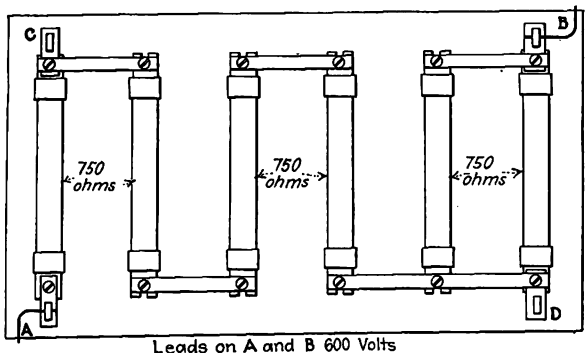
track design. None of the new track has even approached the end of its usefulness, but a recent examination of one of the oldest sections—St. Jean Avenue between Warren and Shoemaker—indicates clearly what life may be expected. It appears that this track will be good for fourteen to twenty more years of use and that the total life will be somewhere between 21 and 28 years. Apparently rail wear will be the determining factor. An examination at the time this section of the track was opened up showed that all other parts of the rail, ties and concrete were in exactly the same condition as when first put into place. There was no evidence of water having worked along the rail in either direction and the compressed concrete pavement bore clearly legible imprints of the die marks giving the rail mill's name, the date the rails were rolled and the numbers used to designate the rail section.

Testing Line Breakers

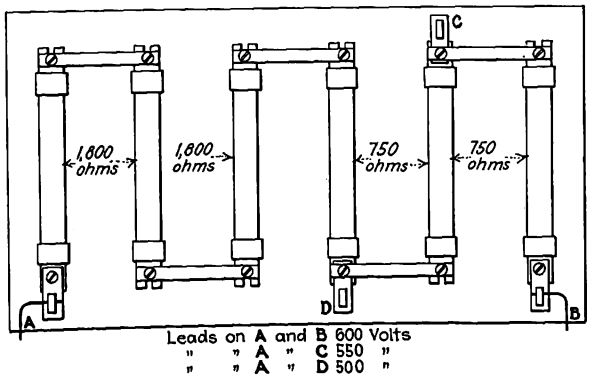
By R. S. Beers

Railway Engineering Department General Electric Company

When a motorman reports that the line breaker on a car does not always close, a test of some kind is desirable to ascertain whether the cause is low line voltage or a weak operating coil. The most accurate test, of course, is to use an ammeter and variable resistance, first measuring the minimum current required



Resistor tube connections for testing all type DB-976 and DB-981 line breakers having coil specifications F-323352



Arrangement of resistor tubes for testing all DB-986 and DB-987 line breakers with coil specifications F-3046442

to close a line breaker that has a good coil and then making the same test on the line breaker whose coil is doubtful. When an ammeter is not available a simple "rough and ready" test may be made with no other equipment than resistor tubes. This test depends on the fact that a resistance connected in series with a line breaker will absorb some of the line voltage and the line breaker the remainder.

Assume the line breaker will close when 200 volts are applied to it. By selecting the proper amount of resistance to connect in series, 300 volts may be absorbed by the resistance and 200 by the line breaker. With this arrangement the line breaker will just close when 500 volts are applied to the combination, although only 200 will be applied to the line breaker. If something is wrong with the line breaker so that it will not close at 200 volts, it obviously will not close when 500 volts are applied to the combination of resistance and line breaker. The correct resistance may be determined quickly by calculation if enough of the line breaker constants are known. If they are not known the proper resistance may be determined by a cut and try method.

The success of the test depends on an approximate knowledge of the trolley voltage, although making the test with two values of resistance is a reasonable check on the line voltage. In other words, if the line breaker fails to close when the resistance for 550 volts is in circuit and closes when the resistance for 500 volts is used, it is safe to assume the trolley voltage is about 500.

The test of a line breaker mounted on a car is made by removing the fuse from the MS-46 control switch and using the fuse clips as an easy way of connecting the resistor tubes in the line breaker circuit. Spring clip connectors, such as are commonly used for radio, are the simplest means for making the connection to the fuse clip. Then close the control switch and turn the controller handle to the first point to energize the line breaker, which should close. If it does not close fully, probably the coil is partially short circuited and does not give the pull it should. Although it may be caused by other faults, such as excessive friction brought about by too much wear of the bronze bushings that separate the armature and frame where they are hinged together. This excessive friction results only when the frame is magnetized. When the operating coil is dead all the parts move freely, but as soon as they are magnetized excessive friction is present and can be removed only by replacing the worn bushings with new ones.

Riders Outnumber Readers

Combined circulation of the *Ladies' Home Journal* the *Pictorial Review* and the *Woman's Home Companion* in our large cities is extremely small compared to the number of car riders, according to F. R. Barnard, Street Railways Advertising Company, writing in *Printers Ink*. Interesting figures to prove this are given in a table which is reproduced below.

	Population	*Ladies' Home Journal*	*Pictorial Review*	*Woman's Home Companion*	Monthly Street Car Riders
Chicago	2,886,121	77,632	54,246	64,448	135,660,915
Philadelphia	1,922,788	55,154	43,071	26,434	79,671,094
Detroit	995,668	38,059	32,458	33,693	41,297,177
Cleveland	889,519	28,004	27,604	27,877	32,669,933
St. Louis	803,853	25,456	30,493	22,335	34,855,505
Baltimore	773,580	19,798	20,631	15,925	27,168,400
Pittsburgh	613,422	21,245	18,787	21,599	26,910,071
Buffalo	536,718	15,667	14,560	12,716	16,293,039
Milwaukee	484,595	15,271	11,009	16,885	18,436,409
Kansas City	467,600	14,665	17,014	14,089	15,690,995
Cincinnati	406,312	17,308	15,780	16,333	14,439,990
New Orleans	404,575	6,632	5,098	8,037	11,970,356
Indianapolis	342,718	12,325	17,507	15,701	9,877,777
Louisville	257,671	7,757	6,585	7,845	8,959,964
Providence	243,378	12,622	12,929	8,339	12,973,110
Atlanta	222,963	7,200	7,447	8,601	8,014,805
	12,251,481	374,795	335,219	320,857	494,889,540

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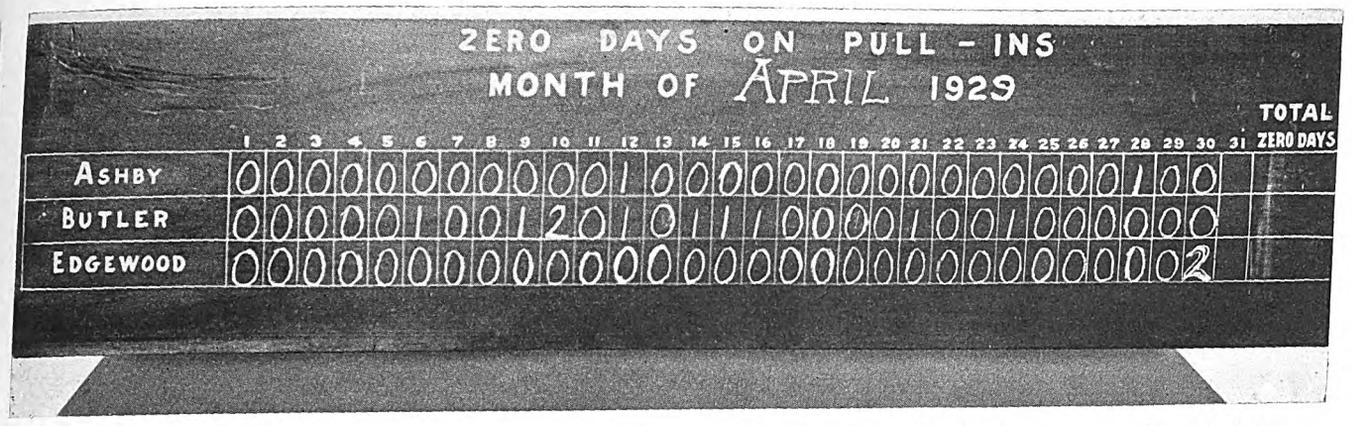

Car pull-in "zero board" at one of the Atlanta carhouses. Figures are posted each day, thus keeping the men informed of the relative standing in the competition for the best record

Improved Machinery and Practices

Raise *Maintenance* Standards

on Southern Properties

By

G. C. HECKER

Special Engineer
American Electric Railway Association

METHODS which have led to a reduction of 49 per cent in equipment maintenance costs and have eliminated 87.5 per cent of the pull-ins on four Southern properties have been discussed by the author in the last two issues of this paper. These four properties —Atlanta, Birmingham, Memphis and New Orleans— have made this remarkable record in a six-year period beginning in 1922.

It was in April, 1922, that the Electric Railway Association of Equipment Men, Southern Properties, was organized. On every hand appears evidence that the record of progressive improvement on these properties is definitely related to the activities of the association. These articles have been written, therefore, to direct attention to a noteworthy achievement and to emphasize the value of an association such as this one. There has been no thought of setting up costs on these properties for others to shoot at. It is the steady improvement year after year that makes their performance impressive.

Some of the practices of the mechanical departments already have been discussed. The present article directs attention to specific shop practices to illustrate the adoption of improved methods and the increased use of machines and special devices.

In Atlanta, equipment is overhauled on a 60,000 car-mile basis, except a few old cars which are overhauled on a 50,000 mile basis. Some of the methods used, and the special equipment installed for facilitating the work and reducing costs, are illustrated.

The liberal use of jib cranes, monorail and transfer cranes has greatly simplified the handling of the heavy equipment in the shops. A home-made electric hoist mounted on a jib crane has increased the capacity of the wheel press about 30 per cent, with less physical effort. The hoist is worm driven and requires no brakes.

Failures due to lightning have been reduced greatly by equipping all cars with aluminum cell arresters and impedance coils. Ground wires bolted direct to the bolsters give a short, low-resistance path to ground. Careful inspection and periodic testing insure good condition of the arresters and connections during the lightning season.

Other interesting practices that have reduced equipment troubles in Atlanta are the use of dot pressure lubricator fittings on brake valves, safety stops for air brake cylinder levers, field jumper wires placed inside of motor cases, flanges on axle collars to prevent entrance of dirt between collars and bearing flanges, installation of bolts in the bottom of journal boxes to support dust

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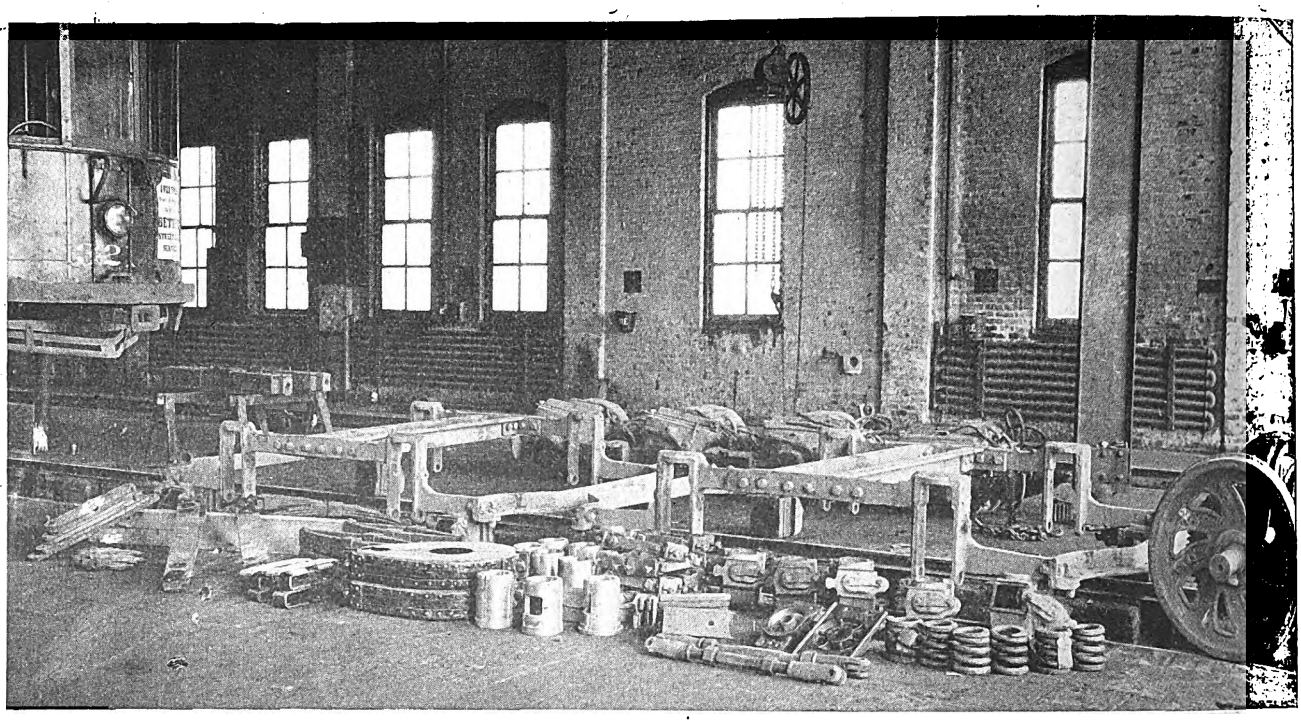


Dismantling car trucks in Atlanta. All parts are removed and repaired or reconditioned parts are used to replace them

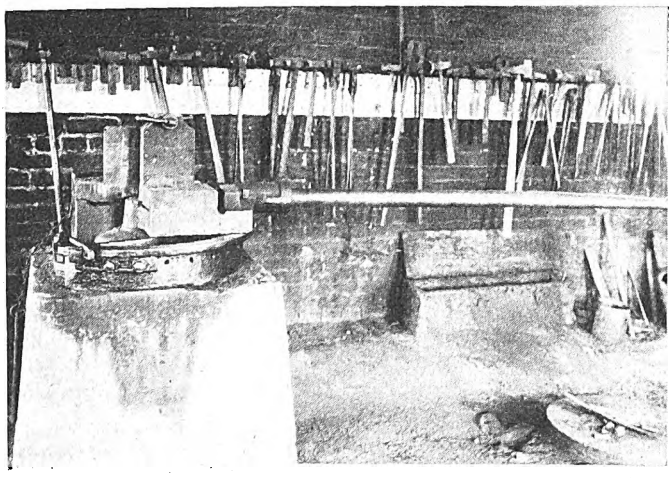
guards, controller drum changes made to eliminate arcing and short-circuiting, and reboring and equipping older motors with new housings.

In Birmingham the car cleaning, inspection and oiling are done on a 1,000 car-mile basis. The system now in effect has permitted a reduction of inspectors from 72 to 40, and in addition has eliminated a night crew of six men on truck repairs.

Some of the practices developed on this property are shown in the illustrations. Chrome-nickel steel armature shafts replace all worn or broken ones. Hair cracks in axles are located by first wiping the surface clean and then passing a blow torch flame over the surface. Where a crack exists oil will come to the surface. It is stated that this simple method is very effective and has reduced greatly the time needed to locate cracks in axles.

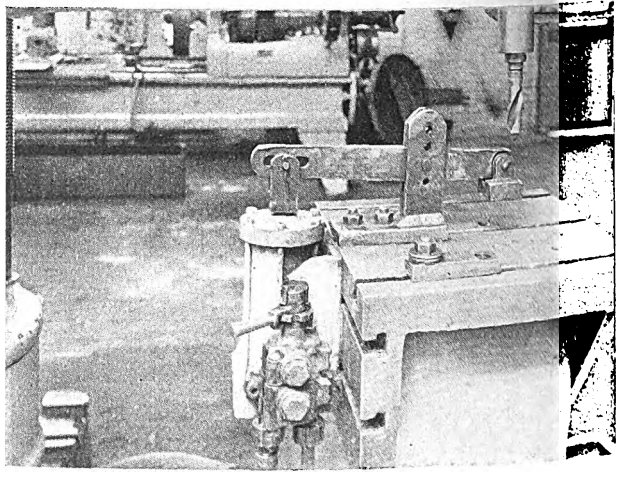
Bronze bearings have replaced all babbitt-lined armature and axle bearings. They are tinned while being spun around by a hand wheel, an ingenious jig clamping the heated bearing. Axle bearings are now bought finished on the outside and rough-bored $\frac{1}{8}$ in. to $\frac{1}{16}$ in. under size. They are finished to fit individual axles as needed in a specially designed chuck. The chuck is made for the lathe on which it is to be used, the interior being finished after fitting to the lathe, so that it is perfectly true. To line up a bearing it is inserted in the chuck and the collar is tightened on a taper thread. The outside of the chuck and the bushings used are split so that the bearings are clamped tightly in place as the collar is screwed up. This practice not only has increased the life of axle bearings, gears and pinions more than 15 per cent but has greatly reduced gear noise.

On motors of the older types the gear case support has been converted from two-point to three-point by



This Kerlin bending machine has eliminated anvil and face-plate work in Atlanta

It bends all steel bars up to $\frac{3}{4}$x6 in. and round bars up to $2\frac{1}{2}$ in. diameter. The bars are bent to any angle, with short or long radius. It is especially advantageous in forming a number of similar pieces.



Holding work with an air clamp

In Atlanta a home-made air clamp for holding work on the table of a radial drill press has eliminated about 90 per cent of the time formerly required to fasten it to the table with bolts. The device consists of a brake cylinder and piston and a motorman's valve, operating the clamp through a lever.

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welding a steel strap to the top of the case and the motor frame. This has reduced gear case maintenance work on these equipments at least 50 per cent.

In the general overhauling of the older type motors all steel conduit has been removed and the cables incased in duraduct. As a result many failures due to grounded car wiring have been eliminated.

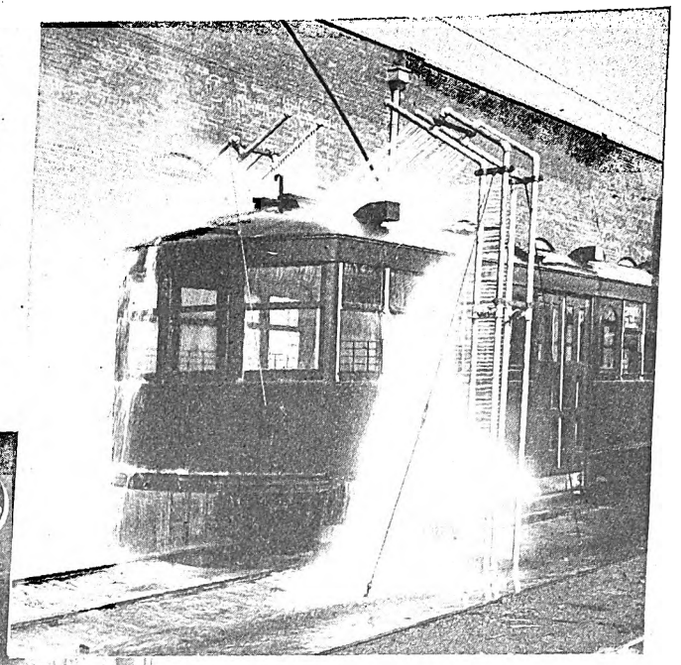
The life of half-ball brake hangers has been doubled and much chattering eliminated by the use of Alemite lubrication. This practice won a prize last year in ELECTRIC RAILWAY JOURNAL'S maintenance contest.

Installation of a pit grinder has practically doubled the life of car wheels. A new wheel press with a hydraulagraph for recording pressures has facilitated wheel installation and reduced the cost of the work. In removing wheels from axles a split steel shell substituted for the pins ordinarily used has eliminated the danger to workmen as well as any possibility of broken wheels or bent axles.

A screw-jack hoist driven by a railway motor has reduced the time for raising car bodies and increased the factor of safety. Trucks are run out from cars under their own power by using a flexible cable connected to the hoist controller and one of the motors on the truck.

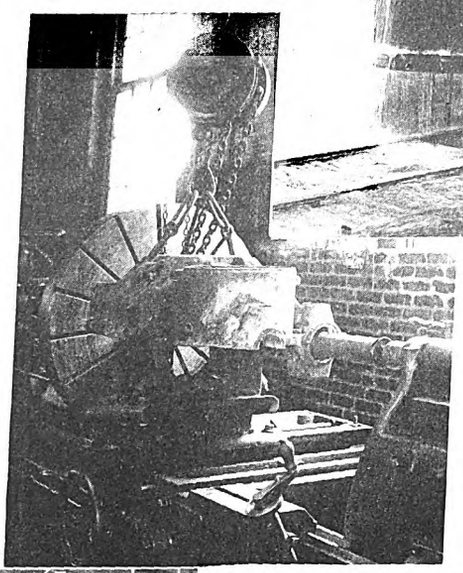
Many other improvements that have contributed to the reduction of maintenance costs in Birmingham include a gas-fired oven for heating car springs, a gas-fired rivet heater, a baking oven for armatures and fields, individual motor drive instead of shafting and belts, guards for all gears, belts and band wheels, improved lighting and other changes that have bettered working conditions.

A lumber storage shed 140x40 ft. adjacent to the woodworking department has its sides made entirely of sliding doors, so that with a minimum of handling lumber can be unloaded directly from a car onto the proper storage racks. A cut-off saw centrally placed in the shed



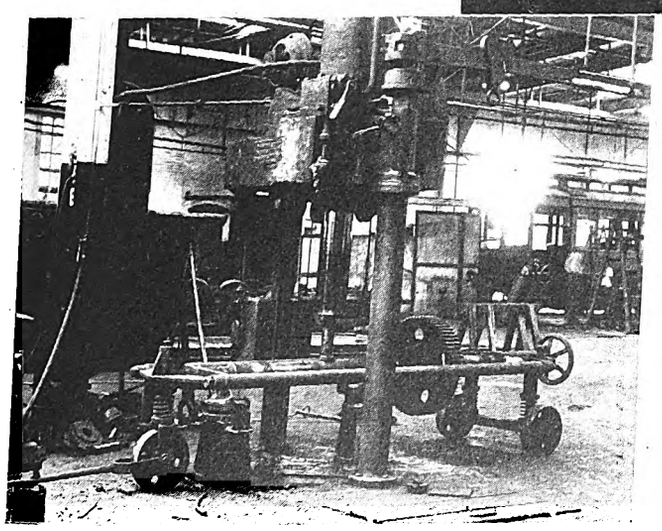
Spray-washing cars in Birmingham permits more frequent cleaning

Every car is now washed once in six or seven days. The car is passed slowly through the spray, after which the dirt is loosened with long-handled brushes. The car roofs are washed, and it is claimed that this eliminates streaking of the windows and sides. Cars are rinsed by passing them several times through the spray.



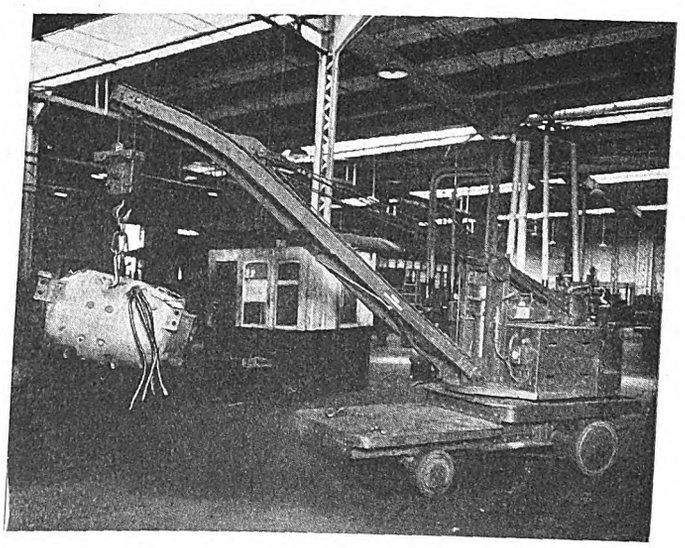
Above, a chuck that has reduced troubles on old motors 50 per cent

On many of the older motors in Birmingham the armature and axle housings were badly worn and out of line. The chuck shown was made for use on a 42-in. lathe. It clamps the motors on the pole-piece seats, insuring that the housings, after building up with electric welding, will be bored true. After boring the armature bearing fit the chuck can be shifted over to bore the axle bearing fits. A taper pin through the bottom of the chuck insures correct spacing of centers.



Saving three-fourths the time of straightening axles

This three-wheeled buggy, developed in Birmingham, holds the axle between centers while it is straightened cold in a hydraulic press. It has cut the time to about one-fourth that required with the old practice of preheating.



A truck that replaced four laborers in Birmingham

This storage battery truck, equipped with a locomotive type crane, is used for handling motors, armatures and other heavy parts. The same truck has also made unnecessary the periodic part-time services of a crew of twelve track laborers to handle car wheels.

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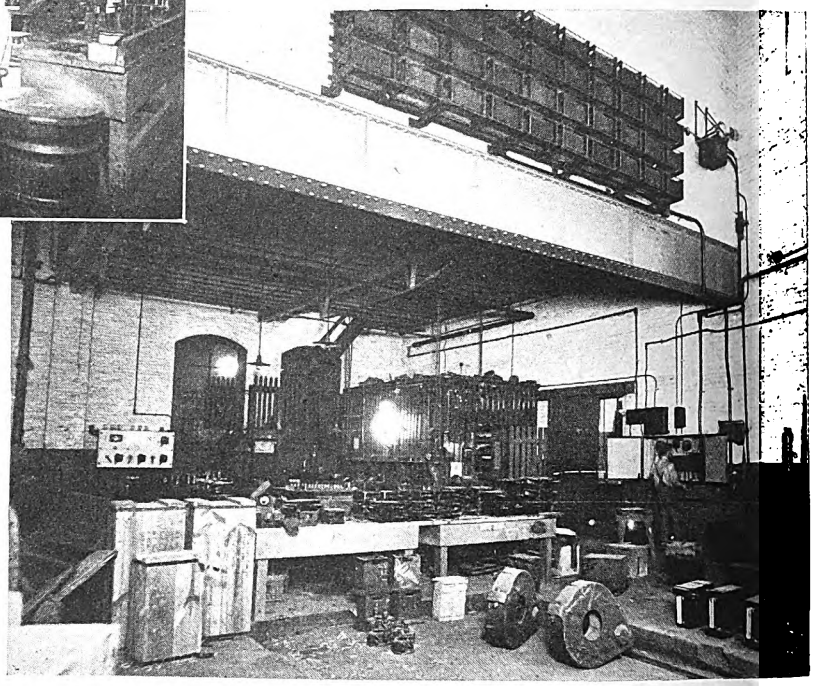
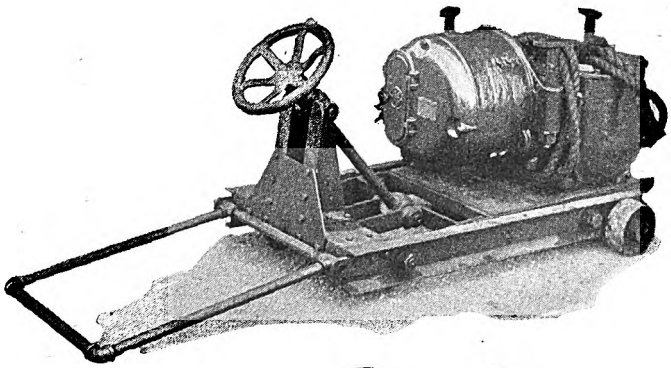
Thermostatically-controlled babbitt pots make good bearings

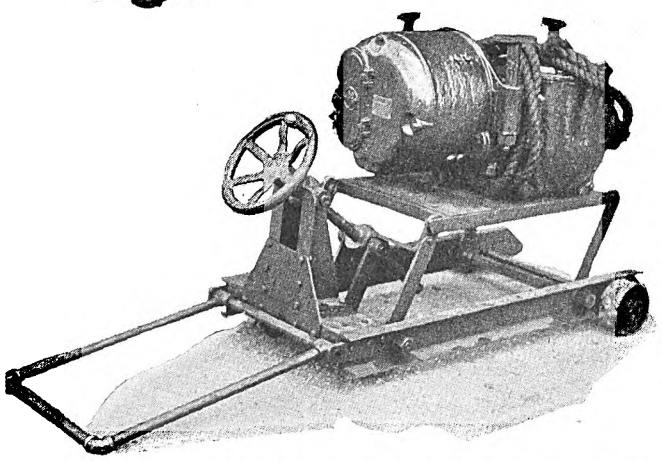
Four gas-heated babbitt pots are installed in New Orleans, one for each composition of metal used. Babbitt temperatures are recorded continuously on a Leeds & Northrup potentiometer-type recorder. Bearings are cleaned in a hot Oakite solution, dried and placed in the furnace. When the babbitt melts out the shell is dipped in acid and cleaned. Then it is swabbed with zinc chloride solution and parts not to be tinned are painted with a clay mixture. The shell is tinned in half-and-half solder at 435-450 deg. C. After tinning it is placed on a mandrel and the babbitt poured from a self-skimming ladle.

Below, overhauling electrical equipment in New Orleans

All electrical apparatus, except repaired railway motors, is tested here. The test panel in the background has a line breaker on it connected for test. Load resistors and protecting line breaker are overhead on the wall. A set is provided for testing aluminum cell lightning arresters.

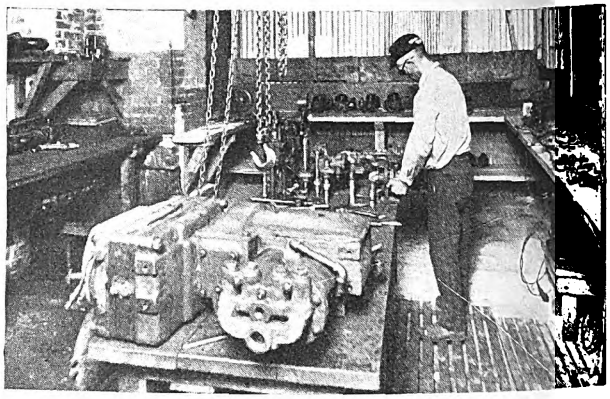






A labor-saving device for removing and installing air compressors on the cars

This truck has a minimum platform height of 6½ in. and a maximum height of 17½ in. It is used only to facilitate removal or installation of compressors, which are carried through the shops by monorail and transfer cranes.



In the air-brake overhauling department

The test set at the end of the central bench tests valves of all types of air-brake equipment used on the cars. Another set recently installed is used for testing bus air-brake equipment.

is used to cut lumber to any desired length before it is trucked to the mill room.

The New Orleans mechanical department, likewise, has adopted modern practices and has made extensive use of machinery to reduce costs. Careful, periodic overhaul on a 40,000 car-mile basis has greatly reduced trouble and expense. The maintenance system is characterized first by the thoroughness of the overhauling and testing methods and second by the completeness of the records kept. These data are of great value as a check on all of the operations of the department. It is the writer's belief, based on a careful examination, that no other company has more complete data on its maintenance costs.

Some of the New Orleans practices that have contributed to this result are shown.

In Memphis fewer cars are operated and there is not an equal opportunity to employ the periodic overhaul

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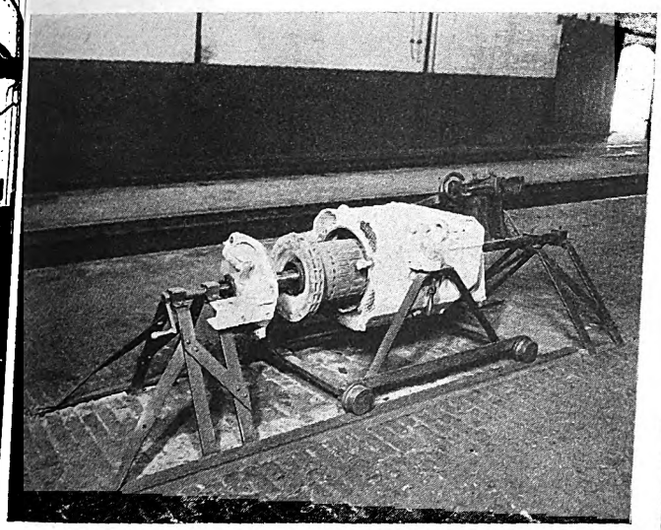
system. Inspection and car cleaning, however, are on substantially the same basis as on the other properties. Some of the best practices are illustrated.

The carpenter shop is completely equipped for turning out any car body parts. A Wysong Miles belt-type sandpapering machine is a great time-saver in smooth-finishing lumber. In the paint shop, which is adjacent to the carpenter shop, all cars are put through on approximately an eighteen-month basis. The paint shop also does the necessary painting on the power company's trucks and automobiles.

All cars are operated from a single carhouse adjacent to the shops. Inspection, oiling and cleaning of cars are done here, each inspector being responsible for certain cars assigned him. As the inspection discloses the need



Removing GE-268 armatures in Memphis

The motor is placed on the carriage, which can be moved longitudinally on a short track. The armature is suspended between centers, the pinion end housing is loosened and the carriage shifted. The armature is then lifted by a monorail air hoist and conveyed to any desired point in the shop.

for any major repairs to a car it is placed in the shops and given a thorough overhauling. Like the other three properties Memphis follows the practice of dipping and baking armatures and has developed improved methods of banding armatures, with the result that motor troubles have been reduced materially. Improvements in bearings and in lubrication practice have increased the life of armature bearings from 13,000 to 76,000 car-miles and of axle bearings from 40,000 to 225,000 car-miles.

In a previous article the writer pointed out that this group of companies has consistently purchased new cars and that during the period under consideration the average annual purchases have been twice as great as in the preceding years. Undoubtedly credit must be given the new equipment for much of the performance. Yet all the modern cars are completely equipped with air-operated doors, safety features and other auxiliary apparatus requiring maintenance, which the cars they replaced did not have. Furthermore, many of the new cars are of the double-truck, four-motor type, with 102 principal wearing parts, while quite a number of the cars they replaced were of the single-truck type with 29 wearing parts or the double-truck two-motor types with 56 wearing parts. In Atlanta in 1922 single-truck cars made 23 per cent of the total car mileage and double-truck, two-motor cars 45 per cent. In 1927 there were no single-truck cars and the double-truck two-motor car mileage had been reduced to 23 per cent of the total. Furthermore, the average schedule speed has been increased from 9.2 m.p.h. in 1921 to 9.77 m.p.h. in 1927.

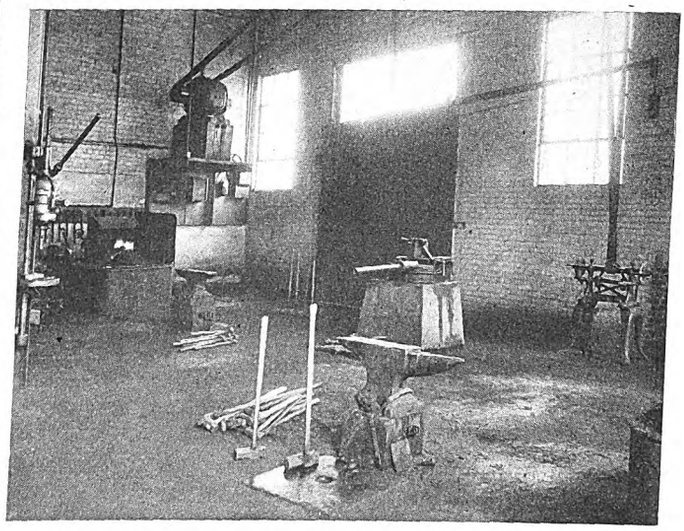
Then, too, it must not be forgotten that while new equipment becomes old equipment in a few years, the combined maintenance costs and car failures have gone down steadily on these properties.

Let us take one illustration to show how seriously these properties regard the matter of car performance. In April of this year the Edgewood carhouse in Atlanta operated 357,000 car-miles without a pull-in. It was a record for the property, extending from April 1 to 10 o'clock in the evening of the 30th. At that time lightning damaged two armatures. This performance was celebrated at a lunch given the carhouse men by the company. Among those present at the lunch were the principal officers and the division superintendents. Officers and department heads congratulated the carhouse organization on its record and expressed their appreciation of the team work, not only in the mechanical department but between that department and the transportation department, which had made possible such a high standard of service to the public.

Factors That Have Brought Success

To sum up I am listing some of the factors which seem to me to have contributed to the performance achieved by these mechanical departments.

Interchange of cost and performance data through the association. This, coupled with inspection trips and discussions at the association meetings, developed a spirit of competition and brought about a determination to improve past performance.



A corner in the Memphis forge shop

The equipment includes two forges, a trip hammer, a Kerlin bender, a case-hardening furnace, draft fan, anvils, crane and drill press. This shop serves both mechanical and way departments and also the power company's garage.

Efficient organization for the work to be done.

Competent, intelligent supervision.

Preventive maintenance policy based on thorough, periodic overhauling and systematic rigid inspection of equipment.

Improved shop methods and practices, and greater use of machinery and special devices.

Good working conditions in shops and carhouses.

Complete records of costs and performance.

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Cleveland Railway Men

Win $25 Maintenance Con

Organized participation in contest through the backing of management leads to large number of entries from Cleveland in track, overhead line and bus departments. The equipment department prize goes to San Diego for the second time. Contest enters final period and closes on July 15, both for third group of $25 department prizes and the annual awards to be made at the A.E.R.A. convention in Atlantic City.

RESULTS of the interest aroused among the Cleveland Railway employees in going after the departmental prizes in ELECTRIC RAILWAY JOURNAL Maintenance Contest, so as to qualify for the company trophy and departmental certificates of merit to be awarded at the annual convention in Atlantic City, were apparent at the last meeting of the committee of judges held recently in New York to decide the winners of the second group of departmental prizes. Of the four prizes given for the best items submitted from each department—equipment, track, overhead and bus—three were won by Cleveland men.

The prize for the way and structures department was won by Joseph Croyle, Cleveland Railway, for his "One-Man Tie Nipper" idea published in the April issue of ELECTRIC RAILWAY JOURNAL. Angus G. Scott of the Cleveland Railway received the prize in the electrical and line department for his "Pole Brushing Device" published elsewhere in this issue. The "Hinged Pit Cover" suggestion submitted by L. Rose, also of the Cleveland Railway, was awarded the prize in the bus and garage department. It also appears in this issue. In the department of rolling stock and shops the prize was awarded to Arthur E. Clegg, San Diego Electric Railway, for his "Method of Adjusting Brush Pressure" published in the April, 1929, issue of ELECTRIC RAILWAY JOURNAL.

This is the first time in the history of the maintenance contest that more than one prize in any given period has been won by the men of a single company. Another interesting fact in connection with the prize winners during this particular period is that the equipment department prize, which is the only one not won by Cleveland, went to San Diego—the winner of the bus department prize during the first contest period.

Of the total number of forty-three items which were judged for this second period of the contest, the Cleveland Railway submitted a far larger number of entries in each of the three departments in which its men won prizes, than any other single company represented during this period of the contest. Obviously, Cleveland has made up its mind to capture the capital prizes to be awarded at the annual convention, which fall into three classifications; viz., an individual capital prize of $100 for the best single item submitted during the year, a company trophy and special departmental certificates of merit.

As outlined in the announcement of the maintenance contest which was published in full in the Oct. 20, 1928, issue of ELECTRIC RAILWAY JOURNAL, the company trophy will be awarded at the annual convention to the company making the greatest contribution to the improvement of maintenance practice in the industry through participation in this contest. In determining the winners, the judges will consider the total number of items submitted by employees or officials of a given company; the extent to which each of the four maintenance divisions are represented in the items submitted; the number of individual departmental prizes won; the relative merit of all material submitted; the extent to which the ideas presented are applicable to other properties; and the value to the industry of the maintenance ideas made available through participation of employees or officials in this contest.

The contest has now entered its

JULY 15 is the closing date for submission of entries for the final group of departmental prizes in ELECTRIC RAILWAY JOURNAL'S Maintenance Contest. Be sure to mail your maintenance article as soon as possible to ELECTRIC RAILWAY JOURNAL. Full details of the contest may be obtained by consulting the Oct. 20, 1928, issue of ELECTRIC RAILWAY JOURNAL. If this is not available, a folder giving this information, together with suggestions regarding the preparation of items for the contest, will be mailed you immediately upon request.

Attention is called to the fact that the closing date for all entries in the contest, including items to be judged for the individual cash capital prize, company trophy and departmental certificates of merit, has been changed from *August 17, 1929, to July 15, 1929.* All entries up to July 15, 1929, will be eligible for these annual awards, as well as for the remaining group of departmental cash prizes. Don't delay sending in your ideas. They may help your department and company to win one or more of the several annual awards that are to be made at the coming convention of the American Electric Railway Association at Atlantic City, N. J.

Standing of Companies and Departments in Maintenance Contest at Close of Second Period April 15, 1929.

Company	Department	Prizes	Winners
Cleveland Ry....	Track.....	2	F. E. Davidson Joseph Croyle
	Line.....	1	Angus Scott
	Bus.....	1	L. Rose
	Total....	4	
San Diego Electric Ry.....	Bus.....	1	Charles Herms
	Equipment	1	Arthur C. Clegg
	Total....	2	
Toronto Transportation Commission.....	Line.....	1	L. H. McAdam
New York Central R.R. (electrified section).....	Equipment	1	Harvey L. Bullock*

*Mr. Bullock is now electrical equipment superintendent of the Cleveland Union Terminal, Cleveland, Ohio.

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...ancest Prizes *in Three of Four Departments*

Joseph Croyle

(In Oval)
Leonard S. Rose

Angus G. Scott

Arthur E. Clegg

Department Prize Winners for Second Period of Maintenance Contest

final stage and closes for the year on July 15, 1929. Winners of the four departmental prizes of $25 each, during this final period, will probably have a strong bearing in determining the annual prize winners. It is not too late for organized participation from other companies in order to give Cleveland a close race for final honors.

JOSEPH CROYLE

MR. CROYLE is not a newcomer in the electric railway field, having started in 1889 as a track foreman for the Johnson Steel Rail Company. In 1890 he was appointed an inspector, taking charge of the construction of the street railway on Madison Avenue in New York City. Subsequently he was made "Flying Trouble Man" for the same concern in charge of various jobs in Washington, D. C., where track was to be rebuilt on North Capitol Street. From Washington he was sent as superintendent to numerous jobs in Pennsylvania and New Jersey, among them being the construction of 7 miles of track in Carbondale, Pa., in 1892.

In 1896 we find Mr. Croyle again in New York where for five years he was in charge of reconstruction work of the Metropolitan and Third Avenue Railways, and for three years he was in charge of the placing of structural steel for the erectors of the subway. In 1906 Mr. Croyle went to Memphis, Tenn., as superintendent of construction in charge of special track work for Ford, Bacon & Davis, and the following year he moved to Gary, Ind. In 1908 and 1909 he went to Little Rock, Ark., for the same firm, in charge of reconstruction. Next he was sent to Shreveport, La., to rebuild the street railway system there. From 1919 to 1922 Joseph Croyle was employed by the National Tube Company in Ohio, and in the latter year became connected with the Cleveland Railway as track foreman, which position he holds today.

Mr. Croyle may well be considered a pioneer in track construction work, having seen the continual growth and expansion in this field since the start of electric railway operation in this country.

LEONARD ROSE

SINCE 1925 Leonard Rose has been with the Cleveland Railway as assistant superintendent of the motor coach department, in charge of maintenance. The experience which Mr. Rose had obtained previous to his connection with the Cleveland Railway provided a background to qualify him for his appointment as assistant superintendent there. He spent two years as service manager in the New York State district for the White Company, and came into this position after seven years of work with the Packard Motor Company of New York, of which five were spent as technical service manager. The electric railway field was not new to him, as he worked a considerable period in the Morris Park shop of the Long Island Railway, where he was in charge of maintenance of shop electrical equipment. Soon after his graduation from the Pratt Institute School of Science and Technology, he was employed by the Brooklyn Edison Company as inspector of substation construction.

ANGUS G. SCOTT

DURING 1924 Angus G. Scott joined the forces of the Cleveland Railway and, after having spent some time in the various departments he was appointed assistant superintendent of overhead lines, in which capacity he is engaged at the present time. He was awarded the prize in the electrical and line department for his article "Pole Brushing Device," which is an example of his aptitude for the application of labor-saving methods

Previous to his employment with the Cleveland Railway he was affiliated with the Drew Electric & Manufacturing Company, being assigned, in 1922, to the sales department of railway supplies following his graduation from the Case School of Applied Science and Engineering.

ARTHUR E. CLEGG

A FORMER prize winner in the Maintenance Contest, Mr. Clegg is again a winner in the equipment department with a simple and accurate method of measuring brush pressure, the article on which was published in the April issue of ELECTRIC RAILWAY JOURNAL. Mr. Clegg is foreman in the electrical department of the San Diego Electric Railway, San Diego, Cal., where for more than four years he has been in charge of maintenance of control and motors, as well as the ignition equipment of buses. Considerable of his experience was gained while he was engineer of equipment in the mechanical department of the Indiana Service Corporation at Fort Wayne. Previous to that time he served for seven years with the Westinghouse Electric & Manufacturing Company, where he attended the Westinghouse Technical Night School and spent part of his time in the testing department and later in the engineering department as engineer on direct-current railway motor and control.

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Handy Devices Used in Electric Maint

How ingenious applications of up-to-date tools and methods are giving improved results at lower cost in various kinds of electric railway maintenance work

Pole Brushing Device Operated by Truck Engine*

By Angus G. Scott
Assistant Superintendent of Overhead Lines
Cleveland Railway, Cleveland, Ohio

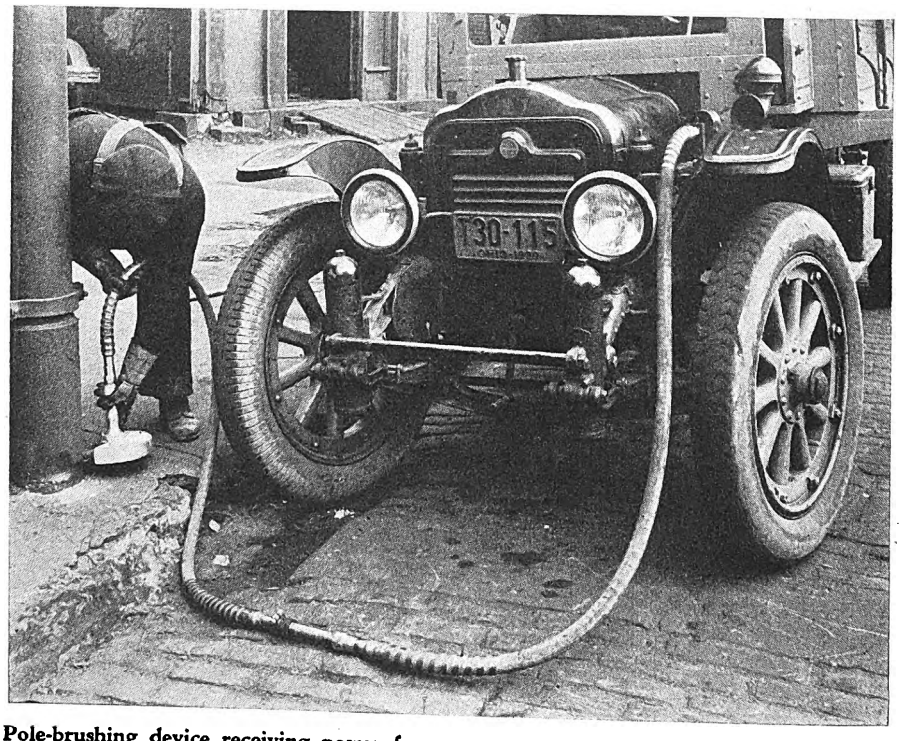
Winner of electrical and line department prize in second group of entries in Maintenance Contest.

BRUSHING apparatus operated by a motor truck engine is used by the Cleveland Railway to remove corrosion from poles in service, as well as those which have been in service and are being reconditioned in the storage yard for future use. The previous method of hand cleaning, using a stiff wire brush, was inefficient and it was practically impossible, even under ideal conditions, to remove all of the corrosion before paint was applied. The use of this new equipment results in a great saving of labor and in obtaining a thoroughly cleaned pole, thus permitting the proper adhesion of paint to metal and preventing electrolytic action which surely occurs beneath a surface covering of paint.

The brushing device consists of two 7-ft. sections of "Strand" flexible shafting operated by a special adapter which connects the shaft to the drive. The adapter is connected by a chain to a gear attached to the truck generator. A speed of 1,200 r.p.m. is given. Attached to the shaft is a stiff, circular wire brush of 10 in. diameter. Another section of shafting, if necessary, can be safely added to enable the crew to reach the upper sections of the pole. The special adapter was made and installed at a cost of $30 and the shafting is sold by practically any supply concern.

Other devices, such as drills and grinders, may also be operated from the flexible shafting, making it a very handy tool.

With this device a man can clean a pole butt and all corrosion from the sections and places where attachments had been in one-quarter of the time it took by the hand method. The most severe corrosion, of course, occurs at the ground line and this can be cleaned out handily with the brushing wheel. After a coat of rust preventative is applied the pole butt is good for years of service, the need for sleeving it in a few years thus being avoided. The saving afforded by this device is measured in the added life of the poles, the longer life of paint applied and the labor saving in brushing the pole.



Pole-brushing device receiving power from a motor truck engine is used by the line division of the Cleveland Railway

Mandrel for Turning Bus Brake Drums*

By Charles Herms
General Foreman
San Diego Electric Railway
San Diego, Cal.

BRAKE drums often become grooved to such an extent that the brakes will not perform properly. When solid cast-steel drums are worn $\frac{1}{4}$ in. over standard size it is the practice of the San Diego Electric Railway, San Diego, Cal., to build them up by means of the electric arc and then to standard size. A $\frac{3}{16}$-in. nickel-steel welding rod is used and care is taken by the welder to complete the job in one operation. This avoids excessive contraction stresses and eliminates hard spots which occur every time a bead is started on cold metal. The practice in our shops is to start the first bead very low on

**Submitted in* Electric Railway Journal *Prize Contest.*

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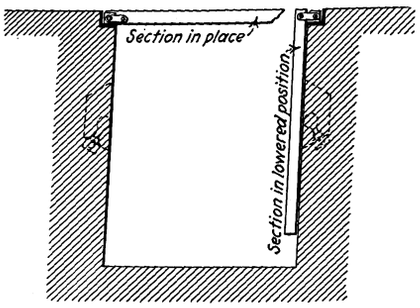
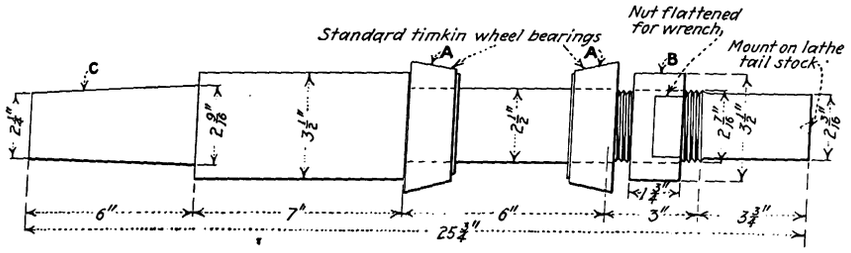
in Railway and Bus MENANCE WORK



Hinged pit covers—a recent improvement in the garages of the Cleveland Railway



Mandrel used for turning bus brake drums

the outside edge of the drum where a smooth finish is not essential. For turning we have found that Blue Chip Rex triple "A" tool steel makes an excellent turning tool.

Our first attempts at turning brake drums was not very satisfactory. We mounted the drums on the wheel spiders and chucked the spider in a lathe. We found it difficult to turn the drum true with the wheel bearings, consequently we developed a self-centering mandrel which centers the drum automatically to the wheel bearings. On our equipment standard Timken wheel bearings are used as guide cones which fit the bearing cups in the spider. The cones are held rigidly in place by means of the nut indicated as *B* on the accompanying sketch. The taper *C* fits into the lathe center. The mandrel revolves with the drum and there is no strain on the mandrel other than that of holding the drum true with the wheel bearings while the lathe chuck jaws are screwed down on the wheel spider. The drum is thus driven by the spider, and the mandrel merely revolves with the drum. This method gives absolutely true turning, and the time required for the operation is very short. The same mandrel may be used on various sizes and styles of drums by making special steel cones instead of using the Timken cones.

We find that we can build up and turn a drum at a cost of 40 per cent less than the price of a new drum. Some drums have been built up repeatedly and it has proved entirely successful. It is advisable to make the final finish on the drum with an internal grinder mounted on the lathe tool post carriage to remove tool marks and give a smooth surface.

Hinged Pit Covers

By L. Rose
Assistant Superintendent Cleveland Railway
Cleveland, Ohio

Winner of bus and garage department prize in second group of entries in Maintenance Contest.

IN DESIGNING a pit for a new garage of the Cleveland Railway the problem arose of obtaining suitable covers for an inspection pit 96 ft. long. The ideal pit cover is one which is light, strong and accessible at all times, without being in the way. Curbs were not desired because of the length of the pit and because it is necessary occasionally to break the line of progress of the coaches and remove a coach before it reaches the end of the pit.

To meet the needs of this situation a toggle linkage was designed, as indicated on the accompanying illustration. By using this linkage and hanging three 1-ft. sections of pit cover on alternate sides of the pit, opposite the light recesses, a pit covering was obtained which meets all the requirements. In this installation the covers were of a conventional type of subway grating. The toggle linkage was supplied by the manufacturer of the grating, and the supporting angle brackets were arc-welded onto the curb angles forming the top of the pit. The grating was properly drilled at the factory so that the assembly was simplicity itself.

The hinged or toggle end is lifted up and back until the "drop" end clears the curb angle. The cover is then lowered until it hangs in place on the toggles, as shown. By properly proportioning the linkage and locating the screws, the covers will hang close to the wall and flush with the floor.

While the initial cost of this installation is somewhat more than that of a conventional type the advantages outweigh the cost when appearance, convenience and the savings of time and labor are considered.

TWO of the four prize winners in the second group of departmental awards in Electric Railway Journal's Maintenance Contest are printed on these pages. Look up the winning items for the rolling stock and the track departments which were published in the April, 1929, issue. These were "Method of Adjusting Brush Pressure" on page 544 and "One Man Tie Nipper" on page 550. They are widely applicable to railway maintenance and are well worth adopting and using.

Pneumatic Jig for Truck Assembly*

By Charles Devers
Supervisor of Methods
Pittsburgh Railways, Pittsburgh, Pa.

LINE production methods are used for all work on truck maintenance in the Homewood shops of the Pittsburgh Railways. When this plan was first introduced it was a radical departure from any established precedent, and naturally there arose quite a number of serious problems. One of those which had to be solved concerned the work necessary for final truck assembly. After much study a pneumatic jig was con-

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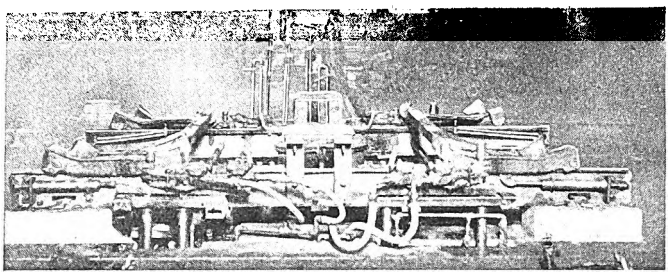
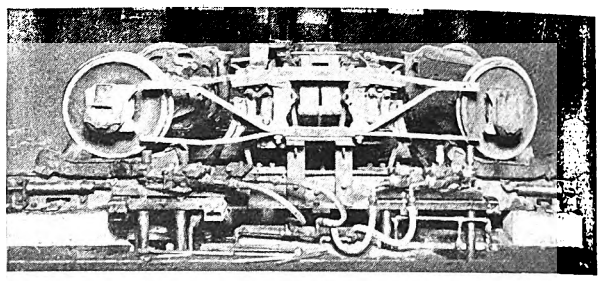
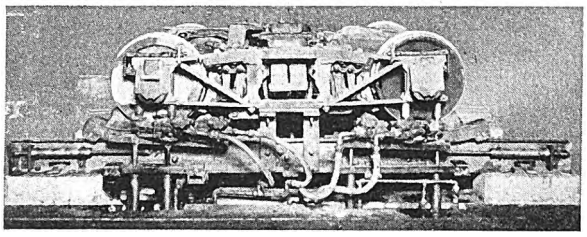


Truck assembly jig before any parts have been placed in position



Truck, frame resting on center supports. The bolsters and springs are in position while the wheels and motors rest on the carriages at the end of the truck frame



Here the wheels and motors are in position and the pneumatic wrenches are tightening the journal box bolts

structed which performs most of the assembling operations and so lightens the work that two men can do the entire job.

In this work the truck frame is the first unit put upon the jig. The frame is held in alignment by two small pieces of channel iron, one on each side at the center. The next operation is the placing of the wheels and motors in position. Four pneumatically operated carriages receive the wheels and move them and the motors into their proper position. Bolster springs and bolsters are then placed in position. The springs are compressed by use of two 12-in. air cylinders, which are fastened underneath the jig. After the springs have been compressed the bolster tie straps are tightened up. Eight pneumatic wrenches are permanently installed underneath the journal box bolts. These wrenches are raised into position by air cylinders and tighten the eight journal box bolts simultaneously.

Through the use of this jig two men carry out the entire work of truck assembly. They install wheels, motors, bolsters and springs to eighteen trucks, each working day of eight hours. The installation of this jig in the shop has effected a considerable saving in both time and labor.

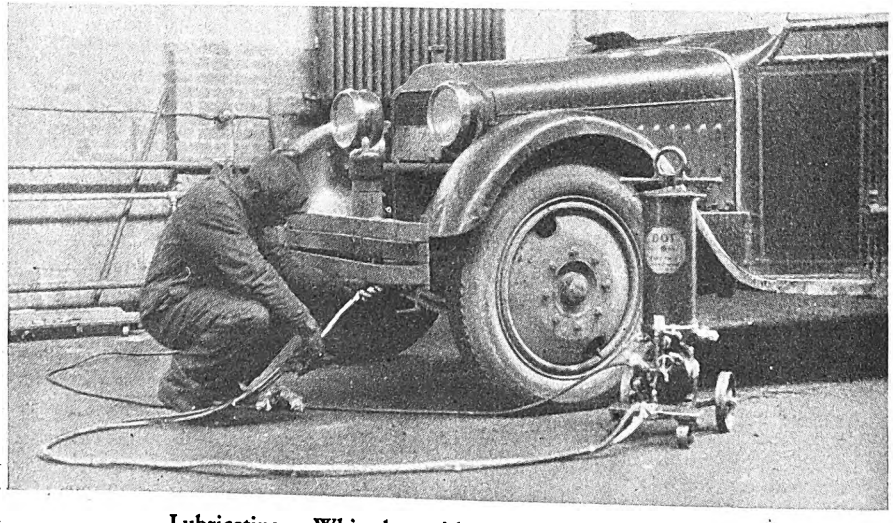
Costs Cut by Use of High Pressure Grease System*

By C. B. Hall

Chief Clerk Mechanical Department Virginia Electric & Power Company, Norfolk, Va.

With the addition of two "Dot" electrical lubricators to the equipment of the bus department of the Virginia Electric & Power Company, a saving in time and labor of 50 per cent has resulted. Operation of the new high pressure system is managed by one man in approximately one-half the time required previously when a hand operated two-man gun was used. The new equipment cost $195 and is arranged for 110-volt, 60-cycle a.c. operation.

**Submitted in* Electric Railway Journal *Prize Contest.*



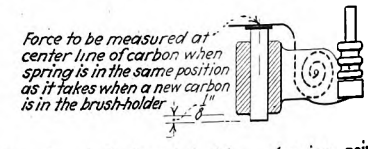
Lubricating a White bus with new electrical lubricator

Brush Tension for Railway Motor Brush-Holders

By R. N. Cresswell

Engineering Department Westinghouse Electric & Manufacturing Company Homewood Works

More care is being used today to apply the proper tension to carbon brushes than was exercised several years ago. This has resulted in the use of higher tension, since better results are obtained. It is not possible to get good results by applying the same tension on brushes that is used under different operating conditions. For this reason any tension that may be recommended might not prove satisfactory for all cases. However, a tension of 6 to 8 lb. per finger has proved satisfactory on brush-holders that use more than one finger. On brush-holders that only have one finger per holder, a tension of 10 to 12 lb. per finger should be used. In some exceptional cases it may be necessary to increase these tensions 50 per cent. It is best that the tensions be applied to the brush-holders when they are in the shop. In this way a more uniform tension may be applied as it is easier to get a more accurate measurement. The tension should be taken from a point at the center of the contact surface on the finger. This should be done when the contact surface of the finger is in a horizontal position, or the position it should be in when used on a new carbon.



Brush and brush-holder, showing point where force of fingers should be measured

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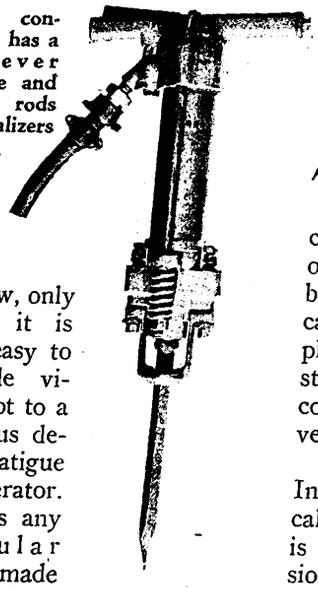
USEFUL EQUIPMENT from the Manufacturer

Light-Weight Concrete Breaker

THE Sullivan Machinery Company has recently put on the market a new concrete breaker known as the "K-2 Buster." Its weight is comparatively low, only 76 lb., yet it is strong and easy to handle, while vibration is kept to a minimum, thus decreasing the fatigue of the operator. The K-2 uses any of the regular forms of tools made of hexagon steel, with plain hexagonal shanks. It requires ¾-in. air hose, is entirely newly designed and has a cylinder turned and bored from a solid bar of alloy steel with a simple, free-floating piston of tool steel. The drop forge handle incloses the valve mechanism while the valve is of the hollow shell, cylindrical model, inclosed in a valve box with cover.



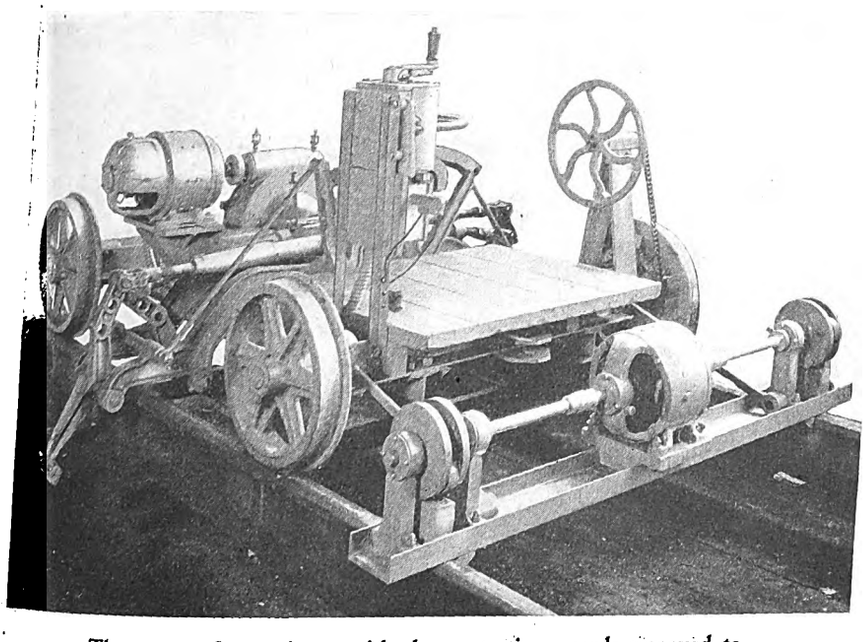
The "K-2" concrete breaker has a push-type lever throttle valve and U-type side rods acting as equalizers

Mortar Flow Pulsator

THE mortar flow principle in track construction is that after the concreting of the modern steel tie type of track structure, the whole should be so moved in the wet concrete as to cause a flow of the mortar and complete contact and bond wherever the steel of the track structure touches concrete. This movement must be very slight, but rapid.

A device recently developed by the International Steel Tie Company is called the Mortar Flow Pulsator and is furnished attached to the compression tamping machine as shown in the illustration. It is driven by a 2-hp. 550-volt motor and is controlled and operated on the job by the operator of the compression tamping machine.

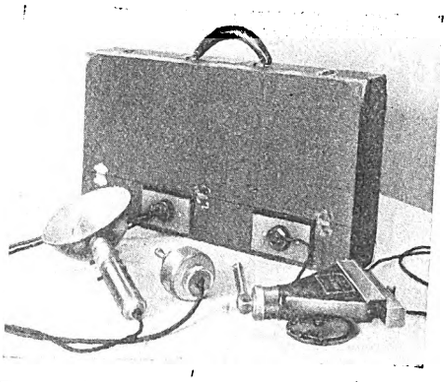
The device imparts 4,800 impulses per minute to the whole track structure following the compression tamping operation and practically unites all the steel with concrete. Rows of air bubbles can be observed coming up along the rail, indicating the displacement of small air pockets as the mortar comes into close contact and bond with the steel.



The mortar flow pulsator with the protective guards removed to show the details

Portable Dynamic Balancing Equipment

BY MEANS of the stroboscopic principle, apparatus known as the Davey Dynamic Balancing Equipment, which weighs only 20 lb., can be used for determining separately the static and dynamic unbalance existing in machines ranging in size from turbines down to fractional-horsepower motors and correcting both types of unbalance in turn. The apparatus is being manufactured by the Electrocon Corporation, New York, N. Y. In an accompanying illustration are shown the three parts: the hand lamp, which contains a special neon tube, is at the left, the phase adjuster is in the center, and the Davey "Vibrometer" is at the right. The equipment can be used where it is advisable to balance a rotor running under its own power, where it is advisable to balance at a speed higher than that of the available balancing machine, or where a rotor has become unbalanced in service, but it is inadvisable to dismantle the machine. It is also



Davey dynamic balancing equipment removed from the case. From left to right the parts are: hand neon lamp, phase adjuster, and "Vibrometer"

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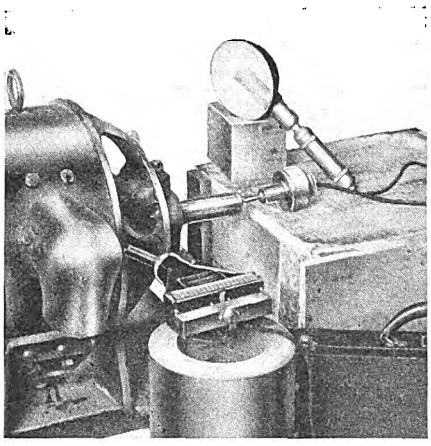


Davey dynamic balancing equipment set up on a motor to determine the static and dynamic unbalance

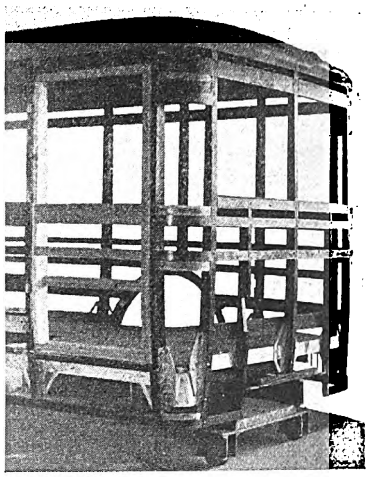
applicable to production balancing before assembly.

In another illustration is shown a set-up for testing the unbalance of an electric motor and determining the position and amount of the resulting vibration. When the rotor is illuminated by light flashes from the neon hand lamp it appears stationary, no matter what its speed. The phase-adjuster head is attached to the shaft or driven by the shaft the same as a tachometer. The phase adjuster in the head regulates the light flashes so that rotor will appear stationary at any desired point. The Vibrometer arm is placed in contact with the machine frame at any point, and indicates not only the amount of vibration, but also the position of the frame in its path of vibration with respect to the rotor in the latter's revolution.

The vibrations of the machine, transmitted through the arm of the Vibrometer, cause a small mirror within the instrument to oscillate. Light from an incandescent lamp is thrown on the mirror, and is then reflected on to a scale magnified several hundred times. The scale is graduated in thousandths. Red light from a neon lamp, which is also controlled by the head, is also thrown on the screen and impinges on the band of white light. As the phase adjuster is turned, the red band from the neon lamp will assume different positions along the band of light. When it is at the extreme right, it indicates that the motion of the machine is towards the Vibrometer. Thus it is possible to determine the exact position of the machine in its path of vibration, and to establish the connection between this and the position of the rotor, it is only necessary to light the hand lamp. Thus the high spot can be determined accurately.

New Body Designed for Mack Buses

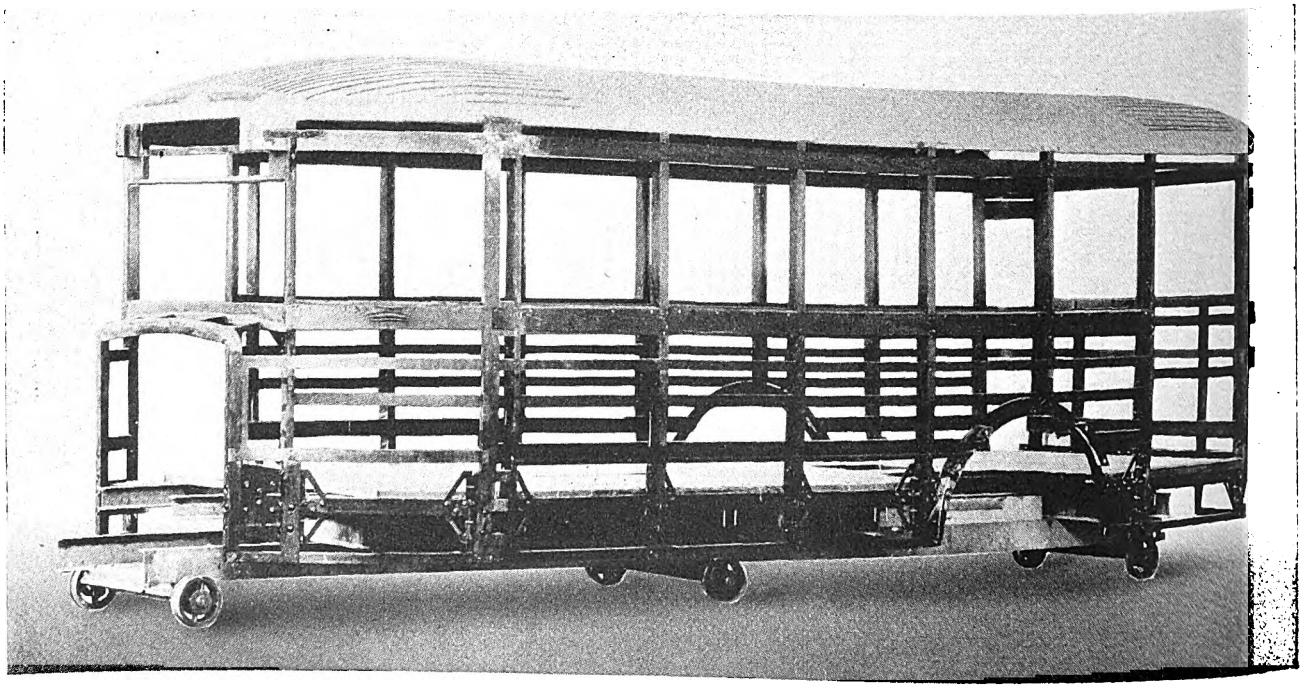
AMONG the characteristics of a new bus body recently developed by Mack is the integral skirt of unit parts construction, the units of which are replaceable from stock in all Mack factory branches. The rub rail has been eliminated and the doors are equipped with concealed door hinges and smooth panels, while improved destination signs and new types of ventilators are incorporated on the new bodies. Spare tires are



All joints are mortised and tenoned, screwed, glued and reinforced by pressed-steel angle plates and braces

carried beneath the chassis instead of the rear, allowing for greater overhang without increasing over-all dimensions. The cowl has been considerably shortened and the steering column is placed outside the frame and well forward, thus placing the driver in the left forecorner of the body, consequently making more room available for the use of standing passengers.

The ceiling of the new body is smooth, while the aisle space is kept large to promote convenience for standees during rush hours. The bodies are built to accommodate from 29 to 37 passengers and the width is 96 in., thus insuring the maximum comfort to passengers. To increase smooth riding rubber shock insulators are used extensively at all points of spring suspension.



New Mack body is built up on steel structural sills; posts are secured by through bolts to malleable-iron gussets not riveted to sills

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NEWS *of the Industry*

Utilities Render Aid in Cleveland Disaster

Cleveland utility companies gave a marvelous demonstration of speed and efficiency in a great emergency when explosion and fire, shortly before noon of May 15, transformed the model Cleveland Clinic into a death chamber for some 125 doctors, nurses and patients who were struck down by deadly poisonous fumes.

A line crew of the Cleveland Railway, in the vicinity at the time, reached the scene simultaneously with the first fire department equipment while yellow fumes were still belching from shattered windows and skylights. Members of the line crew helped rescue some of the victims and attempted to revive others whose bodies were carried out by firemen. The offices of the railway, notified immediately, sent doctors and nurses to the scene, while bus crews were mobilized to provide emergency service on Euclid Avenue during a three-hour period in which the railway service was blocked. Linemen from the Ohio Bell Telephone Company established emergency telephone service on a post in the Clinic yard twenty minutes after the blast.

Traffic Study Suggested in Houston

The average speed of street cars in downtown Houston, Tex., is 3½ m.p.h., and that of automobiles a scant one-half mile better in heavy traffic, Carl Frazer, of the Houston Electric Company, informed members of a suburb improvement club.

Merchants of the Texas city insist that much patronage comes from automobiles parked near their stores. Pressure from them on the city administration has blocked efforts to abolish the 45-degree angle parking.

Mr. Frazer recommends a study of the factors responsible for traffic snarls. Speed of both street cars and automobiles through congested sections could be hiked 100 per cent with intelligent regulation, he believes.

The Texas city has traffic control lights which operate on a "ripple system," calculated to allow vehicles to proceed uninterrupted at 10 m.p.h. In actual practice, Mr. Frazer points out, the automobilist is forced to stop at each intersection. "The ripple system is really an obstacle to traffic," he declared.

Another New York City Fare Plea Disallowed

The New York Transit Commission on May 21 rejected as illegal the 7-cent fare tariff sheets filed on June 22, 1928, by the Drydock, East Broadway & Battery Railroad, one of the Third Avenue Railway Company's subsidiary surface car lines. Chairman William G. Fullen declared that the question of "reasonable return" raised by the company had no bearing because the 5-cent fare was "contractual in nature" due to the form of franchise grant made by the Legislature in 1860 and subsequent years.

Chairman Fullen questioned whether a higher fare would remedy conditions. The falling off in traffic, in his opinion, "is apparently due in large part to the slowing down of its operation as a result of the interference of increasing vehicular traffic in some of the narrower streets of lower Manhattan and to the existence and advent of competing lines with shorter running time and the same fare."

Counsel for the company said the case would be taken to the courts.

Midwest Men Meet June 13-15

The annual meeting of the Midwest Electric Railway Association will be held at the Chase Hotel, St. Louis, Missouri, June 13, 14 and 15.

The Midwest Claims Association will meet at the same time and place. On June 14 a joint meeting will be held.

Entertainment is in charge of Barney Frauenthal of the St. Louis Public Service Company, operating both railway and bus lines in St. Louis. Details of the program will be announced later.

Prosperity a Delicate Economic Balance

Committee on Recent Economic Changes Says the Country Must Skillfully Apply the Principle of Equilibrium in Every Economic Relation

WHILE America has a promising future, the outstanding fact illuminated by the survey made by President Hoover's Committee on Recent Economic Changes is that the country cannot maintain its economic advantage or hope fully to realize on its economic future unless it consciously accepts the principal of equilibrium and applies it skillfully in every economic relation.

The committee notes that while the period 1922-1929 has been one of intense activity, conditions have remained spotty, from industry to industry and from region to region. Despite this spottiness, however, almost the total people have been bettered in their situation by the increasing productivity.

Standard of Living Is Rising

While rayon manufacturers have worked at top speed, cotton mills have been on part time; while the silk hosiery industry, the women's shoe trade and the fur business have been active, there has been depression in the woolen and worsted industry; while dairying has been prosperous, grain brokers have been depressed. Coal mining has been in difficulties, and classes of wholesalers and retailers have been under grave economic pressure. Progress has been made toward more stable employment in seasonal industries, yet "technological" unemployment, resulting from displacement of workers by improved machinery and methods, has attracted attention.

Geographical differences also were noted. The Pacific States have made an extraordinary advance; the South has rapidly developed as a manufacturing area; the East North-Central division has grown; while the New England states and, to some extent, the Middle Atlantic section, have developed less rapidly and have experienced some difficulties in adapting their older industries to new conditions.

In spite of variability, of difference in activity as between groups and areas and industries, the rising standard of living characteristic of this period was widespread and has reached the highest level in the national history of these United States.

In speaking of saturation points of production, the report states:

"The survey has proved conclusively what has long been held theoretically to be true, that wants are almost insatiable; that one want satisfied makes way for another. The conclusion is that economically we have a boundless field before us; that there are new wants which will make way endlessly for newer wants, as fast as they are satisfied.

"We have the power to produce and the capital to bring about exchange between the producing and consuming groups. We have communication to speed and spread the influence of ideas. We have swift and dependable transportation. We have an educational system which is steadily raising standards and improving tastes. We have the sciences and arts to help us. We have a great national opportunity.

"We seem only to have touched the fringe of our potentialities."

As the committee sees it, to maintain the dynamic equilibrium of recent years is, indeed, a problem of leadership which more and more demands deliberate public attention and control. Research and study, the orderly classification of knowledge, joined to increasing skill, well may make complete control of the economic system a possibility. The problems are many and difficult, but the degree of progress in recent years inspires us with high hopes. The committee says:

"In the marked balance of consumption and production, for example, the control of the economic organism is increasingly evident. With the development of a stream of credit to facilitate business operations, and with flexible power to energize industry and to increase the effectiveness of the workers, has come an increasing evenness in the flow of production. Once an intermittent starting and stopping of production-consumption was characteristic of the economic situation. It was jerky and unpredictable, and overproduction was followed by a pause for consumption to catch up. For the seven years under survey, a more marked balance of production-consumption is evident.

"To maintain this balance, and to extend it into fields not now in balance with the

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more prosperous elements of the nation, is clearly an important problem of leadership. With certain natural resources still wastefully exploited, with great industries such as agriculture and coal mining still below the general level of prosperity, with certain regions retarded, there remains much to do. To bring these more fully into the stream of successful forces is a problem of the first order.

"Our complex and intricate economic machine can produce, but to keep it producing continuously it must be maintained in balance. During the past few years equilibrium has been fairly well maintained. We have not wasted the hours of labor by strikes or lockouts. Until recently we have not diverted savings from productive business to speculation. There has been balance between the economic forces—not perfect balance, but a degree of balance which has enabled the intricate machine to produce and to serve our people."

Cleveland Men Restive

The Cleveland Railway, Cleveland, Ohio, has declined to sign a contract with Division 268 of the Amalgamated. At a special meeting of the union on May 17 a motion was offered to walk out at midnight on May 19 if no agreement had been signed by that time. This motion was hotly debated, and a substitute motion finally was adopted instructing officers of the union to make one more effort to obtain a contract. If this fails another special meeting will be called, probably for the purpose of authorizing a strike vote.

Union officials say they do not want a closed shop contract, which was outlawed by the Supreme Court in the 1924 controversy, but will be satisfied with an open shop contract. The agitation for a contract is especially acute this year because of the probable acquisition of control over the company by Van Sweringen interests. The men state that they want assurance that they will be protected in their wages and work in the event of a change in control. They are also concerned about the substitution of buses for street cars on some lines.

Action Expected on Chicago Unification Bills

Action is expected on a number of utility bills before the Illinois General Assembly at Springfield adjourns sine die, probably early in June.

The bill is still in committee which requires a public utility that makes use of streets or alleys to obtain a franchise or license from the city in addition to a certificate of public convenience and necessity from the State Commerce Commission.

The eight Chicago traction bills, which have passed the House, are in Senate committee on utilities. It is expected an effort will be made to amend the bills so the terminal permit will not apply to downstate. Such amendment was killed in the House committee and on the floor and it is believed it will be killed by the Senate, if offered.

On May 21, the Senate passed, without opposition, a bill which removes from the Public Utility Act the provisions for appointment, term of office and salary of the secretary of the Illinois Commerce Commission and leaves such provisions under the Administrative code.

According to a House bill on third reading in that branch, the Illinois Commerce Commission shall not authorize any public utility to acquire land by eminent domain until the persons having an interest in the land are notified of the hearing. Committee on public utility and transportation had previously recommended that it do not pass.

Dr. McClintock to Survey Kansas City Traffic

A traffic survey of Kansas City, Mo., is being arranged to start June 15, under the direction of Dr. Miller McClintock.

The idea originated with the Chamber of Commerce and a committee known as the city wide traffic committee was named representing the chamber, the city, the Kansas City Public Service Company and other public utilities, and various associations of merchants and business men.

Theodore M. Matson will be chief engineer of the project, and the resident representative of Dr. McClintock.

Until now the regulation of traffic in Kansas City and legislation concerning it have been a hit-and-miss matter.

Parking Ban Successful in St. Louis

The ninety-day trial period of the no-parking rule for Washington Avenue, Olive and Locust Streets, St. Louis, Mo., proved so helpful to the movement of street cars, buses and other vehicular traffic through the downtown section, Director of Streets and Sewers Brooks has presented to the Board of Aldermen a bill to make the regulation permanent. The trial ordinance was passed last February and the ninety-day period expired on May 16. Director Brooks has also started a movement to eliminate all parking in alleys in the congested districts of the city.

Excellent Business and Social Program for C.E.R.A.

Two morning business sessions will be held at the summer meeting of the Central Electric Railway Association, at the Golfmore Hotel, Grand Beach, Mich., June 27 and 28. The program for these sessions follows:

"City Fares and Municipal Growth," by Walter Jackson, fare consultant, Mount Vernon, N. Y.

"Type of Bus Best Suited for City Transportation," by Del A. Smith, general manager of the Department of Street Railways, Detroit, Mich.

"Bus Policies of an Electric Railway Company," by Thomas Fitzgerald, vice-president of the Pittsburgh Railways, Pittsburgh, Pa.

"Effect of Flat Rate Taxicab Operation on the Revenue of Street Railways and Metered Cab Operations," by H. A. Innes-Brown, editor *Taxi Weekly*.

"Improved Interurban Operation," by J. R. Blackhall, general manager of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

Report of "Promotion of More Profitable Business Committee," by D. R. Thomas, president Electric Railways Freight Company, followed by prepared discussions on freight and passenger service.

Elaborate arrangements have been made for entertainment, including golf, tennis, bathing, bridge and a sight-seeing tour of Chicago for the ladies. An informal dinner dance will be held Thursday evening for members and guests of the association.

COMING MEETINGS

June 3-6—National Association of Purchasing Agents, annual convention, Hotel Statler, Buffalo, N. Y.

June 5-7—Canadian Electric Railway Association, annual convention, Montreal, Quebec.

June 13-15—Midwest Electric Railway Association, Hotel Chase, St. Louis, Mo.

June 21-22—New York Electric Railway Association, Bluff Point, N. Y.

June 27-28—Central Electric Railway Association, Michigan City, Ind.

July 1-2—National Motor Bus Division, American Automobile Association, annual meeting, Hotel Lafayette, Buffalo, N. Y.

July 24-26—Electric Railway Association of Equipment Men, Southern Properties, Lafayette Hotel, Lexington, Ky.

July 26-27—Central Electric Railway Accountants' Association, Angola, Ind.

Aug. 15-16—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.

Aug. 27—National Association of Railroad and Utilities Commissioners, Glacier National Park, Mont.

***Sept. 28 - Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium.**

Terminal Opening at Cleveland May Be Delayed

The opening of the Cleveland Union Terminal, scheduled for Jan. 1, 1930, probably will be delayed several months as a result of an injunction issued in Cleveland by Federal Judge Paul Jones restraining the Cleveland Union Terminals Company from entering upon the property of the Wheeling & Lake Erie unless or until the Interstate Commerce Commission authorizes the Wheeling to enter the terminal.

The injunction grew out of a fight between the Taplin interests of Cleveland and the Van Sweringens for control of the Wheeling. The Wheeling directors have voted to accept a contract offered by the Van Sweringen interests to enter the terminal for a rental of $20,000 annually and to sell the Wheeling propery, claimed to be worth $6,000,000 for $1,600,000.

Since the Wheeling property lies at a strategic point at the east approach to the terminal, the entrance to the terminal will be blocked unless the Van Sweringen interests can acquire it. As a consequence of the injunction a considerable part of the work on the terminal development is at a standstill, and the date for completion of rapid transit lines, effecting the future of the Cleveland Railway, is uncertain.

City Manager Hopkins of Cleveland appeared as a volunteer witness before the commission to urge that the Van Sweringen projects be completed as soon as possible to prevent injury to business.

New Magazine for Stark Electric

"King Accident," an article showing how safety pays employees of the Stark Electric Railroad, Alliance, Ohio, appears in the first issue of "Trip Topics," a magazine, published by the Suburban Light & Power Company covering its various utilities. The author is O. K. Ayers, vice-president of the Stark Electric. "Trip Topics," the name of the new magazine, is an anagram derived from the first letter of each class of utility owned by the Suburban—telephone, railroad, ice and power.

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Commission Measure Fails in Texas

In the final vote of the Senate Committee on State Affairs a bill creating a public utilities commission for the State of Texas was reported adversely by a majority of the committee. The House also has acted unfavorably on the bill. Governor Moody submitted the subject at the recent regular session and at the present special session. Another special session will be called in June, primarily to pass appropriation bills and it is reported that Governor Moody will again urge the public utility measure.

Special Service for Women Workers on Night Shift

The Community Traction Company, Toledo, Ohio, has come to the aid of some of the important manufacturing concerns by furnishing them special service. Recently an arrangement was made with the Electric Auto-Lite Company to take women workers going off duty at 3 a.m. to their homes by special coach service. This was the only method by which the plant could secure sufficient help for that shift. Special school lines, some serving railroad yards in outlying districts, and owl service are now being provided by motor coach.

Founding of Gary System Celebrated

The twenty-first anniversary of the birthday of the Gary Railway, Gary, Ind., was celebrated recently with a gala "Parade of Progress" and by a banquet of "old time" trainmen and officials. A street car parade of seven cars, represented the various stages of the company's development, was headed by the city's first electric car, old "101." At that time there were only about 3 miles of track, whereas today the company operates more than 76 miles of track. The novel procession traveled over the entire city system, making two round trips each day. An "Old Timers" banquet was held on May 20, at the Hotel Gary, many veterans of the system telling of experiences in the early days. Gary has a population of 115,000 today. The city was two years old when railway service was started.

"Ad" Copy Contest Won by Jacksonville Company

First award in an advertising contest during 1928 among Stone & Webster, Inc., railways and bus companies has been made to the Jacksonville Traction Company. The award was made on a point basis, compiled from monthly reports by the competing companies. At the end of the year, which closed March 31, totals showed that the Jacksonville Company had 970 points, a three-point margin ahead of the Northern Texas Traction Company at Fort Worth, Tex. Thirteen other companies competed.

Each month's report was graded on a basis of a possible 100 points. Of these 45 were for excellence of copy; 40 for layout and art work, and 15 for typography. During the entire twelve months the Jacksonville Company figured among the first three companies each month.

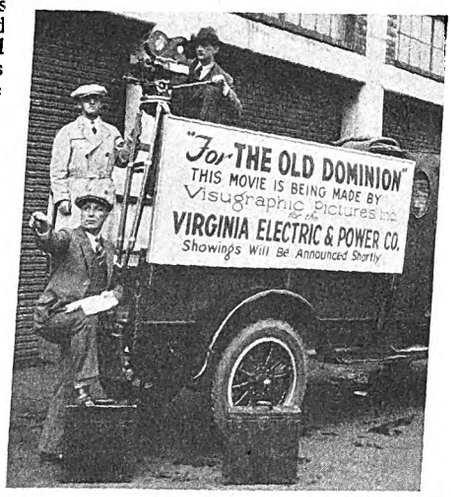
With 970 points out of a possible of 1,200 for the year, the work of Herbert Bayer, advertising manager of the Jacksonville Traction Company, was far ahead of all other competitors with the exception of the Northern Texas Traction Company. The Savannah Electric & Power Company was third with 783 points.

A distinctive feature of Mr. Bayer's work was the tie-up with stores and theatres, by which reciprocal store and railway advertising stunts were executed.

Historic Virginia on the Screen

Scheduled for production on the screen June 1, the Virginia Electric & Power Company is now producing a commercial and historical film, "For the Old Dominion," to be shown in every moving picture theatre in the territory served by the company.

The "shots" are being made by the Visugraphic Pictures, Inc. They will include the thriving seaport city of Norfolk, with its atmosphere of charm and modernism; Richmond, with its Capitol Square, the Washington Monument and classic building associated with the birth of the American nation and the Civil War period; Jamestown, where the first permanent English colony in America was founded; the territory in which the romantic story of Pocahontas and John Smith was enacted; Yorktown at which the closing scene of the Revolutionary War was staged; Williamsburg, the first capital of Virginia and seat of the second oldest college in the country and where today John D. Rockefeller, Jr., is expending millions to recreate the historic buildings of that quaint colonial city. In addition, many other historic points will be woven into the story of the awakening of Virginia.



Ready to shoot "For the Old Dominion"

The industrial aspects of the film will include scenes in tobacco factories of Richmond; its ice, paper and baking industries, and the rayon plant now in operation in the territory adjacent to the Richmond territory. Similar industries in Norfolk, Portsmouth, Suffolk and Petersburg will be filmed.

Film studies also will be made of the sources of great electrical energy owned by the company in Norfolk, Fredericksburg, Richmond and Roanoke Rapids.

Officials of the power company say the film is produced for no other purpose than to show the "come-back" staged in Virginia within the past few years. The historical scenes are expected to add greatly to the message of the picture.

The picture is being filmed under the direction of A. H. Herrmann, director of publicity for the company.

Fare Request in Louisville Rejected

The lower board of the General Council of Louisville, Ky., at a regular meeting on May 21 rejected a proposed bill introduced last February, and calling for a 10-cent cash fare by the Louisville Railway with the privilege of issuing tickets at a reduced rate.

After this bill had been killed the Council passed a substitute bill drawn by Mayor William B. Harrison which would continue the present 7-cent fare and value company property at $18,000,000, on which a rate of return of 6 per cent would be allowed. There was no opposition vote on either measure.

The Council also authorized the city to employ William Marshall Bullitt, prominent local attorney, to represent the city in handling any railway litigation, apparently deemed inevitable under the circumstances. No opposition was raised to this latter action, although it was reported that the Taxpayers League, had instructed one of its delegates to the meeting to protest against Mr. Bullitt's retention.

June 30 Filing Date for Coffin Briefs

June 30, not July 15, is the final date for the filing of briefs by entrants from the electric railway field in the Coffin Foundation prize award contest. The incorrect date was inadvertently given in the item in the JOURNAL for May 11 in which the announcement was made that Canadian companies were free to compete for the award.

Wage Negotiations at Providence—Members of the union at Providence, R. I., after hearing the terms of the contract submitted by Alonzo R. Williams, general manager of the United Electric Railways, as a substitute for the agreement under which the union men are now working, voted unanimously to reject the company proposals. They also instructed the union officers to open negotiations with the company for a continuation of the present contract with certain wage rate increases and other specified changes. The agreement expires on May 31.

Special Service for St. Louis—A morning and evening express railway service between Kirkwood, Mo., and downtown St. Louis, reducing the running time twelve minutes has been installed by the St. Louis Public Service Company. The run from Kirkwood to Fourth and Market Streets, St. Louis, is made in 63 minutes. Regular rates are charged, the entire trip requiring two fares or 16 cents. Both fares are collected as the passenger enters the car. Arriving at St. Louis, passengers are discharged at any city stop, while outbound passengers for Webster Groves or Kirkwood are picked up at any city stop.

School Fare to Continue Throughout Vacation Period—All school children under sixteen years of age will be able to go on using school tokens on the cars and buses of the Seattle Municipal Railway, Seattle, Wash., after school is out for the summer, paying their way to parks, playgrounds and bathing beaches with them, under an ordinance approved by Mayor Edwards. The ordinance was backed by George B. Avery, superintendent of utilities. It passed the Council without opposition.

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Right-of-Way Bought—The Oregon Electric Railway has purchased property near Lebanon, Ore., adjoining the Southern Pacific tracks which is to be followed by further purchases along the line of survey recently made for an electric logging road from Lebanon to Foster.

Labor Favors Fare Advance—Central Labor Council at Portland, Ore., has unanimously indorsed the petition of the Portland Electric Power Company now pending before the Public Service Commission for an increase from an 8 to a 10-cent fare.

Reading Awards First of Electrification Contracts — The first tangible step in the Reading Railroad's $20,000,000 electrification program at Philadelphia has been taken by the awarding of a contract for 4,000 tons of steel for catenary supporting structures and signal bridges to the Bethlehem Steel Company.

Terminable Permit Bill Passed — The Missouri Senate on May 15 passed the bill authorizing St. Louis to grant terminable permits to public utilities.

Electrification Predicted—The eventual electrification of the Oregon-Washington Railway & Navigation lines is predicted in a newspaper report from Lewiston, Idaho.

Wage Agreement in Davenport Renewed—The Tri-City Railway, Davenport, Iowa, has executed contracts with its trainmen, bus operators and shop employees for the year beginning May 31, 1929, continuing the present wage scales.

Louisville Railway Broadcasting — The Louisville Railway, Louisville, Ky., has gone on the air over WHAS, the station of the Louisville *Courier Journal* and Louisville *Times*. It is planned to have programs each Thursday, starting at 8:30 in the evening, Central Standard Time.

Lake Burien Plea Renewed—The city of Seattle, Wash., has asked the Department of Public Works to refuse to grant the application of the Suburban Transportation Company for an extension of its route to compete with the Lake Burien railway, now a part of the Seattle municipal system, or authorize the city to abandon this branch. On April 10 the department refused to grant a similar request to discontinue the Lake Burien line.

A City Planning Move—The City Planning Commission of Portland, Ore., has suggested that the Southern Pacific Railway vacate Fourth Street, along which its Red Electric trains now operate, and that they arrange to use the tracks of the Oregon Electric Railway. This is to clear Fourth Street for use as a main traffic thoroughfare even before action can be taken on the municipal belt line terminal under which all trains, both electric and steam, will be removed to the water front district.

Facilities Expanded—Rates Reduced—Noon express freight and a reduction of almost 10 per cent in livestock rates have been announced by the Indianapolis & Southeastern Railroad as a result of increased business between Indianapolis and Connersville and Greensburg. The railroad has been authorized by the Public Service Commission to give motor freight transportation service between Greensburg and Batesville, Ind., serving Napoleon, Osgood, Versailles and New Point.

Membership Drive Makes Record—Chicago Elevated Post No. 184, recent winner of the American Legion Certificate of Meritorious Service, continues to set a fast pace in the 1929 membership drive. The latest report shows that 693 veterans have been enrolled in "L" Post this year. This is almost a 300 per cent increase over the total number of veterans enrolled in 1928. This remarkable record was celebrated on the evening of May 7 with an "Open House Night."

Franchise Vote on June 18.—June 18 has been fixed as the day on which the proposed 30-year franchise for the Jacksonville Traction Company will go before the electors. The proposed new operating grant has been passed by the City Council and approved by the company. Substitution of buses for street car service on certain lines is proposed.

Foreign Notes

Bus Anniversary Celebration in London

For the first time in history, July 4 is to be celebrated in London, England, this year. That date will mark the hundreth anniversary of the London bus. George Shillibeer, a coach-builder and ex-midshipman of the Royal Navy, started the system with two horse buses which he operated between Paddington and the Bank of England. Because they reminded the public of hearses, these buses were shunned for some time. Finally Shillibeer employed as conductors two sons of British Naval officers, who had had bus experience in France, With the spread of this news, poke-bonnetted young ladies demurely decided to improve their French and proceeded to take regular bus rides for educational purposes, with perhaps a discreet flirtation on the side. Free newspapers and magazines were distributed to the riders, and the buses became so popular Shillibeer decided to extend the service. This necessitated the employment of paid conductors, but since no method was then known for checking up the number of passengers, Shillibeer finally retired bankrupt. Later he became an undertaker.

In the meantime two other rival buses were in operation, and in 1855, the Compagnie Generale des Omnibus de Londres, a French company, began operation with 27 buses. Again Londoners refused to ride the buses and protested the "foreign innovation" so strenuously that the police were forced to intervene. When the company agreed to buy all the old bus routes and employ the same English drivers and conductors the opposition ceased.

The present London omnibus system accommodates more than 6,000,000 passengers daily.

Subway Building Hurried in Buenos Aires

With 40,000 new people in 1928 added to its more than 2,000,000 population, Buenos Aires, Argentina, finds it necessary to hurry the extension of its underground transit facilities.

To that end, construction is now in full swing in excavating and building the east and west subway line, while contracts on north and south side line extensions have been awarded to one of the city's well-known corporations.

Present activity is centered on the section of work comprised between Federico Lacroze Station and Callao Street. As the excavation from this street is to a point near the river front or port section of Buenos Aires, the authorities are taking three months' time for consideration of the plans, which are expected to be approved within a few weeks.

The company holding the concession for the link from Retiro Station to Plaza Constitucion, which will cross the city in a north and south direction, has completed its drawings, which are in the hands of municipal authorities for approval.

The original unit of the underground transit system in Buenos Aires was constructed by the same corporation that holds the franchise for operating the electric surface cars.

The original line is that now in operation between Plaza de Mayo and Plaza Once de Septiembre. This route passes largely under the great business thoroughfare, Calle Mayo, whose overflowing streets are to some extent relieved as thousands descend to the subway.

Conspicuous sights that catch the stranger's eye in Buenos Aires subways are the color schemes adopted for stations; one of these may be yellow, another green, another blue, etc. Such colors, together with striking signs, greatly aid the stranger's trip.

Air Transport Powers Granted British Railways

Powers to add air transport to their existing facilities were granted the British main line railway companies in bills recently sanctioned by a joint committee of both Houses of Parliament. In every case where a railway applies for a license to establish an airdrome, the Air Council, a government department, must hold a local inquiry. Services to and from Ireland, the Hebrides, the Isle of Man, and the Channel Islands are contemplated, as well as services to and from the Continent of Europe.

Subway to Be Built in Osaka—Plans are under way to begin subway construction in Osaka, Japan, probably within the next few weeks. The first section of the subway will connect Mina-katamachi and Abiko, but the construction work will be started in four sections simultaneously, the most important being the work at the Osaka station of the Government Railway. The boring at this point will be to a depth of 55 ft. The tube will run underneath the Dojima-gawa, Oye-bashi and Yodoya-bashi Rivers at a depth of about 25 ft. below the river-beds.

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Recent Bus Developments

Long-Distance Lines Merge

Bus lines operating in all sections of the United States are to be included in a proposed consolidation intended to unify long distance motor transportaton operation so that a dependable service may be maintained in the nation-wide system of bus travel which has recently been developed. The three principal companies involved are the Greyhound Lines, the Yelloway System, and the Pickwick Stages. Merging with these companies are the bus lines of the Southern Pacific Motor Transport Company, owned by the Southern Pacific Railway. These systems stretch from the Atlantic to the Pacific Coast. They constitute the only system of passenger transportation of the kind which extends entirely across the United States.

Operations on the Pacific Coast will be under Pacific Transportation Securities, Inc., and cover Oregon and California, routes of the Yelloway, Pickwick Stages, Southern Pacific Motor Transport Company, Oregon Stages, and Pacific Stages. In addition there are the lines run by the Pickwick Stages from Los Angeles through Arizona and New Mexico to El Paso, and the line from San Francisco to Salt Lake City by way of Reno. Ownership will be vested equally among the Motor Transit Corporation, the Pickwick Corporation and the Southern Pacific Company.

Pickwick and Yelloway operation between Los Angeles and Chicago, Kansas City, Omaha, and St. Louis will be under the Pickwick-Greyhound Corporation with ownership divided between the Pickwick Corporation and the Motor Transit Corporation.

Greyhound Lines east of the Mississippi River will remain undisturbed by the merger; they are owned entirely by the Motor Transit Corporation.

The merged operations represent a capital investment of about $30,000,000. More than 1,000 buses will be operated 200,000 miles a day over 25,000 miles of routes. The number of passengers carried annually will exceed 10,000,000.

The chairman of the board of the Pacific Coast Corporation will be C. E. Wickman of Minneapolis. The president will be T. B. Wilson, formerly head of the Southern Pacific Motor Transport operations and the chairman of the executive committee will be C. F. Wren, president of the Pickwick Corporation.

No change is being made in the personnel of the Motor Transit Corporation except that W. E. Travis has been made chairman of the board. He has been president and manager of the Yelloway systems.

All of the companies concerned have played an important part in long distance bus transportation, and represent the chief elements of this form of passenger service.

People's Necessity Outweighs Traction Loss in Ohio

The Scioto Valley Railway & Power Company has lost its long-time fight to prevent the Cannonball Transportation Company from extending its bus line from Chillicothe, Ohio, to Columbus. By way of Portsmouth the bus company operates a line from Ironton to Chillicothe. In a majority opinion, the State Public Utilities Commission held that the necessity of the people of southern Ohio to have a direct method of transportation into Columbus outweighed the fact that the electric railway company would lose money if the Cannonball's request were granted.

The opinion restricts the Cannonball to service over state route 104 from Chillicothe to Columbus, and Cannonball buses must not carry Chillicothe and Circleville passengers, but only through-passengers both ways out of Columbus. The opinion left open the way for the railway, which sought to operate supplemental bus service itself, to amend its own application and protest so that it may be able to operate buses over state route 23 from Chillicothe to Columbus.

Judge William Klinger, Lima, dissented from the majority opinion, holding that the Supreme Court had said the commission could not give a certificate to another utility when the utility at present operating in that territory was willing to give extra service if needed.

Substitution in Savannah—Authority has been granted the Savannah Electric & Power Company, Savannah, Ga., by the Council to substitute bus service for the present railway service on the Daffin Park line.

Over the Berkshire Trail—The Northampton Street Railway plans to project a bus service from Northampton to Pittsfield, Mass., over the Berkshire Trail. Permits have been obtained from Northampton, Williamsburg, Goshen and Cummington, but action is still pending in Dalton and Pittsfield.

Would Stop Buses in Santa Ana—The Pacific Electric Railway has asked the Railroad Commission for permission to discontinue its bus lines in Santa Ana.

Substitution in Davenport—Tracks of the Gaines Street or Mercy hospital line will be abandoned and buses installed to give the same service over the route, if present plans of the Tri-City Railway, Davenport, Ia., meet the approval of the City Council. General Manager R. J. Smith of the company says that lack of sufficient income from the Gaines Street line prompted the company to adopt the plan to replace street cars with buses.

Substitution in Fitchburg Opposed—Opposition developed to the proposal of the Fitchburg & Leominster Street Railway to substitute bus service for trolleys over the Merriam Avenue route between Fitchburg and Leominster, Mass., when the hearing was held before the license board of the latter city. The Lovell Bus Lines, Inc., which operates in Leominster, including the West Street line, which runs parallel with Merriam Avenue, asked to be protected from the competition it said would result if the railway received the permission it sought. E. W. Baker, president of the railway, explained that the outlay to improve the roadway would not be justified by the revenue.

Pacific Electric Adds to Bus Service—A certificate of public convenience and necessity has been granted by the California Railroad Commission to the Pacific Electric Railway, Los Angeles, to operate an auto stage service between Hollywood and Girard, Cal.

Petition for Indiana Curtailment—The Chicago, South Bend & Northern Indiana Railway has asked authority to discontinue all local bus service on the south side of the city of Elkhart, Ind. The company also wants to be permitted to discontinue service on lines operating to the north section of the city after 9 p.m. and to eliminate all bus service in the city on Sundays and holidays. Expenses of bus operation in Elkhart exceeded revenue by more than $6,264 in 1928. The principal business district and residential sections of the city are served by the company

Mayors Favor Chehalis - Centralia Change—After a hearing in Chehalis, Wash., on May 13, of an application of W. E. Brown, to establish inter-city bus service between Chehalis and Centralia to replace the interurban service of the Puget Sound Power & Light Company, the Mayors of both cities favored the change and, with others, urged that the franchise be granted.

Buses Unprofitable — The Illinois Power & Light Corporation has applied to the Illinois Commerce Commission for permission to discontinue bus service in Hillsboro, Schram City and Taylor Springs on the grounds that the route is unprofitable. The buses were substituted for street cars several years ago. City officials have been advised of the plans for the abandonment of bus service.

Buses for Ashmont Under Special Bill—Governor Allen of Massachusetts has signed the bill to settle the dispute over a proposed bus line in the Ashmont section of Greater Boston. The Boston City Council has refused to grant the necessary permit for construction of part of this line. The bill signed by the Governor authorizes the Department of Public Works to issue the license notwithstanding the disapproval of the City Council. The route to be followed is from the corner of Hilltop Street and Granite Avenue to the Ashmont station of the Elevated and thence into Milton. The bill provides further that after a public hearing the Utilities Department will grant the certificate of public convenience and necessity.

Another Bus Substitution at Framingham—The Middlesex & Boston Street Railway is planning the early substitution of bus service on its line between Framingham, Mass., and the Newton, Mass., boundary. The substitution of bus service leaves only one electric railway operating out of Framingham, Mass., the Boston, Worcester & New York Street Railway.

Patrons Expect Something for Nothing—Suspension of the Arlington, Belmont & Watertown bus line by the Boston Elevated Railway, Boston, Mass., has been followed by a statement by the company that the discontinuance was necessary because it was clearly apparent there was an insufficient demand for the service. The trustees give the cost per revenue-mile as 32 cents against receipts of 12 cents. Those who oppose the suspension contend it is immaterial whether the line is profitable since it is a feeder for other lines.

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Financial and Corporate

Des Moines Sale June 22

Property of the Des Moines City Railway, Des Moines, Ia., operated under a receivership since Nov. 11, 1927, will be sold at public auction on June 22. The receivership was instituted when the Harris Trust & Saving Bank, Chicago, brought action in the federal court after the railway had defaulted in payment of $700,000 of bonds for which the bank acted as trustee. Under the decree the sale is subject to a first mortgage of $5,762,000.

The decree of sale authorizes the master, if dissatisfied with bids, to set a new date upon his own authority and to postpone the actual sale "from time to time." He is empowered to convey the property to the highest bidder, subject to approval of the court.

Local interest centered upon the inclusion in the decree of an order authorizing the master to sell the system either with or without the two-man car operation agreement entered into in 1915 between the company and the union—a contract which runs until 1940. A Polk County District Court held that the contract is binding. Officials of the company say they could save $200,000 annually by the operation of one-man cars.

Michigan Interurban Curtails Service

J. F. Collins, vice-president and general manager of the Michigan Electric Railway, announced that all electric interurban passenger service on the Jackson and Lansing division of the company would cease after midnight May 18 and that electric passenger service between Lansing and St. Johns and intermediate points would be discontinued on and after midnight May 16. This move leaves the northern division entirely operated by motor vehicles—electric service on that division having been terminated some time ago. Disposition of the right-of-way will be determined later. Interurban freight service on lines connecting Jackson, Kalamazoo and Grand Rapids will be continued. Interurban passenger traffic on this branch was discontinued some months ago.

$734,242 Premium on New York Stock

The city of New York obtained a premium of $734,242 on the sale of $52,000,000 four-year, rapid transit 5¼ per cent corporate stock to Kuhn, Loeb & Company and to Henry G. Schneider, an individual bidder. The effect of the premium above the face value of the bonds is to reduce the net interest cost of the financing to the city from 5.25 per cent to approximately 4.81 per cent.

The first issue of $52,000,000 corporate stock for rapid transit construction was sold in February, 1928, to the National City Company syndicate at a premium of $254,784 on 4 per cent coupon basis, or a 3.86 per cent net cost basis. The offering made on May 7 was scheduled originally for last November, when $55.000,000 in bonds was sold, but because of the unfavorable condition of the municipal market the sale of the stock was postponed. The stock sale last year was made during the most favorable period of the municipal bond market.

Offer Made for Muskegon Railway

Negotiations have been started for the purchase of the railway lines of the Muskegon Traction & Lighting Company, Muskegon, Mich., by the officials of the Peoples Transport Company, which plans to operate the street car lines in conjunction with its bus lines. If all goes well with these plans the city will retain transportation facilities that were to have been abandoned early in the fall.

With negotiations started for the purchase of the lines, the Muskegon Parent-Teachers' Association announces it will withdraw the petition just filed asking for a vote on the question of municipal ownership.

The Peoples Transport Company wants to issue $500,000 of capital stock divided into 50,000 shares with a par value of $10. The president is E. J. Bouwsma; vice-president and treasurer, M. J. Britzen; secretary, Willard G. Turner, Jr.

Supreme Court Decides O'Fallon Case

Holds that Congress has directed that values shall be fixed upon a consideration of present costs—that element one of many factors

THE long awaited decision in the action of the St. Louis & O'Fallon Railway and the Manufacturers' Railway against the Interstate Commerce Commission was handed down by the Supreme Court on May 20. The majority held that in this instance the commission had not given due consideration, as required by law, to the principle of reproduction cost new in fixing the valuation of the carriers for rate-making and recapture purposes under the provisions of the transportation act of 1920.

The majority opinion said:

"We hold, that the basis on all calculations as to the reasonableness of rates to be charged must be the fair value of the property being used by it for the convenience of the public.

"In order to ascertain that value, the original cost of construction, the amount expended in permanent improvements, the amount and market value of the bonds and stock, the present as compared with the original cost of construction, the probable earning capacity of the property under particular rates prescribed by statute, and the sum required to meet operating expenses, are all matters for consideration, and are to be given such weight as may be just and right in each case.

"We do not say that there may not be other matters to be regarded in estimating the value of the property. What the company is entitled to ask is a fair return upon the value of that which it employs for the public convenience. On the other hand, what the public is entitled to demand is that no more be exacted from it for the use of a public highway than the services rendered by it are reasonably worth."

BASIS OF "INTELLIGENT FORECAST"

"In Southwestern Bell Telephone vs. Public Service Commission (287) we said:

" 'It is impossible to ascertain what will amount to a fair return upon properties devoted to public service without giving consideration to the cost of labor, supplies, etc., at the time the investigation is made. An honest and intelligent forecast of probable future values, made upon a view of all the relevant circumstances, is essential. If the highly important element of present costs is wholly disregarded such forecast becomes impossible. Estimates for tomorrow cannot ignore prices today.'

"The doctrine above stated has been consistently adhered to by this court. The report of the commission is long and argumentative. Much of it is devoted to general observations relative to the method and purpose of making valuations; many objections are urged to the doctrine approved by us; and the superiority of another view is stoutly asserted.

"It carefully refrains from stating that any consideration whatever was given to present or reproduction costs in estimating the value of the carrier's property. Four dissenting commissioners declare that reproduction costs were not considered; and the report itself confirms their view. Two of the majority avow a like understanding of the course pursued."

QUOTES COMMISSIONER HALL

"The following from the dissenting opinion of Commissioner Hall, concurred in by three others, accurately describes the action of the commission:

"In order to determine the value of the O'Fallon property devoted to carrier service during the recapture periods, ten months in the year 1920 and the years 1921, 1922 and 1923, we start with a valuation or inventory date of June 30, 1919. The units in existence on that date are known. Original cost of the entire property cannot be ascertained.

" 'As to the man-made units we estimate the cost of reproducing them in their condition on that date. In so doing we apply to the units installed prior to June 30, 1914, the unit prices of 1914, the unit prices of 1914, representing a fairly consistent price level for the preceding five or ten years. To like units, installed after June 30, 1924, and prior to June 30, 1919, we apply the same prices, but add a sum representing price increases on those units during that period. For the third period, from June 30, 1919, down to each recapture date, we abandon estimate and turn to recorded net cost of additions less retirements.

" 'On this composite, made up of estimated value for two periods and ascer-

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tained net cost for the third period, the majority base a conclusion as to value at recapture date of the man-made items. Land goes in at its current value as measured by that of neighboring lands.

"'Without summarizing the other processes, all clearly stated in the majority report, it will be observed that the rate-making value arrived at for the successive recapture periods, as for example the year 1923, rests upon 1923 market value of lands; costs of other property installed since June 30, 1919; unit prices of 1914, enhanced by allowance for increased cost of units installed during June 30, 1914-1919; and for the units installed prior to June 30, 1914, constituting by far the major part of the property; unit prices of 1914 without any enhancement whatever.

"'As to this major part of the carrier's property devoted to carrier purposes in 1923, no consideration is given to costs and prices then obtaining or to increase therein since 1914.'

"The question on which the commission divided is this:

"When seeking to ascertain the value of railroad property for recapture purposes must it give consideration to current, or reproduction, costs? The weight to be accorded thereto is not the matter before us. No doubt there are some, perhaps many, railroads the ultimate value of which should be placed far below the sum necessary for reproduction. But Congress has directed that values shall be fixed upon a consideration of present costs, along with all other pertinent facts; and this mandate must be obeyed."

In his dissent Associate Justice Stone began by stating that he desired to add a word by way of emphasis of those aspects of the case "which appeared to me sufficient, apart from all considerations, to sustain the finding of the commission." He added:

"This court has said that present reproduction costs must be considered in ascertaining value for rate-making purposes. But it has not said that such evidence, when fairly considered, may not be outweighed by other considerations affecting value, or that any evidence of present reproduction costs, when compared with all the other factors affecting value, must be given a weight to which it is not entitled in the judgment of the tribunal 'informed by experience' and 'appointed by law' to deal with the problem now presented.

"But if 'weight in the legal sense' must be given to evidence of present construction costs by the judgment now given, we do not lay down any legal rule which will inform the commission how much weight, short of its full effect, to the exclusion of all other considerations, is to be given to the evidence of synthetic costs of construction in valuing a railroad property.

Sees an "Economic Paradox"

"If full effect were to be given to it in all cases, then, as the commission points out in its report, the railroads of the country having in 1919 a reproduction cost of value of $19,000,000,000 would now have a value of $40,000,000,000, and we would arrive at the economic paradox that the present value of railroads is far in excess of any amount on which they could earn a return.

"If less than full effect may be given, it is difficult for me to see how, without departure from established principles, the commission could be asked to do more than it has already done—to weigh the evidence guided by all the proper considerations—or how, if there is evidence upon which its findings may rest, we can substitute our judgment for that of the commission.

"Such, I believe, is the 'due consideration' which the statute requires of 'all the elements of value recognized by the law for rate-making purposes.'"

Justice Brandeis' Opinion

In the dissenting opinion prepared by Associate Justice Brandeis, the minority takes issue with the majority decision that in valuing railroad property in the O'Fallon case the Interstate Commerce Commission failed to give weight to the cost of "'reproduction new.'"

The Justice contended that, while current reproduction cost may be said to be an element in the present value of property, it was clear "that current cost of reproduction higher than the original cost does not necessarily tend to prove a present higher value."

In this connection he added:

"Often the fact of higher reconstruction cost is without any influence on present values. It is common knowledge that the current market value of many office buildings and residences constructed prior to the World War have failed to reflect the greatly increased building costs of recent years, although the need of new buildings of like character was being demonstrated by the large volume of construction at the higher price level.

"Many railroads built before the World War have never been worth as much as their original cost, because high construction cost, combined with adverse operating conditions and limited traffic, have at all times prevented their earning, despite reasonable rates, a fair return on the original cost.

"* * * If it had been the intention of Congress to compel the commission to increase values for rate making purposes because the price level had risen, it would naturally have incorporated such a direction in the paragraph.

"It is inconceivable that Congress, after rejecting property investment account as excessive, intended by Section 15A to make mandatory on the commission the consideration of elements which would give a valuation double that which had been rejected."

Conspectus of Indexes for May, 1929

Compiled for Publication in Electric Railway Journal by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	May 1929 **7.76**	April 1929 **7.75**	May [illegible]	May 1929 **7.76**	Jan. 1924 **6.91**
Electric Railway Materials* 1913 = 100	May 1929 **145.5**	April 1929 **145.0**	May 1928 **140.4**	March 1924 **163.9**	Feb. 1928 **139.5**
Electric Railway Wages* 1913 = 100	May 1929 **230.1**	April 1929 **230.1**	May 1928 **229.2**	April 1929 **230.1**	Jan. 1924 **217.4**
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	May 1929 **199.5**	April 1929 **200.9**	May 1928 **201.9**	March 1924 **206.8**	Sept. 1927 **199.4**
Eng. News-Record Construction Cost (General) 1913 = 100	May 1929 **205.2**	April 1929 **203.4**	May 1928 **207.0**	March 1924 **224.7**	Nov. 1927 **202.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	April 1929 **96.8**	March 1929 **97.5**	April 1928 **97.4**	Nov. 1925 **104.5**	April 1927 **93.7**
Bradstreet Wholesale Commodities 1913 = 9.21	May 1929 **12.68**	April 1929 **12.87**	May 1928 **13.44**	Dec. 1925 **14.41**	July 1924 **12.23**
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	April 1929 **151.6**	March 1929 **153.0**	April 1928 **152.1**	Nov. 1925 **167.1**	May 1924 **141.0**
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	April 1929 **159.3**	March 1929 **159.8**	April 1928 **160.8**	Nov. 1925 **171.8**	March 1929 **159.8**
Industrial Activity Elec. World—Kw.-hr used 1923-25 = 100	April 1929 **136.4**	March 1929 **135.7**	April 1928 **119.3**	Feb. 1929 **140.4**	July 1924 **73.4**
Bank Clearings Outside N. Y. City 1926 = 100	April 1929 **104.0**	March 1929 **103.9**	April 1928 **105.6**	Feb. 1929 **110.1**	May 1924 **84.4**
Business Failures Number	April 1929 1738	March 1929 1703	April 1928 1672	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	**32.59**	**35.44**	**41.13**	**122.95**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Changes in United Traction Directors—Arthur R. Kleeman, Edward J. Crummey, and Bruce Gamley, directors of the United Traction Company, Albany, N. Y., placed on the board by the Ellis I. Phillips' interests, have been displaced by representatives of the Associated Gas & Electric Company interests, including John Mange, president of Associated. James Hamilton, Ernest Murphy, General manager of United Traction, and Harry B. Weatherwax, vice-president, continue as directors.

Virginia Road Sold—Purchase of the Petersburg, Hopewell & City Point Electric Railway, Petersburg, Va., has been made by Roy H. Morris and associates of Chicago, at a reported cost of $330,000, the transfer to be made by June 15, the date of the expiration of an option held by the Chicago interests.

Receivership Ended—The Receivership of Manhattan & Queens Traction Corporation, New York, has been terminated, according to B. Waller Duncan, manager for the receivers, by order of the federal court. The company operates between Manhattan and Jamaica via the Queensborough Bridge and Queens Boulevard.

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Men of the Industry

Frank R. Phillips, Philadelphia Company Executive

Becomes chief executive officer of organization controlling the Pittsburgh Railways and other utilities in Pittsburgh

STOCKHOLDERS of the Philadelphia Company, Pittsburgh, Pa., at a meeting on May 14, elected John J. O'Brien president of the company and Frank R. Phillips, a director. It was announced that at the next meeting of the directors Mr. Phillips would be elected vice-president and general manager. Since the resignation of A. W. Robertson, formerly president of the Philadelphia Company, to become chairman of the board of the Westinghouse Electric & Manufacturing Company some months ago, the presidency of the Philadelphia Company has been vacant. Mr. Phillips, who has been vice-president and general manager of the Duquesne Light Company and vice-president of the Equitable Gas Company, in his new position becomes chief executive officer of the Philadelphia Company and subsidiaries. In this capacity it is understood that he will exercise all of the operating duties heretofore devolving upon the president. The principal subsidiaries of the Philadelphia Company are the Duquesne Light Company, Pittsburgh Railways, Equitable Gas Company, Pittsburgh Motor Coach Company and Allegheny Steam Heating Company.

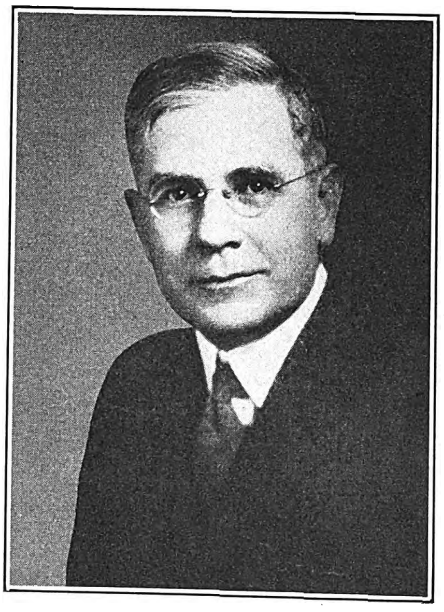
John J. O'Brien, the new president of the Philadelphia Company resides in Chicago and is president of the Standard Gas & Electric Company, the utility system of which the Pittsburgh companies are a part.

Mr. Phillips is a nationally known figure in the public utility field. He has been connected with the utilities in Pittsburgh for the past nineteen years. After completing his education in Cleveland in 1894, Mr. Phillips became master mechanic of the Cleveland Railway. Following this he served as mechanical and electrical engineer for the Union Light, Heat & Power Company of Covington, Ky., the Bellevue Water Company of Bellevue, Ky., and the South Covington & Cincinnati Street Railway also of Covington, Ky. He went to Pittsburgh in the fall of 1909 to assist in the development of the railways in that city. His first achievement was the low-floor, steel car operated with pony trucks and so-called baby motors which went into service in 1910, but was followed a year later by a low-floor steel trolley car, both of which proved less costly in construction and more economical in operation than the types which had preceded them.

In 1910 he was made superintendent of equipment of the Pittsburgh Railways, a position he filled until July, 1923, when he was made acting general manager for the receivers following the death of the late P. M. Jones. Upon the lifting of the receivership on February 1, 1924, Mr. Phillips was made mechanical and electrical engineer and was also appointed the representative of the company to the Traction Conference Board.

Mr. Phillips was active in designing the double-deck motor car placed in service in Pittsburgh in 1917. About the same time he designed a low-floor, high-speed, all steel interurban car of a type which has since been made standard on the Pittsburgh Railways lines. Mr. Phillips was also active in the construction of the new cars which have recently been placed in service on the Pittsburgh Railways lines, including the one-man cars and those used in multiple-unit operation.

He has become nationally known through his activities in behalf of the American Electric Railway Association, in which he has served on many important committees. He is a past-president of the Pennsylvania Street Railway Association, and is now president of the Pennsylvania Electric Association.



Frank R. Phillips

On Sept. 1, 1926, Mr. Phillips was elected vice-president and general manager of the Duquesne Light Company and subsidiaries, and in April, 1928, was elected vice-president of the Equitable Gas Company and its subsidiaries.

G. J. Marott Heads New Indianapolis District

George J. Marott, Indianapolis, has just been named by Mayor Slack of that city as a member of the board of trustees of the city's new utility district. His term of office is for three years. For many years Mr. Marott was president of the former Indiana Railways & Light Company. A public utilities district was created for Indianapolis by the last Legislature. Under the law, the utilities district will have control of all city-owned utilities, none of which are so owned at present. The idea back of the formation was the acquirement of the local gas company. In the future, if it is deemed necessary to create or acquire any further utilities, the district under the law will have charge.

Major T. J. Strickler, president of the Kansas City Gas Company, Kansas City, Mo., on May 18 was elected president of the Missouri Association of Public Utilites at the closing session of the three-day meeting of that body at Sedalia, Mo. Mayor Strickler succeeds A. E. Reynolds, Springfield.

L. S. Storrs Honored

His Work Is Lauded and Resolutions Passed Formally Acknowledging His Signal Service

LUCIUS S. STORRS, who resigned on April 1 as managing director of the American Electric Railway Association to accept the post as executive chairman of the board of the United Railways & Electric Company of Baltimore, was tendered a dinner at the Mayflower Hotel, Washington, on the evening of May 1 during the meeting of the United States Chamber of Commerce. Members of the Advisory Council, the American Electric Railway Association executive committee, and many other prominent executives of the industry joined in this tribute to the service which Mr. Storrs has rendered the industry during his four years as managing director.

J. N. Shannahan, chairman of the Advisory Council, was toastmaster. The speakers included B. C. Cobb, J. P. Barnes, Thomas N. McCarter, James H. McGraw, Paul Shoup, A. W. Robertson, Homer Ferguson, W. H. Sawyer, R. P. Stevens and Mr. Storrs.

Mr. McCarter commented on the period of readjustment for the industry during which Mr. Storrs helped to bring about more collective thinking and a broadened perspective in the industry. He expressed the conviction that an industry which renders a service so vital to modern communities can be put upon a sound financial basis and declared emphatically that the problems of the local transportation industry must be solved in the interest of those who have invested in them in good faith and of the country itself.

President Barnes extolled the guest for his persistent confidence in the industry, and lauded the qualities of patience and tact through which Mr. Storrs had brought about closer co-operation among properties in working for the solution of collective problems.

Mr. McGraw attributed the present difficulties of the industry to its failure to anticipate the condition which all but overwhelmed it. "The time has come," declared Mr. McGraw, "to look forward, not backward. During the last four years Mr. Storrs as managing director has helped us to understand the factors which caused our difficulty and has aided us in looking toward the future instead of the past."

Mr. Storrs Deeply Moved

Mr. Storrs protested his total inability to express adequately his feelings of gratification. He declared, however, that one of life's principal accomplishments is the accumulation of warm friends, and that this testimonial from those with whom he had worked so closely during his service as managing director would constitute a cherished memory during the remainder of his days.

The executive committee of the association tendered Mr. Storrs a unanimous vote of appreciation for the outstanding service which he has rendered during an exceedingly difficult period of readjustment. The resolution to this effect said in part:

"His confidence in the basic soundness of the business of local transportation has never wavered. He has aided in bringing about a better public understanding of the problems of the industry and of the essential and indispensable part which public transportation plays in the life of the modern community.

"He has been both a counsellor and friend to the executives of the entire industry. Through his genial personality and unusual qualities of tact and judgment, he

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has brought about increased co-operation between operating companies and now leaves the American Electric Railway Association better organized and functioning at the highest state of efficiency and effectiveness in its history. Due to his enthusiasm, keen interest and wide grasp of local transportation fundamentals, he has stimulated the work of committees of both the American Association and its several affiliated organizations. Through his contact with other industries and associations, and with the several agencies of government, he has brought about a better public understanding of the problems of local transportation, accompanied by increased good will.

"Mr. Storrs leaves the position of managing director to assume again the direction of the destinies of an individual operating property, for which position of responsibility he is pre-eminently qualified. The executive committee of the American Electric Railway Association accepts his resignation with deep regret. It extends to him the good wishes of the entire industry for his continued success in his new position and congratulates the directors of the United Railways & Electric Company and the public of Baltimore upon having enlisted the services of so eminent and well qualified a local transportation executive and so delightful and genial a citizen and gentleman."

George Stokes in Charge of Equipment on Insull Line

George Stokes has been appointed general inspector of cars and equipment of the Chicago, South Shore & South Bend Railway, the Chicago, North Shore & Milwaukee Railroad, the Chicago, Aurora & Elgin Railroad and the Chicago Rapid Transit Company. Mr. Stokes has been with the North Shore Line for the past seven years. Starting with the transportation department in May, 1922, as collector, he was made conductor the following year, in the Chicago-Millwaukee service. Before joining the North Shore Line, Mr. Stokes was connected with the Pullman Company.

Former Senator Heads Commission's Legal Staff

William Cabell Bruce, former United States Senator from Maryland, has been appointed general counsel to the Maryland Public Service Commission by Gov. Albert C. Ritchie, who at the same time announced that John H. Lewin, a prominent Baltimore lawyer, would become people's counsel to the commission.

Mr. Bruce was general counsel to the commission from the time the commission was organized in 1910 until 1922, when he resigned to become a candidate for the United States Senate. Later the post of general counsel was abolished, but it was revived in 1927 by an act of the General Assembly. No appointment was made, however; Raymond S. Williams, a Baltimore lawyer, serving as special counsel in some cases. It has been announced that Mr. Williams will continue to serve in the cases in which he has been interested and which are still pending. The most important of these is the car fare case of the United Railways & Electric Company, which is to be argued before the United States Supreme Court in the fall.

Mr. Lewin, who formerly was assistant city solicitor of Baltimore, will succeed Thomas J. Tingley, resigned.

D. L. Turner Resigns

Consulting engineer to New York Commission will go into private practice Sept. 1 after thirty years of city service

DANIEL L. TURNER, consulting engineer to the New York Transit Commission and the Board of Transportation, and for nearly thirty years intimately associated with the planning and developing of the city's rapid transit lines, will retire from public service on Sept. 1. Mr. Turner will make a trip around the world and will then resume private engineering practice.

It has truthfully been said that in his entire career Mr. Turner's first allegiance has been to the city of New York. Not content with merely performing his duties as an engineer, Mr. Turner enlarged the fields of his work by studying the trends of traffic and investigating the results of

D. L. Turner

local transportation extensions upon the outlying districts of the city and upon the community as a whole. By this work he made himself an expert on urban transit and acquired a reputation which attracted the attention of the nation.

The extent to which this is true is instanced by his work on the joint vehicular and rapid transit highway in Detroit, his service as consulting engineer on rapid transit in that city, his work since 1924 as consulting engineer for the Pittsburgh Transit Commission and for the North Jersey Commission, and his retention as consultant in other similar projects.

Mr. Turner served in New York with the Rapid Transit Board, the Public Service Commission, the Rapid Transit Construction Commission, the Rapid Transit Commission and the Board of Transportation. His first post was that of assistant to William Barclay Parsons, chief engineer in charge of construction of the first subway. In 1918 he became chief engineer of the Public Service Commission, and in 1921 was named consulting engineer to the Transit Commission. When the Board of Transportation was organized in 1924 he was designated as its engineering consultant.

As a matter of fact his first connection with rapid transit in this city was in December, 1900, when subways were unknown. He left the Lawrence Scientific School at Harvard University, where he was an instructor in surveying and hydraulics, to become an aide of the Board of Rapid Transit Railroad Commissioners. He drew the plans for draining the new subway lines here and later conducted surveys for Brooklyn extensions.

He served for many years on the New York State Commission of Fine Arts, and since 1927 has headed the Suburban Transit Engineering Board, acting under the direction of the Port of New York Authority.

He was born Oct. 25, 1869, in Portsmouth, Va., and his retirement will come a few weeks before his sixtieth birthday. He received his engineering training at the Rensselaer Polytechnic Institute. While an instructor at Harvard, he drew plans for improving and draining Soldiers Field, the university athletic ground.

Mr. Turner is a member of many engineering societies and organizations concerned with city planning and civic welfare.

Changes in District Commission

It is expected that the Senate soon will confirm President Hoover's nomination of Maj. Gen. Mason M. Patrick and Harleigh H. Hartman to be members of the Public Service Commission of the District of Columbia, but the reorganization of the commission cannot be completed before June 1, as the resignation of John W. Childress, the present chairman, does not become effective until May 31. General Patrick, successor to Mr. Childress, therefore, cannot take office before that date. Mr. Hartman, who was appointed to succeed Col. Harrison Brand, Jr., however, is expected to be inducted into office soon after Senate confirmation.

Messrs. Parry and Thomas in New Salt Lake Posts

P. M. Parry, since 1920 commercial manager for the Utah Power & Light Company, Salt Lake City, has been elected vice-president and commercial manager of that company, and George B. Thomas, formerly secretary and treasurer, has been elected vice-president and secretary.

Both of these men have had long experience in the public utility field. Mr. Parry was connected with the Utah Power & Light Company's predecessor in Ogden for many years. He was made manager of its Ogden division in 1912, at the time of the consolidation of several companies into the present organization, and held that position until he was made commercial manager of the company in 1920.

Mr. Thomas was auditor of the Telluride Power Company prior to the organization of the Utah Power & Light Company, and was named auditor and assistant treasurer of the latter company in 1912, later becoming secretary and treasurer. He is also secretary and treasurer of the Utah Light & Traction Company and holds similar offices with the Western Colorado Power Company, Durango.

O. C. Gettinger Promoted by Elgin Road

O. C. Gettinger, trainmaster for the Chicago, Aurora & Elgin Railroad for the past nine years, has just been appointed superintendent of transportation in direct charge of all train movements of the railroad, both passenger and freight.

In October, 1908, he entered railroad service as a conductor on the Aurora City lines. By the end of the following year he qualified as a motorman and shortly thereafter began working for the Chicago, Aurora & Elgin Railroad. In 1912 he was made train dispatcher at Wheaton, from which post he was promoted to train master in 1920.

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W. J. McCarter and P. W. Ogden in New Cleveland Posts

Walter J. McCarter has been appointed superintendent of training of the Cleveland Railway, Cleveland, Ohio, reporting to Clinton D. Smith, superintendent of the department of personnel.

Mr. McCarter is a graduate of the Class of 1921, Purdue University, where he was awarded the degree of bachelor of science in electrical engineering and was elected to several honorary fraternities. He joined the Milwaukee Electric Railway & Light Company in the fall of 1921, and as a student engineer and during the course of his practical training, he served as motorman, conductor, lineman, shop man, tester and substation operator, supplementing his special training with the study of industrial relations.

In 1922 and 1923 he served as instructor of engineering subjects in the industrial relation or industrial department, and in the fall of 1923 was made principal assistant to Dr. A. J. Rowland, educational director.

In January, 1926, Mr. McCarter was appointed supervisor of training in the transportation department of the Milwaukee Company, and as such supervised the training of all new employees, and the follow-up training of the employees after their permanent assignment. His success in this work culminated in his appointment as assistant educational director on Jan. 1, 1929. In this latter capacity he has served all departments of the company.

Mr. McCarter knows the efficiency of the motorman selection tests used in recent years at Milwaukee as an effective means for selecting suitable employees for the transportation service. He has also been instrumental in the development of one of the most complete employee training programs that may be found among public utility companies.

As superintendent of training of the Cleveland Railway Mr. McCarter will head a new division which will include the employment or selection of employees, the training and educational program for new and older employees, and accident prevention activities, all according to the general program of the personnel department as outlined in the ELECTRIC RAILWAY JOURNAL for July 2, 1927, at the time of the announcement of the appointment of Clinton D. Smith as superintendent of personnel.

The new division of training has been formed in conformity to the convictions of President J. H. Alexander that transportation can be merchandised, and that increased sales will be obtained from specific instruction or training of the employees. The program of the division includes the mechanical or psychological test for new employees, and the correlation of such tests with individual studies of accident-prone men. This specialization of training concentrates on the individual development and accepts general education as supplemental to the major task. It will be applicable to all transportation service employees.

Effective also as of May 1 Mr. Philip W. Ogden was appointed supervisor of employment, reporting to Mr. McCarter.

Mr. Ogden matriculated at East High School, Rochester, N. Y., in 1911, and then attended Mechanics Institute, Rochester, where he pursued the co-operative engineering course. In 1916 he was graduated from Cornell University. Prior to the World War, in which he served as Second Lieutenant in the Quartermaster's Corps, Mr. Ogden was associated with T. H. Symington Company, Rochester, N. Y., and after the Armistice was connected with the Eastman Kodak Company, Rochester.

He joined the Cleveland Railway in 1922, and for a period of three years carried on research activities under the direction of Mr. Alexander, then vice-president of the company. Since 1925, and until his appointment, Mr. Ogden has been associated with M. W. Rew, superintendent of the motor coach department, in which post he was responsible for personnel activities, including employment.

W. J. Stanton Heads Metropolitan Section A.E.R.A.

To fill the unexpired term of A. LeRoy Hodges, recently resigned, W. J. Stanton was recently chosen president of the Metropolitan Section, A.E.R.A. Mr. Stanton has taken an active interest in the affairs

W. J. Stanton

of the section ever since its organization, and has figured prominently in the activities of the supply men's group in New York City for many years.

"Jerry," as he is known to his host of friends, was born in Schenectady, March 7, 1884. He secured his early education in that city and upon completing high school work joined the General Electric Company. After a few years in the testing department, he entered the railway engineering department and in 1910 was transferred to the railway sales department under J. G. Barry with headquarters in New York City. This work took him to all parts of the United States.

He resigned from the General Electric Company in 1918 to accept a position as sales manager for the Railway Improvement Company in New York City. The following year found him associated as sales manager with the National Railway Appliance Company, and shortly afterward he went with the Ohio Brass Company, with which he remained for eight years, working out of the New York office. On June 1, 1928, he resigned to accept a position as vice-president and treasurer of the Cuban-American Manganese Corporation, which position he holds at the present time.

D. E. Watson Acting Vice-President in Indianapolis

At a meeting of the directors of the Indianapolis Street Railway, Indianapolis, Ind., on May 16, 1929, the following officers were elected: D. E. Watson, active vice-president, L. T. Hixson, secretary and treasurer, J. P. Tretton, general manager, T. L. Fox, second assistant secretary and treasurer.

Marshall S. Morgan resigned from the board. This left two vacancies which were filled by the election of D. E. Watson and J. P. Frenzel, Jr.

E. L. Bodge at Ottawa.

E. L. Bodge, formerly assistant freight traffic manager of the Illinois Terminal Railroad, has been appointed traffic manager of the Chicago & Illinois Valley Railroad, at Ottawa, Ill., succeeding R. G. Near, resigned.

Mr. Bodge was traffic manager of the St. Louis, Troy & Eastern Railroad at St. Louis, Mo., for several years, and after this line was consolidated with the Illinois Traction System was made coal traffic manager of the latter road. Upon the merging of the Illinois Traction System with the Illinois Terminal Railroad, he was appointed assistant freight traffic manager, in which capacity he served until he was made traffic manager last month of the Chicago & Illinois Valley, a subsidiary.

G. A. Burnham Heads American Brown Boveri

George A. Burnham, president of Condit Electrical Manufacturing Corporation, has accepted the presidency of American Brown Boveri Company, Inc., of Camden, N. J., a newly formed subsidiary of the American Brown Boveri Electric Corporation, created for the purpose of placing all electrical and mechanical operations, exclusive of ship building, under one management.

Mr. Burnham has been granted patents on many inventions pertaining to the control and protection of electric circuits. He is actively interested in the American Institute of Electrical Engineers and the National Electrical Manufacturers' Association. During the last nine months, in addition to his duties as president of Condit Electrical Manufacturing Corporation, he has been assistant to the president of American Brown Boveri Electric Corporation, and general manager of the electrical-mechanical division, activities now included in American Brown Boveri Company, Inc.

He was born in Essex, Mass., 1882, and was graduated from Tufts College, B.S. in Engineering 1908, M.S. 1910. Prior to attending college he was engaged in the construction and operation of power plants. Soon after graduation he was employed by the Condit Electrical Manufacturing Company finally being elected president of the Condit Electrical Manufacturing Corporation, successor to the Condit Electrical Manufacturing Company, in 1926.

Traffic Officials of Indiana Service Promoted

The transportation department of the Indiana Service Corporation, Ft. Wayne, Ind., has announced the promotion of the following employees:

Newton Archer promoted to accounting department from passenger and freight agent, Lafayette, Indiana.

George Garvin promoted to agent at Lafayette from assistant agent at Wabash.

Clyde Root transferred from agent at Peru passenger station to passenger and freight agent at Marion.

Merle McKee promoted from assistant agent at Peru passenger station to agent.

Paul Wire promoted from clerk at Huntington to assistant agent at Peru passenger station.

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Henry W. Blake

Veteran editor of *Electric Railway Journal* dies. Had served industry thirty-eight years. Author and authority on American and foreign practice

HENRY W. BLAKE, senior editor of the ELECTRIC RAILWAY JOURNAL, died at his home in Englewood, N. J., on May 20. Until a few months ago, Mr. Blake had been in his accustomed good health, but at that time, at the suggestion of his physician, he postponed a contemplated trip to Europe, during which he had expected to gather additional material for the notable series of articles on European electric railway and bus practice which have been appearing since a similar trip made by him about two years ago. Despite this decision to forego the trip to Europe, the condition of his health did not appear to warrant special concern on the part of his physician, family or associates. Late last week, however, he suffered a severe attack of nervous exhaustion which did not respond to the treatments usually efficacious in offsetting attacks of this kind.

AN UNUSUAL CULTURAL BACKGROUND

Henry W. Blake was in many respects a great technical editor. He brought to his task as a young man an unusual equipment. He was learned not only in engineering, which he had studied at Yale University and the Massachusetts Institute of Technology, but in the liberal arts and in the humanities. Added to this background was the cultural influence of a period spent in Europe at the conclusion of his academic studies. If destiny did not decree that he be an editor, certainly there have been few men in the history of technical journalism better fitted than was he for the work to which he was to dedicate his life. Aside from his cultural and technical attainments he brought to his career as an editor a carefully poised judicial mind, wholehearted devotion to his task and a sense of the verities that seemed at times almost uncanny.

During the thirty-eight years Mr. Blake served the ELECTRIC RAILWAY JOURNAL and its predecessors many revolutionary changes were effected in the methods of mass transportation. In 1891 when he came to the JOURNAL, the argument between cable and electric advocates was at its height. In addition there loomed as possibilities the compressed air car, the storage battery car, and other forms of motive power. He served actively as editor during the period of the rapid expansion of the electric railway in city, suburban and interurban service and finally during the period in which the bus appeared—first, as a competitor and, then, as an adjunct to the already established transportation agencies. In the interval between these major movements came the development of electricity for use in heavy traction with its so-called battle of the systems, during which Mr. Blake kept his readers apprised of the progress being made, while at the same time he maintained the editorial balance without which no paper truly serves its readers. Not content with that, and while still carrying full editorial responsibility, he prepared for publication in book form, in collaboration with Walter Jackson, "Electric Railway Transportation."

As was indicated at the time he was honored by his associates on the occasion of the completion by him in 1921 of thirty years of service as editor, Mr. Blake made and held hundreds of friends in the industry, partly through the charm of his personality and partly through his willingness always to share his amazing knowledge of mass transportation methods and practices which embraced the entire period from the horse-bus and horse-car to their modern automotive and electric successors. Certainly, as one of his associates once said of him he "wrote his very life into the columns of the ELECTRIC RAILWAY JOURNAL." In so doing he wielded an influence that cannot possibly be measured, but has been felt and is today reflected on almost every electric railway in the country.

Henry W. Blake

So far as the chronological history of Mr. Blake's connection with the paper goes, it dates from his appointment to the staff in 1891 and covers the subsequent periods of his selection as editor in 1894, his sharing of the editorial responsibilities with Edward E. Higgins for several years before the turn of the century and his carrying the full editorial responsibility from 1899 to 1922, when he again shared the editorial responsibilities with another—Harold V. Bozell. He was appointed senior editor in 1925 in which post, after many years, he was relieved of direct responsibility for the paper and at that time relinquished active administration of editorial work in accordance with his own plan of devoting more and more time to his personal activities and of engaging in only such editorial duties as best fitted into his plan of allowing himself more leisure.

HAD KEEN SENSE OF OBLIGATION

Mr. Blake was graduated from Yale in the civil engineering course in 1886 and then took the course in electrical engineering at the Massachusetts Institute of Technology, after which he became connected with the Sprague Electric Railway & Motor Company, at that time engaged in the construction of electric railways in various cities in the United States. Like his father before him and like the New Englander that he was, Mr. Blake had a keen sense of his obligations, including his obligation to his alma mater. That he was held in high esteem by his fellow classmates is attested to by the fact that for many years he had been Alumni Fund Agent for his class, an office of special honor and distinction.

Mr. Blake was born in New Haven on Dec. 7, 1865. He is survived by his wife, one daughter and one son.

He was a member of the American Institute of Electrical Engineers, a member of the International Railway & Tramway Association, and during the formative years of the American Electric Railway Association he contributed abundantly of his time and influence to the work of the association, particularly that of the affiliated bodies, participating in the development of the standard classification of accounts.

APPRECIATION BY JAMES H. MCGRAW

James H. McGraw, publisher of the ELECTRIC RAILWAY JOURNAL, with whom Mr. Blake had been continuously associated during his thirty-eight years of service with the paper, said of him:

"Henry W. Blake was a great editor. His name will go down in the history of industrial journalism with the names of those other great editors of the past: Col. Henry G. Prout of *Railway Gazette*, W. D. Weaver of *Electrical World*, Arthur M. Wellington of *Engineering News*, Charles Kirchhoff of *Iron Age*, John M. Goodell of *Engineering Record* and Frank Wight of *Engineering News-Record*. For thirty-eight years he was intimately associated with the upbuilding of the ELECTRIC RAILWAY JOURNAL and of the McGraw-Hill Publishing Company. Very early in his career he grasped the ideal of editorial service and leadership upon which this institution was founded.

"In the early days *Street Railway Journal* was devoted to the interests of the horse, its care and its car. But electric propulsion was being promoted by men who saw the limitations of the horse and cable, and the possibilities of electricity. Convinced with me of the fundamental principle of technical and business journalism, that industry is always ready for real leadership, Henry Blake took hold of the helm of his paper firmly. In recognizing that the editor's responsibility is not merely to present current news and opinion, but to provide a vehicle for advancing thought, he stamped the imprint of his mind and personality indelibly upon the paper and the industry to which his life was devoted."

Joseph A. McGowan

Joseph A. McGowan, 69 years old, veteran railway executive of Indianapolis, died on May 13. He had been acting president of the Indianapolis Street Railway and the Terre Haute, Indianapolis & Eastern Traction Company since the death of Robert I. Todd last July. Mr. McGowan had been ill for several days prior to his death. Strain due to increase in work upon assuming the presidency of both companies is believed to have aggravated the heart condition from which he suffered and which really caused his death.

Mr. McGowan went to Indianapolis in 1903 at the instance of his cousin, the late Hugh J. McGowan, who was then developing the Indianapolis Street Railway and the old Indianapolis Traction & Terminal Company, of which he was president.

Joseph A. McGowan became auditor and later secretary and treasurer, serving in the latter position until his death, in addition to his duties as acting president of both companies.

Mr. McGowan was born in Ireland.

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169 Exhibitors Take 96,196 Sq. Ft. of Space

Assignments made for Atlantic City convention, Sept. 28 to Oct. 4, as result of two days of deliberation by committee. Another impressive display assured

FREDERICK C. J. DELL, director of exhibits of the American Electric Railway Association, reported at the second meeting of the exhibit committee held at Atlantic City, N. J., on May 16 the following comparative results of space applications for the meeting Sept. 28 to Oct. 4:

Year	Number of Space Requests	Approximate Number of Square Feet
1923	89	43,594
1924	141	60,865
1925	172	98,293
1926	183	95,001
1927	216	104,143
1928	177	98,840
1929	169	96,196

When the convention opened last year there had actually been sold 109,420 sq.ft. to 251 exhibitors. Of this 109,420 sq.ft. 38,212 sq.ft., or approximately 29 per cent, was occupied by buses, trucks and body manufacturers, this space having been assigned to 23 companies.

This year so far sixteen bus, truck and body manufacturers have applied to the electric railway association for 32,734 sq.ft., or 32 per cent, of the total space available, which amounts to 102,498 sq.ft.

As a result of two days of deliberation on the part of the committee these assignments were made:

Exhibitors at the 48th Annual A.E.R.A. Convention, Together With Spaces to Be Occupied by Each Company

Company	Space Number
Adams & Westlake Co.	E-619
Ahlberg Bearing Co.	C-341-342
Aluminum Co. of America	E-628
American Brake Materials Corp.	E-602-603
American Brake Shoe & Foundry Co.	E-562-563
American Brass Co.	E-600-601
American Car & Foundry Motors Co.	C-308
American Fork & Hoe Co.	D-402
American Steel & Wire Co.	D-428-430
Anaconda Wire & Cable Co.	E-599
Anderson Body Co.	Portion of C-302
Anderson Brake Adjuster Co.	E-546
Aqua Oil Service, Inc.	E-523
Arco Co.	C-334-335-336
Baldwin Locomotive Works	Portion of E-617
Bender Body Co.	C-306
Bendix Brake Co.	Portion of C-303
Bethlehem Steel Co.	E-610-611-612-613-614-615-616
Bosch Magneto Co., Robert	E-532
Bragg-Kliesrath Corp.	Portion of C-305
Bridgeport Brass Co.	E-579
Brill Co., J. G.	E-513
Buda Co.	E-618
Budd Wheel Co.	C-324
Bus Transportation	Portion of E-575
Philip Carey Co.	D-413-415
Carnegie Steel Co.	D-429-431
Chase & Co., L. C.	E-606
Cheatham Electric Switching Device	D-422
Chillingworth Mfg. Co.	E-581
Chilton Class Journal Co.	E-589
Christenson Air Brake Co.	C-333
Clark Equipment Co.	C-332
Cleveland Pneumatic Tool Co.	C-301
Cleveland Tanning Co.	C-352-353-354
Collier, Inc., Barron G.	E-530-531
Continental Motors Corp.	C-351
Consolidated Car Heating Co.	E-512
Crew Levick Co.	E-533
Cummings Car & Coach Co.	E-525
Curtain Howe Corp.	E-555
Dayton Mechanical Tie Co.	D-412-414
Dayton Steel Foundry Co.	E-521
DeLuxe Products Corp.	E-519
DeVilbiss Co.	E-561A
DeWalt Products Corp.	A-100
Differential Steel Car Co.	Portion of E-550
Dodge Brothers Corp.	C-315-316
Duff-Norton Mfg. Co.	D-406
Earll, C. I.	E-583
Eberhard Mfg. Co.	E-517
Economy Electric Devices Co.	C-319B
Edwards Company, Inc., M.	E-524
Electric Railway Improvement Co.	E-551-553
Electric Railway Journal	Portion of E-575
Electric Service Supplies Co.	E-576-577-578
Ellcon Co.	E-526 and Portion of E-528
Erie Malleable Iron Co.	C-329
Ferodo and Asbestos, Inc.	C-337-338
Frazer Electric Transmission Co.	C-320B
Fremont Metal Body Co.	C-349-350
Fruehauf Trailer Co.	C-355 and E-608-609
Fuller & Sons Mfg. Co.	C-300
General Electric Co.	E-568
General Motors Truck Co.	C-309
Globe Ticket Co.	E-549
W. S. Godwin Co., Inc.	D-404
Gold Car Heating & Lighting Co.	E-548
Goroco Mechanical Spreader Co.	E-520
Griffin Wheel Co.	E-564-565-566
Hale & Kilburn	E-500-501
Hannum Manufacturing Co.	E-516
Haskelite Manufacturing Co.	E-514
Hercules Motors Corp.	C-304
Heywood Wakefield Co.	E-506-507
Hilliard Corp.	E-623
Hunt-Spiller Manufacturing Corp.	C-348
Hyatt Roller Bearing Co.	E-522
Illinois Motive Equipment Co.	Portion of E-587
Ingersoll-Rand Co.	A-105-107-109
International Motor Co.	Portion of C-307
International Register Co.	E-595
Internation Steel Tie Co.	D-401-403-405-407-409-411
Irving Iron Works Co.	E-537-539
Johns-Manville Corp.	C-322-323
Johnson Fare Box Co.	Portion of E-587
Johnston Paint Co., R. F.	E-621
Kelton-Aurand Mfg. Co.	C-345
Kenfield Davis Pub. Co.	E-588
Lang Body Co.	Portion of C-302
Leece-Neville Co.	C-327
Lorain Steel Co.	D-432-433-434-435
Macdonald Mfg. Co.	E-622
Mack-International Motor Truck	Portion of C-307
Mack-Motor Truck Co.	Portion of C-307
Mack Trucks, Inc.	Portion of C-307
Manganese Steel Forge Co.	E-604
Metal & Thermit Corp.	D-418-419-420
Moisselle W lded Rail Joint Co.	D-410
Money-Meters, Inc.	E-607
Morton Mfg. Co.	E-527 and Portion of E-529
Motor Wheel Corp.	C-346
Nachod & U. S. Signal Co.	D-424
National Bearing Metals Corp.	E-591
National Brake Co.	Portion of E-528-529
National Carbon Co.	E-536-538
National Cash Register Co.	C-330-331
National Malleable & Steel Castings	E-540
National Pneumatic Co.	E-508-509-510-511
National Railway Appliance Co.	Portion of C-319
New Departure Manufacturing Co.	C-343
Nichols-Lintern Co.	C-328
Norma-Hoffmann Bearings Corp.	E-592
North East Electric Co.	C-326
Oakite Products, Inc.	E-552-554
Ohio Brass Co.	E-502-503-504-505
Ohmer Fare Register Co.	E-567
Okonite Co.	E-596
OkoniteCallender Cable Co.	E-597
Oxalite Corp.	D-408
Pantasote Co., Inc.	E-515
Perey Mfg. Co.	E-620
Public Service Coordinated Transport	E-594
Pyrene Mfg. Co.	E-561B
Radel Leather Mfg. Co.	C-347
Rail Joint Co.	D-400
Railwaa Age	E-590
Railway Materials Corp.	E-545
Railway Trackwork Co.	D-421-423-425
Railway Utility Co.	E-550B
H. H. Robertson Co.	E-542
Rochester Printing Co.	E-584
Ross Gear & Tool Co.	C-325
Safety Car Devices Co.	Portion of 570
St. Louis Car Co.	E-627
Sattley Co.	E-586
Saums Co., Geo.	E-585
S K F Industries, Inc.	E-598
Skinner Automotive Device Co.	C-344
Spicer Mfg. Corp.	C-303A
Standard Johnson Co.	C-320A
Standard Steel Works Co.	Portion of E-617
Stearns-Stafford Roller Bearing	E-558
Studebaker Corp. of America	C-312-313-314
Templeton Kenly & Co., Ltd.	D-426
Texas Co.	E-625-626
Timken-Detroit Axle Co.	C-317
Timken Roller Bearing Co.	E-605
Tool Steel Gear & Pinion Co.	C-319C
Transit Equipment Co.	E-560
Tuco Products Corp.	E-541-543
Twin Coach Corp.	C-310
Una Welding & Bonding Co.	D-427 & B-205
Union Metal & Mfg. Co.	E-624
Universal Lubricating Co.	E-544
Van Dorn Coupler Co.	E-557
Wadell Engineering Co.	E-518
Walter Motor Truck Co.	C-321
Waukesha Motor Co.	C-318
Westinghouse Co.	E-569
Westinghouse Elec. & Mfg. Co.	E-571-572-573-574
Westinghouse Traction Brake Co.	Portion of E-570
Wm. Wharton, Jr., & Co.	D-416-417
Wheel Truing Brake Shoe Co.	E-547
White Co.	C-311
White Mfg. Co.	E-556
Wilson Imperial Co.	E-559
Winchester Repeating Arms Co.	C-339-340
Wood Steel Co., Alan	E-534-535
Wood Conversion Co.	E-593
Zenith Detroit Corp.	C-305B

Track space on Convention Hall Plaza, immediately in front of the Atlantic City Auditorium, has been assigned to the following companies for the display of street cars: The J. G. Brill Co., Cincinnati Car Co., Consolidated Car Heating Co., Osgood Bradley Car Co., Safety Car Heating Co., St. Louis Car Co., Twin Coach Co.

Third Avenue Railway May Use Trackless Trolleys

Following an investigation of the operation of trackless trolleys in Salt Lake City, as well as experiments made locally, officials of the Third Avenue Railway System, operating in New York City and Westchester County, are understood to favor their adoption for service between White Plains and Tarrytown as soon as the necessary permission can be obtained from the local authorities. An application to operate the new vehicles has been filed with the City Council of White Plains as well as with the authorities in Tarrytown, Greenburgh and Elmsford, where local officials have tentatively given their consent. Official approval is expected within thirty days. If the trackless trolleys are adopted a new carhouse for service and storage will have to be erected in White Plains, as the old carhouse was abandoned when trolley service was suspended several years ago. The present garage is of insufficient size to accommodate any considerable number of new conveyances.

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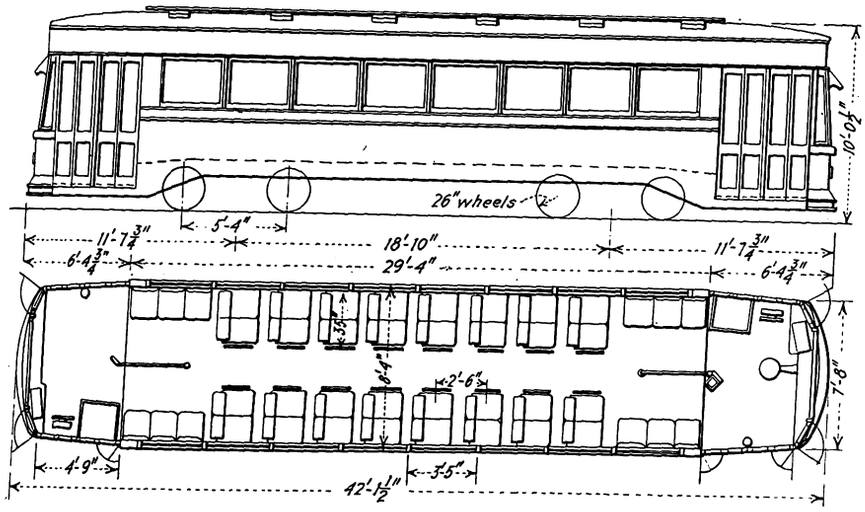
Specifications of Recent Car Orders

Details regarding a number of recent car orders placed with the J. G. Brill Company, as previously told in this paper, are now available. The ten one-man cars ordered for city service by the Delaware Electric Power Company, of Wilmington, Del., are to seat 44 passengers and will weigh complete with equipment, 35,740 lb. They are of the low platform stepless type in general use on that property and embody in their equipment and fixtures an extensive use of aluminum. Five of the cars will be provided with General Electric No. 265 motors, inside hung, four to the car, and five will have Westinghouse No. 510 motors. Air brake equipment is also to be divided between Westinghouse and the General Electric Company. The accompanying plans and specifications show further details regarding the new cars. Delivery is expected to be made during the early part of July.



Elevation and floor plan of Wilmington cars

SPECIFICATIONS FOR DELAWARE ELECTRIC POWER COMPANY CARS

Name of railway	Delaware Electric Power Company
City and state	Wilmington, Del.
Number of units	10
Type of unit	One-man, motor, passenger, city, double-end, double-truck
Number of seats	44
Builder of car body	J. G. Brill Company
City and state	Philadelphia, Pa.
Date of order	April 15, 1929
Date of delivery	July 1, 1929
Weights:	
Car body	16,600 lb.
Trucks	10,000 lb.
Equipment	9,140 lb.
Total	35,740 lb.
Bolster centers	18 ft. 10 in.
Length over all	42 ft. 1½ in.
Length over body posts	29 ft. 1½ in.
Truck wheelbase	5 ft. 4 in.
Width over all	8 ft. 4 in.
Height, rail to trolley base	10 ft. 2¾ in.
Window post spacing	41 in.
Body	Semi-steel
Roof	Arch
Doors	End
Air brakes	Five cars General Electric; Five cars Westinghouse
Armature bearings	Plain
Axles	Brill A.S.T.M. spec., A-20-21
Car signal system	Faraday high voltage
Compressors	Five cars-G. E. Co-27; Five cars Westinghouse DH-27
Conduit	Flexible Duratube
Control	K-35
Door mechanism	National Pneumatic
Doors	Folding
Fare boxes	Cleveland
Finish	Enamel
Floor covering	Flexolith
Glass	Non-shatterable
Hand brakes	Peacock staffless
Hand straps	White, porcelain enamel
Heaters	Consolidated Car Heating Co.
Headlights	Electric Service Supply Co., Keystone
Headlining	Agasote
Interior trim	Mahogany
Journal bearings	Plain-Brill
Journal boxes	Brill M.C.B.
Lamp fixtures	Ivanhoe dome lights
Motors	Five cars G. E.-265; Five cars Westinghouse 510, inside hung
Painting scheme	Orange, cream and red
Roof material	Haskelite
Sash fixtures	Curtain Supply Company
Seats	Brill reversible 201-D type
Seat spacing	30 in.
Seating material	Leather
Slack adjusters	Brill mechanical
Step treads	Kass
Trolley catchers	Earll
Trolley base	Ohio Brass Company
Trolley wheels	Feist, Ohio Brass Company
Trucks	Brill 177-E-1
Ventilators	Brill exhaust type
Wheels, type	Rolled steel 26 in. diameter
Wheelguards or fenders	Parmenter

The five double-truck cars for interurban service on the lines of the Philadelphia & Western Railway will have a seating capacity of 51 passengers and will weigh complete, about 63,000 lb. They will be equipped for two-man operation, and will have both center and end doors. Additional data are supplied in the accompanying table.

SPECIFICATIONS FOR PHILADELPHIA & WESTERN RAILWAY CARS

Name of railway	Philadelphia & Western Railway
City and state	Norristown, Pa.
Number of units	5
Type of unit	Two-man, motor, passenger, interurban, double-end, double-truck
Number of seats	51
Builder of car body	The J. G. Brill Co.
City and state	Philadelphia, Pa.
Date of order	March 25, 1929
Weights:	
Car body	26,070 lb.
Trucks	19,030 lb.
Equipment	17,985 lb.
Total	63,085 lb.
Bolster centers	31 ft. 4 in.
Length over all	50 ft. 6 in.
Length over body posts	40 ft. 8 in.
Truck wheelbase	6 ft. 4 in.
Width over all	9 ft. 7 in.
Height, rail to trolley base	13 ft. 0¼ in.
Window post spacing	32 in.
Body	All steel
Roof	Arch
Doors	Center and end
Air brakes	Westinghouse—AMM
Armature bearings	Plain
Axles	Brill, heat treated
Car signal system	Faraday buzzer
Compressors	Westinghouse DH 25
Conduit	Metal
Control	Westinghouse ALMPC
Couplers	Tomlinson Form 16
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote
Door mechanism	National Pneumatic
Doors	Sliding
Energy saving device	Economy meter
Finish	Lacquer
Floor covering	Flexolith
Gears and pinions	Nuttall, forged steel
Hand brakes	Peacock staffless
Heaters	Railway Utility Company
Headlights	Golden Glow
Headlining	Agasote
Interior trim	Mahogany
Journal bearings	Plain
Journal boxes	Brill M.C.B.
Lamp fixtures	E. S. S. Co's Ivanhoe domes
Motors	Westinghouse 535-B-1 inside hung
Painting scheme	Moss green
Registers	Ohmer
Roof type	Arch
Roof material	Poplar, canvas covered
Seats	Brill reversible 202-B type
Seat spacing	32 in.
Seating material	Genuine leather
Slack adjusters	Truck—Brill mechanical; Car—American Brake Co's
Steps	Folding and stationary
Step treads	Irving
Trolley base	U.S.—20
Trolley wheels	Westinghouse 60-B
Trucks	Brill M.C.B.-2X
Ventilators	Railway Utility Company
Wheels	Standard Steel Works, 30 in. diameter

The two cars recently ordered by the Newell Bridge & Railway Company of Newell, W. Va., are being built by the Kuhlman Car Company, Cleveland, Ohio. They are intended for city use, and will seat 42 passengers each. The accompanying table contains additional information as to dimensions and equipment.

SPECIFICATIONS FOR NEWELL BRIDGE & RAILWAY COMPANY CARS

Name of railway	Newell Bridge & Railway Company
City and state	Newell, W. Va.
Number of units	2
Type of unit	Two-man, motor, passenger, city, double-end, double-truck
Number of seats	46
Builder of car body	Kuhlman Car Company
City and state	Cleveland, Ohio
Date of order	April 11, 1929
Weights:	
Car body	16,760 lb.
Trucks	8,600 lb.
Equipment	6,640 lb.
Total	32,000 lb.
Bolster centers	23 ft. 4 in.
Length over all	45 ft. 3 in.
Length over body posts	33 ft. 3 in.
Truck wheelbase	4 ft. 10 in.
Width over all	8 ft. 6 in.
Height, rail to trolley base	10 ft. 5 in.
Window post spacing	42 in.
Body	Semi-steel
Roof	Arch
Doors	End
Air brakes	Westinghouse straight air
Armature bearings	Plain
Axles	Brill standard
Car signal system	Consolidated
Compressors	D.H. 16
Conduit	Flexible
Control	K 35 KK
Door mechanism	National Pneumatic Company
Doors	Folding
Fare boxes	Cleveland
Finish	Enamel
Floor covering	Wood mat. strips
Gears and pinions	Western Elec. & Mfg. Company
Glass	D. S. A. selected
Hand brakes	Peacock staffless
Hand straps	Electric Service Supply Company sanitary grip
Heat insulating material	Celotex
Heaters	Consolidated Car Heating Company
Headlights	Crouse-Hinds portable
Headlining	Agosote
Interior trim	Mahogany
Journal bearings	Plain
Journal boxes	Brill 3¼x6 in.
Lamp fixtures	Westinghouse
Motors	Westinghouse 508-A, inside hung
Roof material	Wood and canvas
Sash fixtures	Adams & Westlake
Seats	Brill
Seat spacing	Longitudinal
Seating material	Rattan
Steps	One folding; one stationary
Step treads	Kass
Trolley catchers	Knutson
Trolley base	Westinghouse
Trolley wheels	Westinghouse
Trucks	Brill 177-E-1-X
Ventilators	Brill
Wheels, type	Rolled steel, 26 in. diameter

J. G. Brill Company, Philadelphia, Pa., has brought out an attractive catalog on Brill master unit cars. Features maintained for the cars are light weight, quick acceleration, riding comfort, low-level platforms and floors, passenger appeal, maximum safety and circulating passenger load. These unit cars will be either single end or double end, double truck or single truck.

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Electric Terminal Development Gets Underway in St. Louis

Preliminary work of clearing away buildings on the site of the proposed electric passenger and freight terminal in the downtown section of St. Louis, Mo., which is proceeding under the direction of engineers of the St. Louis Electric Terminal Railway, sets in motion a development that will ultimately involve the investment of millions of dollars in that vicinity in warehousing, shipping and transportation facilities.

The elevated and subway tracks included in this improvement, together with the terminal warehouse which is to be constructed on High Street north of Lucas Avenue, will, it is estimated, cost approximately $5,000,000. Other commercial developments and improvements sponsored by private interests are expected to call for the expenditure of an equal amount, and a considerable section of St. Louis, which has made little progress in recent years, will undergo extensive development.

Plans call for the establishment of a subway area under and east of High Street and between Washington and O'Fallon Streets in which will be located a terminal yard. The proposed passenger station will be built at the Washington Street end of this area, and from this point through trains will be operated over the lines of the Illinois Traction System to Venice, Granite City and other points in central Illinois. North of the passenger station development and over the subway area it is proposed to erect a terminal warehouse approximately twelve stories in height in which industries and wholesale organizations will be housed, thus affording direct freight trackage facilities over the Illinois Traction System and its steam railroad connections. The subway will also permit of a similar service to other warehouses and buildings which can be constructed over the air rights thus created.

The entire plan owes its conception to the necessity, long recognized, of providing additional freight facilities for the several carriers operated by the Illinois Terminal Railroad System.

Brown Boveri Organizes New Subsidiary

For the purpose of placing all electrical and mechanical operations exclusive of shipbuilding under one management the American Brown Boveri Electric Corporation has organized a subsidiary corporation to be known as American Brown Boveri. Company, Inc. At the company's plant at Camden, N. J., are produced steam turbines, blowers, compressors, transformers, mercury arc rectifiers, electric locomotives and railway equipment, under designs, processes and patents of Brown Boveri & Company, Ltd., of Switzerland.

American Brown Boveri Company, Inc., owns the entire capital stock of the Condit Electrical Manufacturing Corporation, which company will continue the manufacture and sale of its electrical control and protective equipment, through its own organization. Officers of the company are George A. Burnham, president; Maurice L. Sindeband, vice-president; Joseph T. Graham, secretary and treasurer, and William S. Edsall, general sales manager. Directors, in addition to Messrs. Burnham and Sindeband, are William M. Flook, Allen Curtis, Edward N. Goodwin, William F. Ingold and Theodore G. Smith.

In addition to his duties as president of Condit Electrical Manufacturing Corporation, Mr. Burnham has, during the last nine months, been assistant to the president of the American Brown Boveri Electric Corporation.

Toronto Contemplates Purchase of 110 Cars

Specifications have been prepared and bids will be asked on 110 new cars for city service in Toronto, according to Commissioner E. J. Lennox of the Toronto Transportation Commission. Recommendations will be laid before the Board of Control as soon as the necessary data as to prices, time of delivery, etc., have been assembled and considered. The new cars are expected to cost more than $1,600,000, and payment will be made from the rehabilitation fund which has been accumulated for this purpose.

Operating revenue has shown a consistent increase in the Canadian city over a period of years, and the new equipment will be provided to meet growing requirements and to provide necessary replacements. Practically all of the 950 cars owned by the Toronto Transportation Commission are in service during the morning and evening rush hours. While no details regarding the design of the proposed cars have been made available, it is understood that a number of them will be motor trail cars.

New Trail Cars for Service Between Baltimore and Annapolis

Plans involving the expenditure of over $250,000 to improve its passenger service on its North and South Shore divisions have been announced by Herbert A. Wagner, president, the Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md. Contracts have been placed with the J. G. Brill Company to build nine new trail cars which will embody many novel features making for passenger comfort and luxury. The new trailers will be constructed of steel and mounted on Brill 27 M.C.B. trailer trucks. The cars will be 58 ft. 1 in. long and will weigh about 60,000 lb. Windows will be of plate glass encased in metal sash. Seats will be provided for 38 passengers in the main compartment and 20 in the smoker. The seats will have double spring cushions, upholstered in brown Spanish leather. Cars will be electrically heated, with thermostatic control, and will be provided with a lavatory. Floor covering will be interlocking rubber tile of buff and green. Exterior finish will be the W.B.&A. standard green with gold lettering; interior trim will be in mahogany finish with ivory ceilings. Delivery is scheduled for July.

Plans also call for the complete renovation of seventeen of the present motor cars so that they will conform in general design with the new trailers.

Seattle Plans Work on Elevated Street Railway Trestle

With the ordinance passed and signed by the Mayor of Seattle providing for the removal of a large portion of the Whatcom Avenue elevated street railway trestle, the reconstruction of the existing section along West Spokane Street and rebuilding of a new section from East Marginal Way to First Avenue South, will proceed within the next few weeks. The trestle in its present state is considered unsafe, and approximately $100,000 would have to be expended in repairs if its use is to be continued, street railway officials have advised.

A. E. Pierce, chief engineer of the Municipal Railway estimates that the cost for reconstructing the existing section along West Spokane Street and the rebuilding of a new section from East Marginal Way to First Avenue South will be approximately $100,000. The work will require about 215 tons of rail and 660,000 bd.ft. of lumber. The paving of First Avenue South, which will require 182 tons of rail, will cost approximately $80,000.

New Shops for Cleveland Union Terminal

In anticipation of the opening of the Van Sweringens' new Union Terminal, which is scheduled for January, 1930, bids are being received by the Cleveland Union Terminals Company for the construction of an electric locomotive repair shop and two inspection sheds for electric locomotives. The repair shop and one inspection shed will be located in the Collinwood yards of the New York Central Railroad, where electric operation of the lines running into the terminal will begin. The other inspection shed will be located in the Linndale yards of the Big Four, where electrification is to end.

The repair shop building is to be of concrete, brick and steel construction, with oil proof wood floor and will be 223 ft. long and 171 ft. wide. It will contain one large room, with a balcony running around all four sides. Five tracks will run the entire length of the building; three of these will be repair tracks, with pits beneath, one will be an oil wiping track, and the other a storage track for wheels and trucks. The shop will be equipped to handle work on ten locomotives. The balcony will contain rooms for a blacksmith shop, air compressor room, electric repair shop, offices, battery room, tool room, air brake room, motor generator and storage and locker rooms.

Each inspection shed will be steel and concrete, 198 ft. long and 39 ft. wide, with single tracks running through each side. The pits will be equipped with heating coils to thaw out locomotives during the winter.

Studebaker Makes Commercial Car Appointments

Appointment of three division commercial car representatives has just been announced by C. H. Wondries, manager of the Studebaker commercial car division. Each man has been assigned a specific territory and will work with the branch organizations in their respective territories in promoting commercial car business.

J. L. Engels, formerly sales promotion manager for the commercial car division, has been appointed the Western division commercial car representative. His headquarters will be at San Francisco and his territory that under the jurisdiction of the Portland, San Francisco and Los Angeles branches.

C. H. Miller has the Eastern territory with headquarters at Philadelphia. His territory includes the Boston, New York, Buffalo, Philadelphia, Washington, Pittsburgh and Cleveland branches. He was formerly the commercial car representative for the Philadelphia branch.

T. E. Connor, formerly commercial car representative for the St. Louis branch, has the Middle Western division. His territory includes the Detroit, South Bend, Cincinnati, Kansas City, St. Louis, Omaha, Chicago and St. Paul branches.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

McGRAW-HILL PUBLISHING COMPANY, INC.
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An Outstanding Contribution Toward Orderly Civic Development

WITH the presentation of the final report of the Regional Plan of New York and Its Environs a long forward step has been taken in American civic progress. This is the first time in history that so comprehensive a plan has been prepared to guide the future development of a large urban and suburban district. All previous city planning projects fade into insignificance beside the remarkable undertaking just completed. When Major L'Enfant prepared a plan more than 100 years ago for the future development of the city of Washington, he was thinking of a Capital District of 100 square miles, which he believed might some day have as many as 500,000 inhabitants. The area covered by the Regional Plan of New York embraces more than 5,500 square miles with an estimated population of 20,000,000 by 1965.

The significance of the Reginal Plan, however, lies not in size alone, but rather in its broad conception of all phases of civic development. The provision of adequate public transportation facilities occupies a prominent place. In the past, surprisingly little consideration has been given to transit facilities by city planners. Highways, parks, playgrounds, water supply, etc., have been recognized as important factors, but transportation needs usually have been overlooked. This mistake has not been repeated by the Regional Plan of New York. In fact, the entire plan is built upon a network of rapid transit lines, electrified railroads and high-speed motor highways.

The projects outlined in the report are so colossal that their full magnitude is difficult to grasp. Tremendous obstacles lie in the path of some of these proposals. For example, it is planned to connect railroads entering the district, and operate through service over electrified distributing loops. The railroads which have already been electrified, however, have adopted different systems and installed them on hundreds of miles of track. To standardize their equipment for joint operation over common track would involve so many difficulties that the practicability of this feature of the plan seems extremely doubtful. Nothing could illustrate better than this the need for community planning. Had the Regional Plan of New York been adopted 25 years ago, the present confusion of systems probably would not have occurred.

With certain details of the proposed plan not everyone will agree. Modifications of various features probably will be found necessary in the future. The important point, however, is that a comprehensive program has been prepared for the development of the entire metropolitan area comprising many political subdivisions, but closely related socially and economically. Its execution will require the outlay of enormous sums, but by considering the problem in its entirety, it is estimated that the cost will be considerably less than that of meeting one by one the needs of this growing region. Other communities might well follow the lead of New York in this endeavor to approach the problem of regional planning on a broad and comprehensive basis.

Car Survey Provides Striking Evidence

SO many advantages may be found in the replacement of old cars with new ones that it seems remarkable that car purchases have not been more widespread. Wherever new cars of the modern, lightweight type have been substituted for old, heavy, slow, dilapidated rolling stock, the resulting economy, improvement of public relations, and effect upon earnings have in practically every instance more than justified the investment. The survey of new car experience, of which the third and concluding article is published in this issue, summarizes these results for many properties representing a wide range of local conditions.

Far too much emphasis has been placed on the savings possible with modern equipment, and too little attention has been given to the possibilities for providing an improved service to meet the competition of other forms of transportation. The new cars that have been built are in general equipped with greater motor capacity in proportion to their weight than those they replace, and should be able to make considerably higher schedule speeds than the average maintained by most properties. Yet few companies show any material increase in speed with their new equipment. In many instances the new cars are placed on the same lines with old ones that cannot maintain the pace. Where full advantage has been taken of the possibilities of the new equipment, better service and reduced labor cost have been added to the savings made in power and maintenance.

Perhaps the most surprising result of the survey is that, even with the limitations that have surrounded the use of new equipment purchased during the past several years, the results on most of these properties have been uniformly favorable. It is no mere chance that those companies which have been most prominently identified during recent years as purchasers of new cars have shown better results, both in revenue and in expenses, than comparable properties that are clinging to obsolete equipment. Nor can the financial improvement be laid to the size of the cities in which these railways operate, for the gains are well distributed among small, medium, and large properties. When it is shown on the basis of these returns that a new car will save $1,268 in power and equipment maintenance alone, disregarding for the moment track and transportation savings, and greater attractiveness and earning power, it is apparent that the investment in new cars is not only justified, but is demanded as a matter of sound business policy.

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A Worthy Rival of the Automobile

LAST year the Pittsburgh Railways received from the Osgood-Bradley Car Company two experimental cars that were designed to appeal to the riders through better performance and greater attractiveness. Graceful lines and proportions, high acceleration and braking rates, smooth and quiet operation, comfortable seats, ample aisle room for rush-hour travel, low step heights and economical operation were the major objectives sought in these cars. The new cars were frankly experimental. They included practically every innovation in car design tried up to that time, with the possible exception of the substitution of aluminum in the body framing. The purpose was to study in actual operation those factors that were likely to appeal to the passengers and to determine the practicability of many equipment features proposed for the improvement of car performance.

Now, after a year's trial of the two cars the railway has secured a third experimental car. It differs from the two previous cars principally in that aluminum was used in place of steel for the car body framing and was substituted wherever possible in the various equipment items. It is also equipped with the latest development of worm-drive trucks and high-speed, spring-suspended motors. The floor plan was changed a little and a center exit door was used instead of a rear door exit. It is worthy of particular note that this third car is again equipped with electro-pneumatic control and dynamic brakes. The designers went further this time by providing foot operation of the control and dynamic brakes, a feature that is expected to prove helpful in one-man operation.

In the attempt to insure maximum operating speed, this unit seems to go the limit with four 50-hp. motors on a car which only weighs 27,000 lb. Aluminum was used to such an extent that the car body with its equipment is reported to weigh only 14,000 lb. The use of four 50-hp. motors on so light a car makes it a worthy rival of the automobile. With its pedal-operated control and brakes it is capable of getting away to a fast start in traffic, with brakes designed for quick and smooth retardation.

The question of first cost still remains as an important consideration in the design. The many automatic devices incorporated, and the aluminum construction must justify themselves economically before the trend of future cars can be predicted. To this fact the Pittsburgh management is keenly alert, and it is rendering a distinct contribution to the industry in its pioneering effort to work out in the laboratory of experience the type of equipment best adapted to meet the competition of the automobile.

Far West Leads in Pick-up and Delivery

EVER since the advent of the motor truck the electric railways engaged in freight service have been struggling with the pick-up and delivery problem. Most executives have leaned toward the opinion that this service is a natural corollary of the business, but they have hesitated to embark upon the enterprise for fear that the shippers would not support the necessary extra charges. Others have maintained that this is a service outside of their province; that the larger shippers do not expect it and would not pay for it, and that where pick-up and delivery are desired the function should be left to independent truckers.

Last year a committee of the Central Electric Railway Association went on record in favor of the establishment of pick-up and delivery throughout the territory served by the Central Electric properties. While some progress has been made, the suggestion has not been generally adopted as yet. Apparently, individual roads hesitate to adopt this innovation until a general program for all of the carriers in the territory is worked out and agreed upon. Taking the industry as a whole, comparatively little has been done in the way of providing pick-up and delivery, although the subject has been under active discussion for several years.

In contrast to the general situation, the Pacific Electric Railway, of Los Angeles, Cal., recently instituted extensive store-door collection and delivery service as part of its freight business. This was undertaken for the dual purpose of meeting competition and supplying better service to the shipper. The necessary arrangements were effected by the company through contracts with reliable truckmen in the various communities along its lines. The better class of truck operators have been quick to see the advantage of an arrangement which promised to broaden considerably their sources of revenue. So satisfactory has the arrangement proved that the privilege of becoming allied with the railway in this progressive enterprise is eagerly sought. Thus have the two agencies of transportation been drawn together in mutually satisfactory co-operation.

All doubt as to the reception that the new service would meet at the hands of the shippers and the public, was soon dissipated. The original list of 24 stations has been expanded to 44, with further expansion in prospect. It is also significant that some 200 industries not previously served by the Pacific Electric Railway have become shippers over the line due to the increased convenience of the new service. Announcement of its expansion to meet growing requirements indicates that this commendable initiative on the part of the Pacific Electric Railway is meeting with the measure of success which it deserves.

A New Outlook in Toledo

TOLEDO has written into its history for the past two years some very interesting chapters. At the beginning of 1928 the transit situation in that community was a rather delicate one. The railway and the city had taken issue on a number of questions and it seemed as though events were leading from bad to worse. But this condition was suddenly reversed with the signing of an agreement which proved to be the turning point in the affairs of the Community Traction Company. Under the terms of this agreement, a supplemental ordinance to the Milner franchise of 1920, the city agreed to prohibit all competing transportation lines within a quarter mile of any of the company's street car or bus lines, giving the railway a virtual monopoly of all transportation service in the city. In return the company agreed to pay for a traffic survey, to set up a five-year reconstruction program amounting to $560,000, to purchase new buses, to set up a replacement fund of $230,000 and to re-route its existing lines and expand its service into new areas.

Further, the company agreed to advance $900,000 without interest for ten years to cover the accrued debts in the stabilizing fund. It invested in a number of new

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buses, abandoned superfluous routes, established new routes in districts previously unserved, increased the motor capacity on a number of its cars, re-spaced car stops to reduce the running time, re-scheduled its service for higher speeds, instituted a safety drive and in several other ways attempted to give better service to more people. None of these moves were particularly spectacular, but each contributed to the betterment of the whole system.

Results have been most encouraging. Up to the first part of 1928 the riding had been steadily falling off and earnings had been constantly decreasing. Soon after the improvements outlined had been well started, however, more people began to patronize the system. In the succeeding months a number of records were established, consistently showing more passengers than in the corresponding months of the previous years. Operating expenses were also reduced by substituting buses on unprofitable lines and effecting numerous economy measures, so that net earnings show large increases for the periods. Increases in riding are expected to continue. The company is not stopping with the improvements it has already made; in fact, it is only beginning its track rehabilitation and equipment replacement programs. In view of the results accomplished in so short a period, the outlook in Toledo is bright indeed.

San Francisco Needs a Transit Policy

SAN FRANCISCO is squirming under the lash of the whip laid upon it by its own city engineer, M. M. O'Shaughnessy, in his report on the street railway requirements of the city with special consideration to the unification of existing facilities. Mr. O'Shaughnessy does not mince his words. He never has. He stands high in his profession, and San Francisco has confidence in him that almost amounts to veneration.

Mr. O'Shaughnessy has laid down many fundamentals for which electric railways have long been contending. He is for improved routing. He is against parking. He is against the jitney. He is against the imposition on the railway of paving requirements except those incidental to making track repairs, and any additional cost of street paving occasioned by the presence of tracks. He is for the skip stop.

Moreover, he declares that it is axiomatic that, from the standpoint of the riding public, the best service can be provided by a unified street railway system with universal transfers. He says without equivocation that a continuation of the operation on the 5-cent fare under private ownership means that both the quality of the service and the condition of the property will become poorer and poorer year by year. If Mr. O'Shaughnessy had set about writing the terms of Magna Charter for the electric railways, he could hardly have done better.

The report reviews the entire situation courageously and is fundamentally sound in demanding that the city adopt a policy and do something about it. The seriousness of the situation is reflected in comment by the *Chronicle* stressing the fact that the city does not yet know what it is going to do when the franchises of the private companies expire. That is both lamentable and inexcusable. The same commentator adds that Mr. O'Shaughnessy's report furnishes a mass of information useful in helping the city make up its mind. Certainly that is true. As the report says, the city should either carry out the charter mandate by taking over and operating the systems of the private companies, or adopt a plan whereby the private organizations can continue to render service of a character necessary for the progress and development of the community. In the light of that statement it is no wonder San Francisco squirms under the lash Mr. OShaughnessy has laid upon it.

Subsidy by General Taxation Is Unsound

IN THE REPORT on San Francisco's transportation problems by M. M. O'Shaughnessy, city engineer, he assumes that the city stands committed to the policy of municipal ownership and operation of its street railways and thereupon develops a proposal for the retention of a 5-cent fare, frankly recognizing the deficits that will accrue thereunder, and proposing to make up the deficiency from general tax funds.

There ELECTRIC RAILWAY JOURNAL differs with the report radically and emphatically. It is bad enough for San Francisco to stand committed to a policy of public ownership. The answer to that is to reverse the policy before the city gets further into that bottomless cesspool of constant financial and political turmoil. But above all things, it is a fundamental mistake to put an operating management—whoever it might be—into the dilemma of attempting to provide efficient transportation service that will keep pace with the city's growing requirements, handicapped with a 5-cent fare accompanied by a deficit to be made up from general taxation. That just can't be done, and it is flying in the face of public psychology to attempt it. Under such a plan, the whole weight of public opinion presses toward keeping the deficit and the tax rate at a minimum, with the inevitable result that service will seek the level of bare necessity with the maximum crowding and inconvenience that the public will tolerate.

Mr. O'Shaughnessy justifies this recommendation on the ground that a portion of the burden of maintaining a high grade transportation service should fall on the taxpayers whose properties and business are directly benefited, as well as on the rider who uses the service. The JOURNAL has little quarrel with that reasoning. In fact, the proposal to put a readiness-to-serve charge upon the benefited property is merely another step toward establishing an equitable distribution of the costs of transportation service between car riders and property owners that is so strongly advocated and clearly explained by the city's engineer in discussing the unfairness of present paving charges borne by the railways. But the report proposes that all property and business carry the burden of the operating deficit instead of the property specially benefited by the location of street railway lines. Rather than permit the deficit to recur year after year to plague the operating management, it should be wiped out through proper distribution of capital charges. The only available method of accomplishing the result sought would be to distribute a portion of the capital cost of the system as a benefit assessment against the property affected, in proportion to the benefits received, thereby wiping out a substantial portion of the fixed charges. This would represent application to a street railway system of the plan suggested for rapid transit in several cities. It would with one stroke distribute the costs of transportation service equitably and at the same time avoid that bothersome deficit that would be a constant bone of contention and a continual obstacle to good service—just as it has proved to be in New York.

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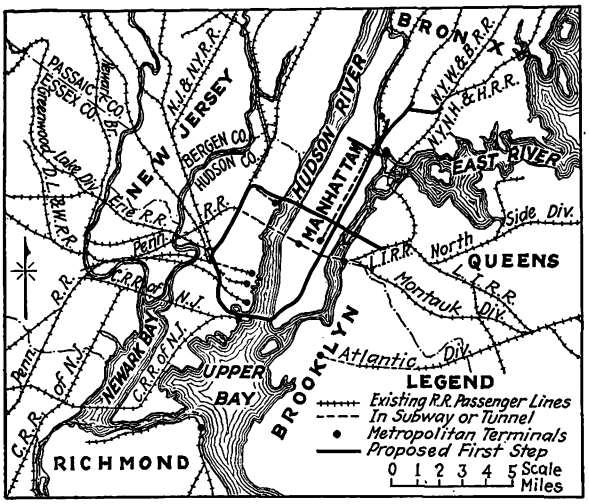
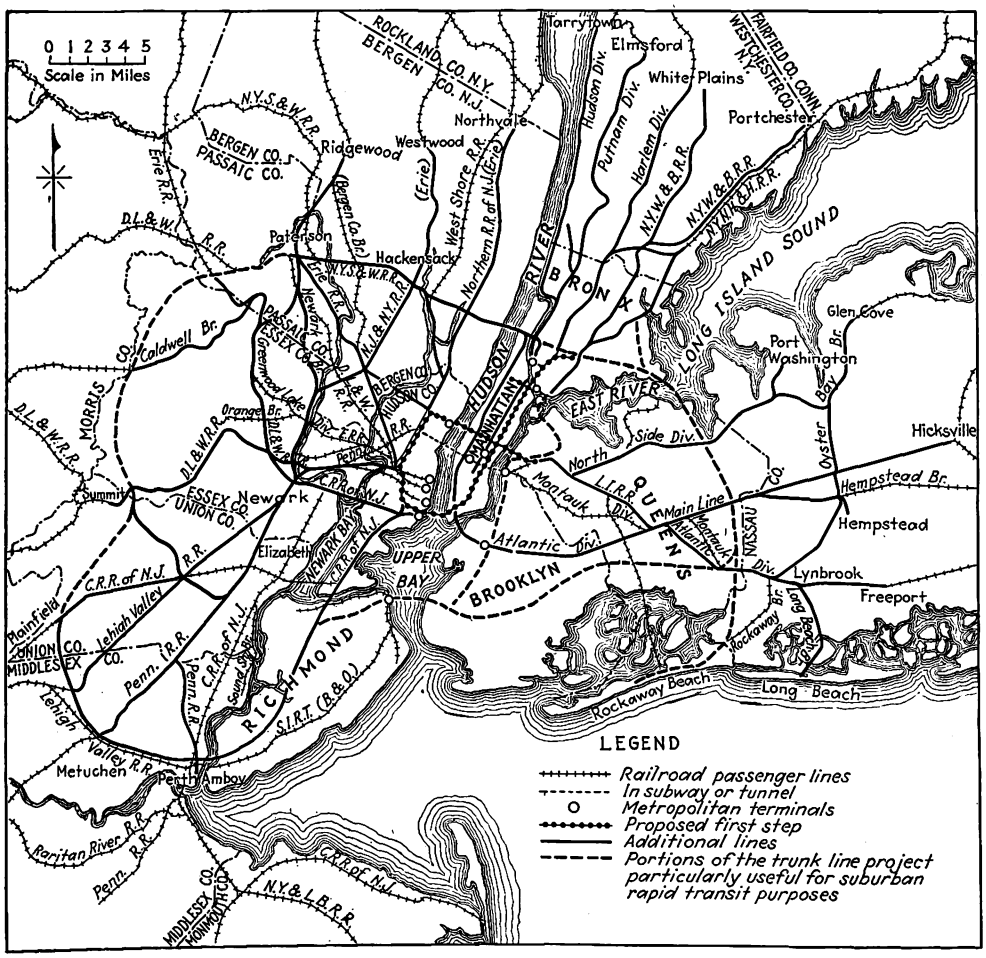


Transportation

Future requirements of this Metropolitan District analyzed in reports made by the Regional Plan of New York and Its Environs. Separate rapid transit system for commuters and co-ordination of trunk line railroad terminal operations proposed. Highways, parkways, bridges, tunnels and airports also included in comprehensive recommendations.



Interstate loop rapid transit system with extensions to the north and east is proposed as a first step in the solution of the commuter problem of the New York metropolitan district. The ultimate plan includes the utilization of a considerable mileage of trunk line railroads as well as the construction of numerous additions and connections, as shown on the lower map

WITH the object of securing better distribution of population, providing improved means of transportation, reducing congestion, and generally making the metropolitan district a more desirable place in which to live, an elaborate report has been prepared by the Regional Plan of New York and Its Environs. The proposed plan is the result of seven years work, carried out by engineers, economists and other experts at an expense of more than $1,000,000. It covers not only New York City but all of Long Island, and territory in the states of New York, Connecticut and New Jersey lying within 40 to 50 miles of the New York City Hall and dependent upon the metropolis for shopping, working and recreation. This area includes 421 separate communities and contains 5,528 square miles.

Over this vast region, which is so closely bound together by common interests that it must be treated as a unit, the new plan spreads a network of many miles of highways, parkways, trunk line extensions, and rapid transit lines, tying them together with new bridges and tunnels wherever necessary and interspersing them with new parks, playgrounds and aviation fields. These enterprises, it is proposed, shall be scheduled for completion prior to 1965. They are part of a program under which it is expected that 20,000,000 people will be able to live more comfortably in the region than 10,000,000 do at the present time.

The general appearance of the plan, as laid down on the map, is of a series of concentric circles, barred like a gridiron, but with the grids large enough so as not to impose a close rectangular system of layout. These represent the highways, parkways, railways and rapid transit systems. They are laid out with the idea of enabling residents to go from one outlying section to another without passing through the congested portions of the city, as well as to give easy access to the central sections.

The plan assumes that Manhattan will remain the population center of the region, but that it will be closely rivaled by the western tip of Long Island and the communities on the west bank of the Hudson River. It is expected that New Jersey will grow with great rapidity when its transportation facilities are developed

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Facilities Planned *for* 20,000,000 People

and its waste lands, prominent among which are the Hackensack Meadows, are reclaimed.

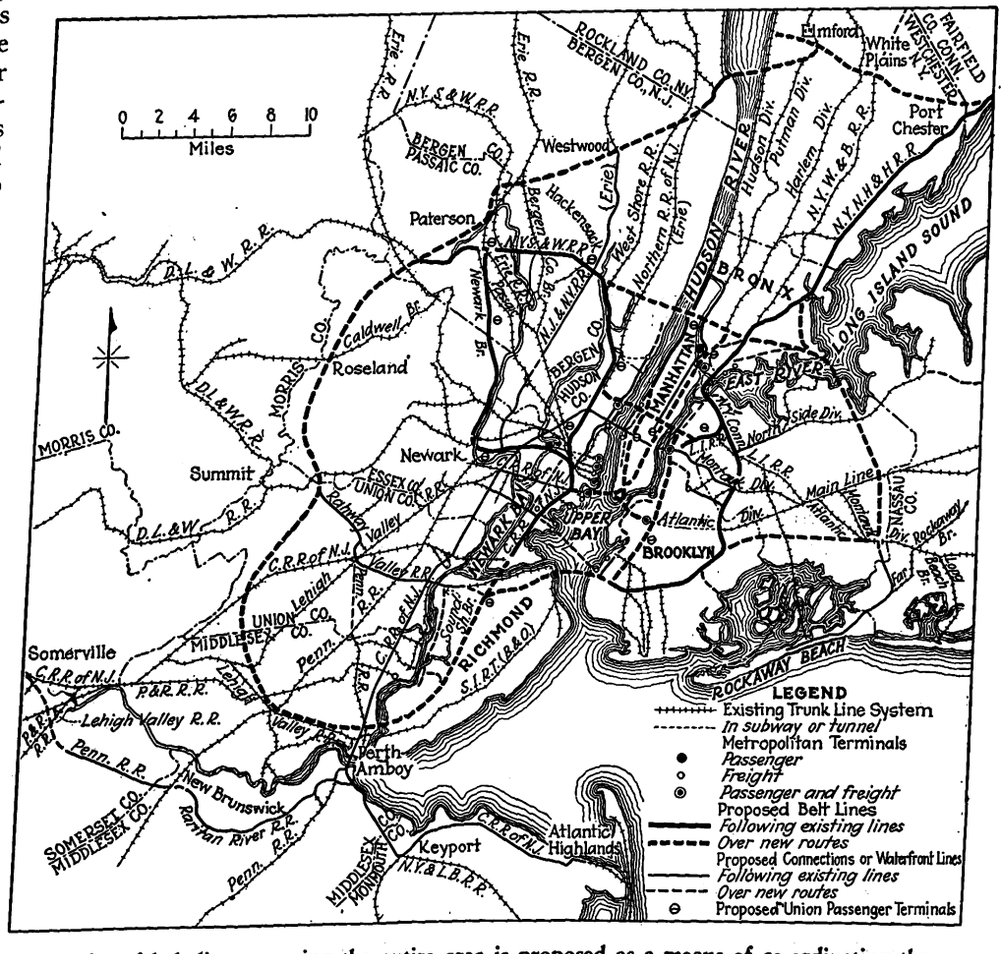
Studies show that about two-thirds of the railroad passengers brought into the city are commuters. The remaining third, numbering at the present time nearly 100,000,000 annually, will have increased to about 270,000,000 by 1965. Suburban rapid transit facilities are now furnished entirely by the trunk-line railroads in trains operated over the same tracks that are used for other types of railroad business. Commuter traffic has been increasing at a rapid rate and now presents so serious a problem for the railroads that it is generally admitted that special facilities for it must be created within the central part of the region. If the special suburban rapid transit facilities proposed within the central areas are carried out to tap the railroad lines beyond these terminals the latter would be enabled to deal adequately with the needs of long-distance travel, which was originally their primary function.

The proposed suburban rapid transit system has been developed with regard for its relationship to the other features of the Regional Plan, especially the existing and proposed trunk-line railroad and city rapid transit systems. The locations of existing and future sub-centers, the proposed highway system, and the best utilization of land have all had an important influence on the selection of routes.

The first step proposed is a loop connecting Manhattan and New Jersey, hooked up on the east with the Long Island Railroad and on the north with the New Haven and the New York, Westchester & Boston, as shown on the map on page 696. This will require tunnels under the Hudson at 57th Street and at a point near the Battery, and other tunnels under the East and Harlem Rivers, as well as a deep level subway in Manhattan.

The ultimate plan presupposes the electrification of most of the railroads handling commuter traffic or the substitution of additional trackage for electrical operation, either under, over, or adjacent to the existing railroad rights-of-way. In New Jersey it would include an area within a radius of about 20 miles from the New York City Hall and in Westchester and Nassau Counties in New York an area within a 25-mile radius from the City Hall.

At the beginning commuters coming in from New Jersey on existing railroads not yet electrified will have to change cars in order to enter the main system, but as



A series of belt lines covering the entire area is proposed as a means of co-ordinating the terminal operations of the trunk line railroads

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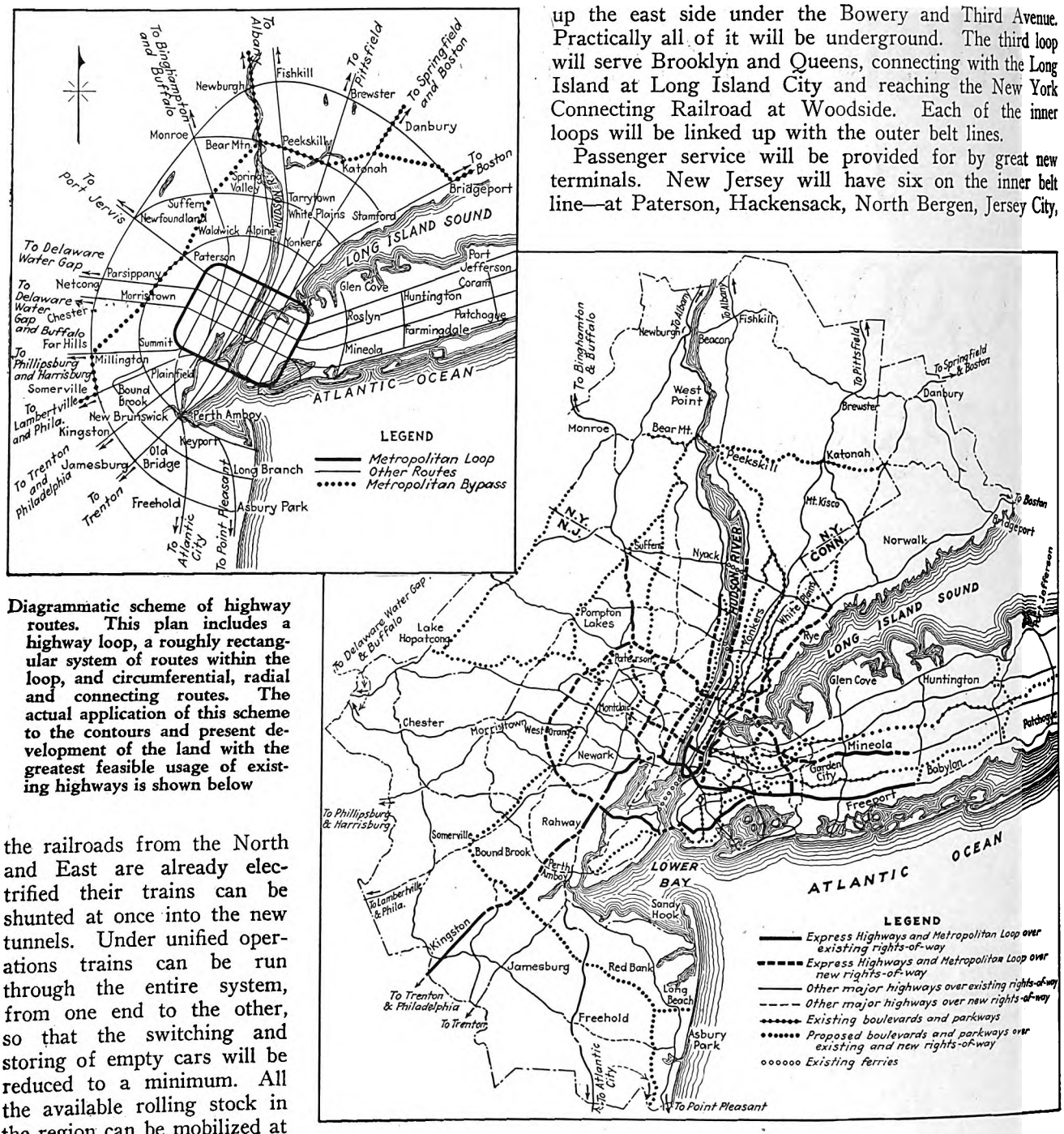

Diagrammatic scheme of highway routes. This plan includes a highway loop, a roughly rectangular system of routes within the loop, and circumferential, radial and connecting routes. The actual application of this scheme to the contours and present development of the land with the greatest feasible usage of existing highways is shown below

the railroads from the North and East are already electrified their trains can be shunted at once into the new tunnels. Under unified operations trains can be run through the entire system, from one end to the other, so that the switching and storing of empty cars will be reduced to a minimum. All the available rolling stock in the region can be mobilized at any time where it is most needed. These proposals coincide in general with plans previously advocated by the North Jersey Transit Commission and the Port of New York Authority.

To meet the growing needs of trunk-line railroad freight traffic the plan begins by laying down an outer belt line, passing around the heart of the region, through New Jersey, Long Island, Westchester County and a corner of Connecticut, at an average distance of about 20 miles from the City Hall. All railroads entering the region will be connected with this belt line, which will be partly new construction and partly along existing railway routes. By means of this belt line and its connections any car from any railway can be switched to any point along the outer rim of the region. Car ferries will become obsolete.

Three inner loops are proposed. One will circle the Jersey shore opposite Manhattan. A second will run down the west side of Manhattan to the Battery and up the east side under the Bowery and Third Avenue. Practically all of it will be underground. The third loop will serve Brooklyn and Queens, connecting with the Long Island at Long Island City and reaching the New York Connecting Railroad at Woodside. Each of the inner loops will be linked up with the outer belt lines.

Passenger service will be provided for by great new terminals. New Jersey will have six on the inner belt line—at Paterson, Hackensack, North Bergen, Jersey City, Newark, and a point in Clifton southwest of Passaic. Manhattan will have a new terminal in the neighborhood of 178th Street and Amsterdam Avenue and probably another at 60th Street and the Hudson River. The Bronx will have a terminal at 149th Street and Mott Avenue. Queens will have one near Queens Plaza, Brooklyn will have one near Prospect Park Plaza, and one is planned south of Port Richmond.

By the aid of these terminals and the lines which will serve them, a passenger coming into the region by trunk-line railroad will be taken directly without change of his means of conveyance, to any community in the 50-mile radius.

Like the railway and rapid transit systems, the proposed highway system for the region is based upon a loop, or series of loops. The principal one of these will run at an average distance of about 12 miles from the New York City Hall. Three inner routes will sup-

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plement the loops. Nine north-and-south routes are indicated. Two of these will traverse Manhattan, following the lines of the west side elevated speedway, already authorized, and the proposed east side boulevard. Five will run through New Jersey. One, starting in Richmond Borough, will pass through Bayonne and run close to the west bank to the Fort Lee Bridge. Others will roughly parallel it further to the west, giving New Jersey cities convenient north-and-south connections. The remaining two routes will be on Long Island.

Twenty "radial routes," extending outward from the loop, will tap Long Island, Westchester County, parts of Connecticut, the upper Hudson along both banks, Western and Southern New Jersey, and the Interstate park and other recreation areas. The main routes will be devoted to express traffic, and taken as a whole will enable through travel to bypass the points of greatest congestion.

In addition to the new highways the report proposes a chain of parkways and boulevards encircles the entire region. Thirty-nine major routes are suggested, connecting the important outlying parks and swinging in a great circle around New York City from Long Branch, N. J., to the south shore of Long Island. These are so planned as to take advantage of the existing scenic opportunities, following river and shore lines wherever possible and traversing the Watchung and Ramapo Mountain chains and the rolling country of Westchester and Long Island.

The proposals include an almost continuous ring of open spaces, encircling the region. The recommendations for the more congested centers of the region are limited by the prohibitive expense of the land in most cases. The report also suggests that the value of water reservations, private golf courses and even cemeteries as "lungs" for the city population be taken into consideration.

A further source of breathing space, as well as an adjunct to the transportation system, will be the airplane landing field. The report advocates the purchase, as soon as possible, of sufficient land for sixteen civil airports, in addition to the 22 airports of all kinds now existing in the region.

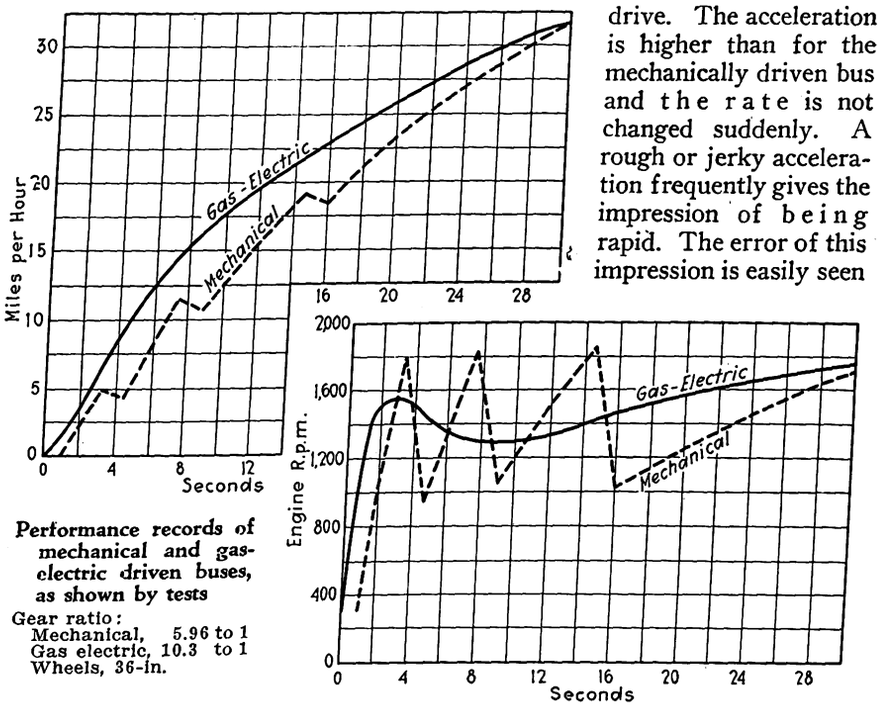
Though no figures were given out as to the cost of carrying out the plan, it is believed that they will run into the billions. The total expense, however, probably would not exceed the cost of emergency measures which would have to be taken to meet the needs of the growing city if no general plan existed, and in the long run the plan would undoubtedly result in large economies for the region as a whole and for every community affected.

Acceleration Rates Compared for Gas-Electric and Mechanical Drive Buses

By W. H. McLaughlin
General Engineer Westinghouse Electric & Manufacturing Company

IN ORDER to compare the advantages of electrically driven and mechanically driven buses, tests were made by the Westinghouse Electric & Manufacturing Company on a chassis equipped first with one type of drive and later with the other. The results are thus entirely comparable because the same engine was used throughout and the difference in the total weight represents the fundamental difference between the conditions of the tests. A graphic picture of what occurred during the acceleration of the two buses, is given in accompanying curves, in which the results of the test have been summarized. These show the performance of the mechanical drive using the four speeds of a standard transmission and portray the average initial delay as actually measured. The various "steps" in the acceleration are due to the loss of bus speed while the operator is shifting gears. The curve clearly indicates the changes in the acceleration rate during the gear-shifting operations, and also the manner in which the engine speed varies during acceleration. The engine speed reaches a maximum of approximately 1,800 r.p.m. and falls to about 1,000 r.p.m. each time the gears are shifted. During this period the engine is disconnected from its load about 25 per cent of the time in order to shift the gears. This loss of power causes a corresponding loss of bus speed.

An average gas-electric test with this engine has also been plotted. The data were taken from comparable tests conducted by the same men over the same course as for the mechanical drive. The acceleration is higher than for the mechanically driven bus and the rate is not changed suddenly. A rough or jerky acceleration frequently gives the impression of being rapid. The error of this impression is easily seen



Performance records of mechanical and gas-electric driven buses, as shown by tests

Gear ratio:
Mechanical, 5.96 to 1
Gas electric, 10.3 to 1
Wheels, 36-in.

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when a comparison is made of distance covered by the two drives at definite times after starting. This is shown by the following table:

Time in Seconds	Distance Traveled in Feet—Gas-Electric	Distance Traveled in Feet—Mechanical
10	144	93
20	468	365
25	671	552
30	900	772

The engine revolutions per unit of distance traveled are fewer for the gas-electric than for the mechanical bus. The data in the following table were taken from the curve:

Time in Seconds	Engine Revolutions for 100 Ft.—Gas-Electric	Engine Revolutions for 100 Ft.—Mechanical
10	154	220
20	98	120
25	88	110
30	82	89

The difference in engine revolutions per mile increases as the stops per mile increase. This is due to two factors. The engine on the mechanical bus is usually raced while shifting gears. The engine in the gas-electric is idling during coasting and braking, while in the mechanical it operates at a speed proportional to bus speed, unless the clutch is released or the gear shifted to neutral.

A bus equipped with gas-electric drive will weigh from 10 to 15 per cent more, and cost from 15 to 20 per cent more, than a similar mechanical job. To offset this increase in cost and weight, however, the advantages previously mentioned are obtained.

Traffic Problems Topic of New York State Meeting

LIVELY discussion of the problems of traffic and transportation in city streets occupied the greater part of the sessions of the 47th annual meeting of the New York Electric Railway Association held at the Hotel Champlain, Bluff Point, N. Y., June 21-22. This subject was introduced by the first speaker, Ernest Murphy, general manager, United Traction Company of Albany. After emphasizing the seriousness of the traffic problem as it exists today, he pointed out that the passengers in public transportation vehicles are not organized as are the majority of riders in private vehicles, the retail merchants, and other interests. Moreover, city officials ordinarily are not qualified by experience to act as representatives of the street car and bus riders. Hence, the railway manager must assume the duty of acting as representative of the riding public in the solution of traffic problems. Vehicular congestion, as it effects the street car rider, was discussed by E. K. Miles, superintendent of transportation, New York State Railways, Syracuse. He brought out the fact that parking and improperly arranged traffic signal lights are the greatest causes of congestion and delay. To secure relief, it is essential that the solutions proposed have the approval of both the general public and the city officials.

Advantages of the electric railway over other means of transportation were emphasized by J. Rowland Bibbins, consulting engineer, Washington, D. C. He pointed out that the transportation problem is essentially a rush-hour problem. At present buses are handling only a comparatively small portion of the total traffic of the large cities in this country. In New York, Chicago, and Philadelphia, they carry about 5 per cent of the traffic, in Boston, 10 per cent; and in Detroit, 19 per cent. According to Mr. Bibbins, the reason for these small percentages is that the total volume of traffic is too large to be handled effectively except by rail. Roadway space is inadequate to handle rush-hour crowds of ten to fifteen thousand passengers per hour on a single route. More and wider streets would be required to handle this volume of traffic by bus. Speed is the most important element in transportation, and buses are slower loading than are street cars, according to Mr. Bibbins. Moreover, because of their greater power, street cars can accelerate faster than buses—another advantage in handling mass transportation. In conclusion, Mr. Bibbins pointed out that proper traffic signals are essential to speedy transportation, and outlined some of the principles to be followed in designing signal systems.

John McLean, attorney, United Traction Company of Albany, spoke on the subject of rights of street cars, and urged the railway men to make greater efforts to put their case before the public. Bus operation in Buffalo was described by J. C. McCollum, executive assistant, International Railway.

That the present condition of the local transportation industry is a challenge to private management was the opinion expressed by Miles B. Lambert, Westinghouse Electric & Manufacturing Company. He said that the problems of today are exceedingly complex in character and, in many instances, are not thoroughly understood. Further scientific research is needed to solve them satisfactorily. He advocated wider use of technical experts by the railways in meeting these problems.

Contributions made by the manufacturers to the efficiency of the street car were discussed by Cornell S. Hawley, president, Consolidated Car Heating Company, R. H. Sjoberg, General Electric Company, and Raymond Boiselle, Westinghouse Traction Brake Company. Passenger safety was the subject discussed by W. H. Hyland, claim agent, Fonda, Johnstown and Gloversville Railroad, the last speaker on the program.

Officers for the coming year were elected as follows: President, Ernest Murphy, general manager, United Traction Company of Albany; first vice-president, R. R. Hadsell, general manager, Schenectady Railway; second vice-president, G. W. Jones, vice-president, Brooklyn and Queens Transit Corporation; third vice-president, B. J. Youngbluth, president, International Railway; secretary and treasurer, W. S. Stanton, Rochester.

The meeting concluded with a banquet, Saturday evening, at which the speaker was James B. Rice, representing Mayor Houde of Montreal.

Coming—An interesting analysis of the relation between the length of traffic signal cycles and the efficiency of street use.

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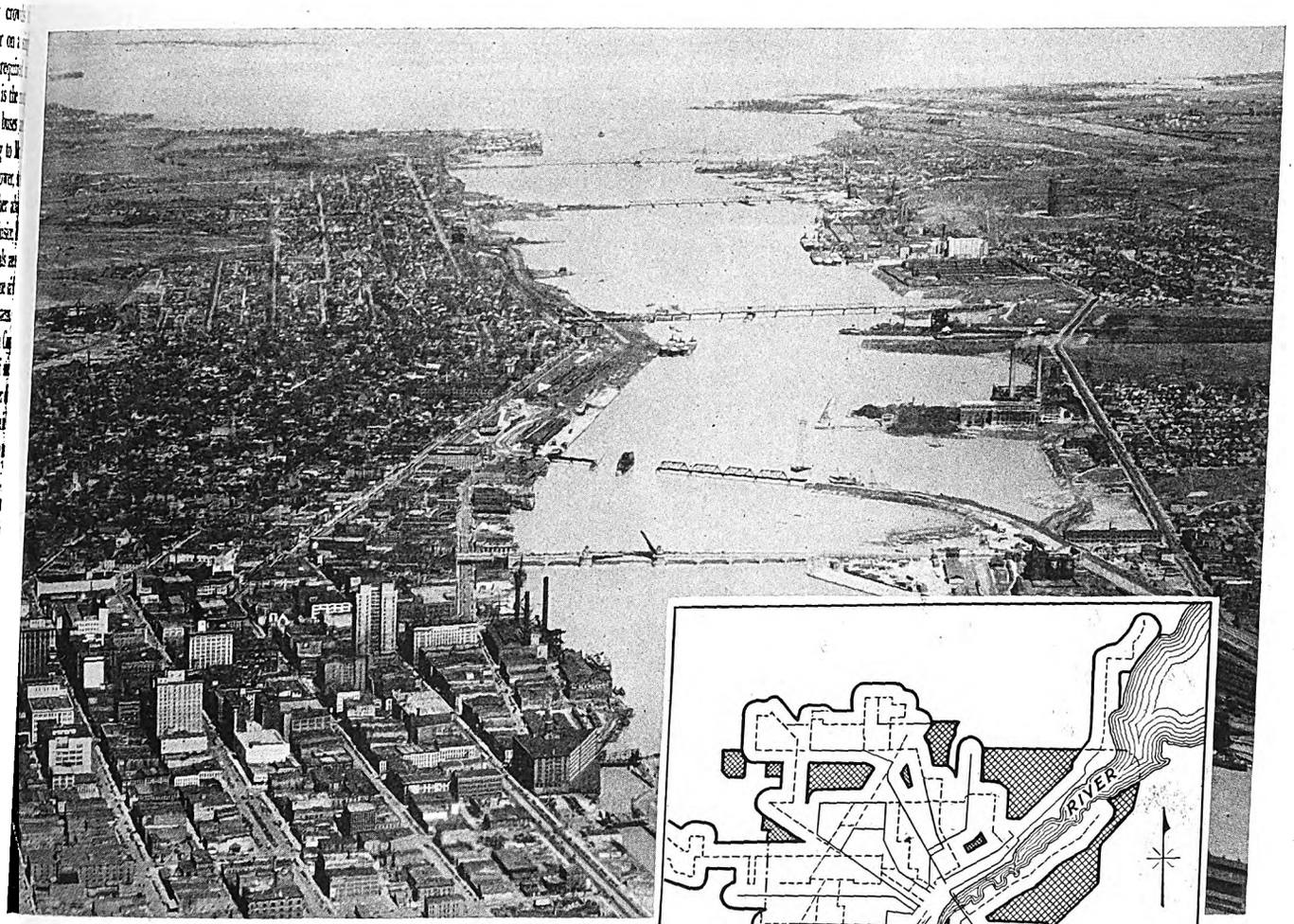
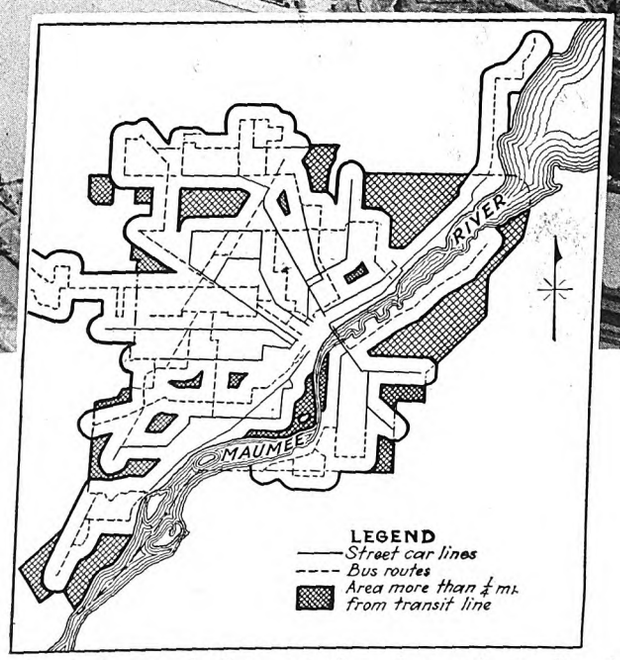
Modernized Toledo System Making Real PROGRESS



Aerial view of Toledo's downtown business section and the north end residential district. The Maumee River, which divides the city, flows into Maumee Bay on the north, an inlet of Lake Erie



By abandoning certain lines, rerouting others and extending the bus system, the Community Traction Company has covered all but a few areas within the city limits by its service

Co-ordination of street cars and buses, extensions of routes to parts of city previously unserved, improvement in railway equipment, acquisition of new buses, and elimination of competition responsible for large **increases in revenue**

TOLEDO'S transportation outlook, rather gloomy for a long period of years, is now beginning to appear unusually bright. At least it must be assumed to be brightening when the figures month after month show large increases and continue to establish new records. And that is just what the figures of the Community Traction Company are doing.

The actual "proof of the pudding," of course, lies in the figures as they are shown in the company's reports. Passenger revenue for 1928 was $3,479,628, compared with $3,251,198 for the previous year, and revenue passengers totaled 48,230,315, compared with 45,503,270 in 1927. Total revenue from all sources showed an increase of $259,288 over the previous year. The most remarkable increase was in bus patronage which soared from 2,795,052 in 1927 to 6,150,851 in 1928. For the

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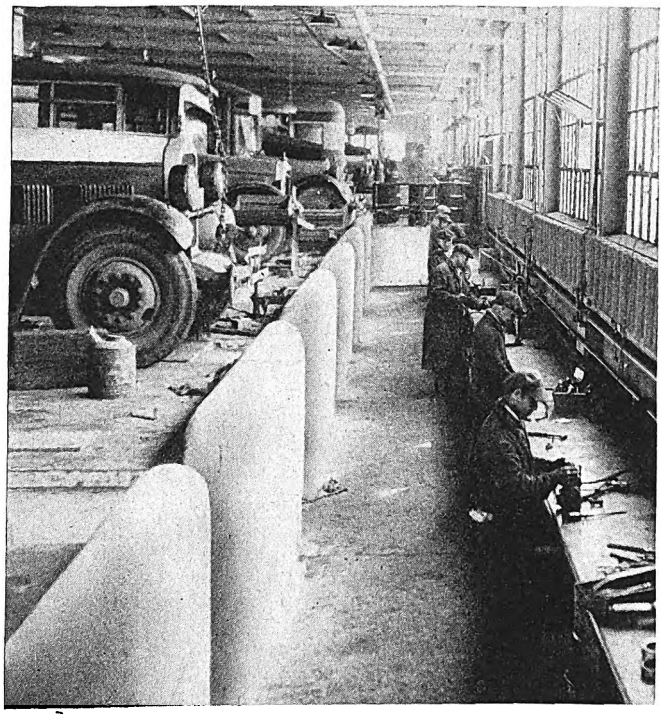
twelve months ended April 30, 1929, the total passenger revenue was $3,360,797, or 12.9 per cent higher than the year before, and the total revenue passengers carried was 50,685,350 or 11.8 per cent higher. These figures are the more encouraging when the percentages for the twelve months ended April 30, 1929, are compared with the per cent increases for the first four months of 1929. Passenger revenue for the four months combined shows an increase of 16.31 per cent over the corresponding period in 1928, while revenue passengers show a 15.01 per cent increase. The company has expanded its service steadily since the middle of 1928, but in spite of this has managed to keep its operating expenses down. In fact, during 1928, the operating costs were reduced from $2,044,191, the 1927 figure, to $2,018,119, while the company made an increase in service of 10 per cent.

As a result of the increased revenue and decreased operating expenses there has been an appreciable increase in earnings. The turning tide has changed the figures from red to black, and the company, with its financial set-up again adjusted, is getting back to a sound basis. A net surplus of $64,234 was realized for the first quarter of 1929, after meeting all obligations, while for the similar period in 1928 the company was faced with a deficit of $5,254. For the entire year of 1928, the surplus, after all operating expenses, taxes, and charges had been deducted, was $125,150, which compares with a deficit of $361,825 for the previous year. Present indications are that this progress is not temporary, but that it will continue in the future.



Part of the new $150,000 garage, where the bus maintenance and servicing activities for the company's large fleet are centralized

Perhaps the greatest accomplishment has been the restoration of the faith of the city officials and the public, and the conversion of a strongly antagonistic feeling into a friendly one toward the company. The public is now interested in its transportation system and is responding heartily to the railway's expansion and modernization program.

The upward trend in revenue passengers is the answer of the public of Toledo to the railway's endeavor to give better service. Of the many steps taken by the railway, the most important ones were the abandonment of superfluous routes, the establishment of new routes in districts previously unserved, the expansion of its bus system, a complete co-ordination of the entire rail and bus system, the installation of extra motors on the street cars, re-scheduling service, and the reconstruction of a large amount of track. Along with these major moves the company arranged for special bus service, established owl service with buses, repaired bridges, eliminated grades, built a large garage and centered its bus activities in it, lowered its accident claims and resulting charges by instituting a safety drive, reduced its operating expenses, designed new transfers, rearranged car stops, marked the new stops with bright orange bands, and provided safety zones. Every effort was made to offer the maximum of service to the greatest number of people in Toledo.

New Agreement Made with City

The general rehabilitation program, sponsored by the railway, followed the passage of an ordinance in June, 1928, supplementing the Milner service-at-cost franchise and giving the Community Traction Company a virtual monopoly of all local transportation facilities in the city. The new ordinance settled a number of issues which had been discussed without success for years. The original Milner service-at-cost ordinance, adopted by the electors on Nov. 2, 1920, proved unsatisfactory in several particulars. The city asserted that the company was not willing to do its share toward its comprehensive street rebuilding program, and the company asserted that the city had been remiss in permitting bus competition free from the limitation of service-at-cost regulations.

The company found itself in the anomalous position of operating superfluous routes while unable to start routes that were needed in new areas. Again, the city maintained that the company was paying too high a rate for power, while the company felt that its yearly reconstruction program was limited too much by the ordinance provision that replacements were to be financed from a depreciation fund, accrued from earnings, amounting to not less than one-half of 1 per cent nor more than 1½ per cent of the capital value. Other differences of viewpoint complicated the whole situation. Several attempts were made previous to 1928 to amend the Milner franchise which became effective in 1920. First came the Bartholomew report, then the Riggs report, and finally the supplemental Riggs report. Although there were earnest attempts to solve the transportation difficulties, no direct results were obtained from them.

By the end of 1927, however, bickering over the Milner ordinance had to come to an end in favor of constructive measures. During the first half of 1928, a number of conferences between the city and company officials were held, and the new ordinance was formulated. It was heartily endorsed by Mayor Jackson and when submitted to the City Council was passed by a vote of 17 to 1. It was approved by the Mayor on June 5 and became effective July 5.

The ordinance is, in effect, a 5-year modification of the original Milner ordinance. It gives the railway practically a monopoly of all local transportation service in Toledo by prohibiting any transportation line within one-fourth mile of a Community Traction Company car or

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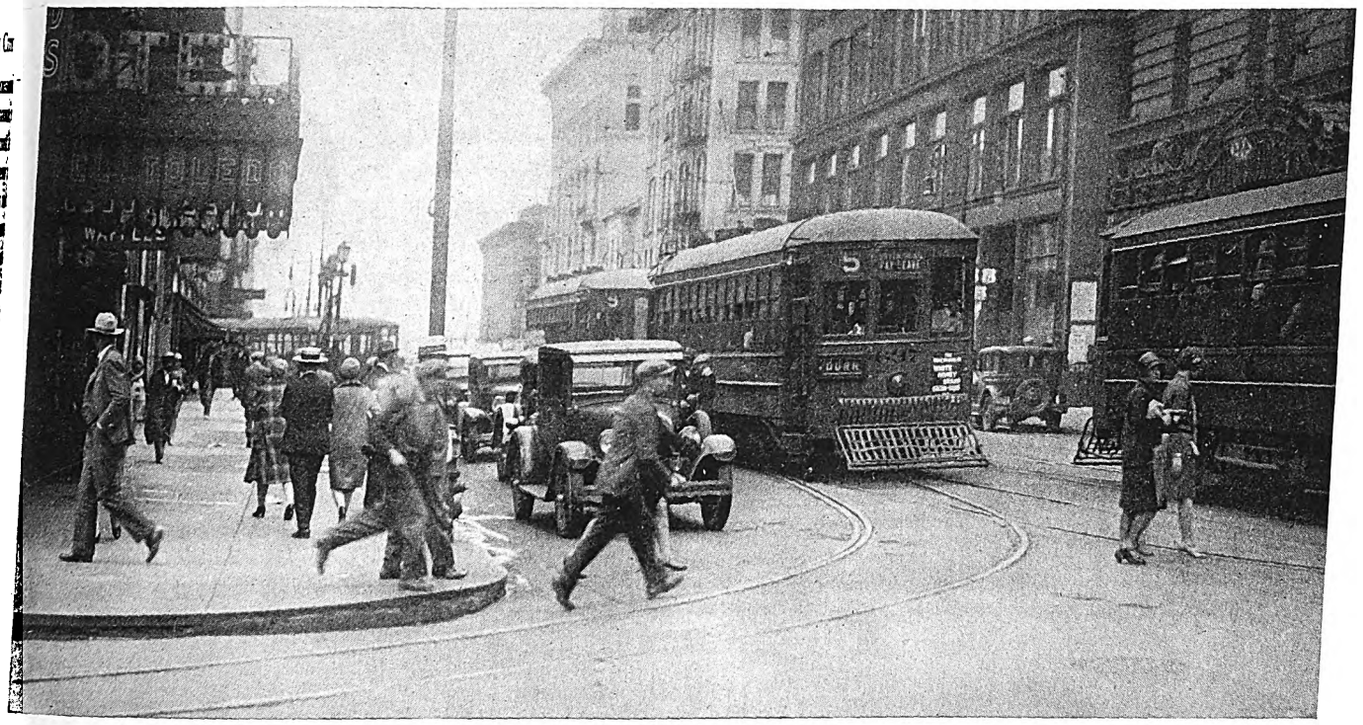
bus line, and also provides for a substantial reduction in the power rate to the railway. The power rate was reduced to 1¼ cents flat per kw.-hr. and a rebate for the past power bill amounting to $150,000 was allowed. In exchange for these terms, the company agreed to pay an old pavement bill amounting to $185,241 with interest at 6 per cent, to pay for a traffic survey which cost $25,000, to set up a five-year reconstruction program amounting to $560,000, to establish a special replacement fund of $230,000 to be advanced against the depreciation fund and refunded after the third year, and to secure a loan of $30,000 for a down payment on new buses.

The Community Traction Company also agreed to a loan of approximately $900,000 for ten years without interest to cover the accrued deficit in the stabilizing fund, exclusive of the original $400,000 in the fund. It also agreed to reroute the existing lines, to abandon non-



Street scene in downtown section of Toledo. Many of the company's cars have been re-equipped with four motors, giving them ample power for rapid acceleration in traffic

essential lines and to expand its service into new areas, all at the standard fares of ten cents for a single ride, three tokens for 25 cents, and 1 cent for a transfer.

Realizing that its superfluous routes in certain districts and its lack of routes in other districts were causing an unnecessary operating expense and at the same time failing to secure the maximum of patronage, the company set as its major objective the rerouting of its lines, reaching into new territory with buses, and fully co-ordinating the two types of service.

In July, 1926, the rail routes totaled 57.43 miles while the bus lines were only 4 miles. In the ensuing twelve months the bus mileage was increased to 30.6 and the following year to 58.0 miles. Following the passage of the ordinance supplementing the Milner franchise, further extensions were made bringing the total bus mileage to 78.5. During the same period, the rail mileage was decreased 11.14 by reroutings and abandonments of lines that really could be better operated with buses. At the present time the total rail and bus mileage is 124.79 which is more than double the figure of July, 1926, of 61.43 miles.

The bus routes for the most part are feeders to the street car lines or lines which do not compete with the trolleys. The whole plan was to co-ordinate the two systems so that a maximum number of people could be served without unnecessary duplication of facilities. The accompanying map, showing the area in the city limits within a quarter of a mile of a transportation line, shows how successfully the rerouting and extensions were in covering the city. The hatched areas on the map, which are not within one-fourth mile of any line of the Community Traction Company, are for the most part parks, institutional grounds, cemeteries, etc.

In January, 1928, a total of 3,787,459 passengers were carried on the 54.1 miles of street car route, averaging 70,021 passengers per mile of route. In January of the following year the rail routes were only 46.9 miles, but 3,895,821 passengers were carried, making an average of 83,101 passengers per mile of route. The increase in passengers carried per mile of route was due to the new system of using street cars for the heavy routes of travel only and feeding them by bus with passengers from the outlying districts.

Buses Show Passenger Increase

A corresponding increase in passengers per mile of route was obtained with the buses, even during the rapid period of expansion in 1928. In January of that year buses covered 32.4 miles of route and carried 373,306 passengers, or 11,522 passengers per mile. In January, 1929, the bus mileage was 68.3, but 1,149,233 passengers were carried, or 16,826 passengers per mile.

Prior to June 30, 1928, there were six independent bus lines competing with the Community Traction Company. Under the terms of the ordinance giving the railway a monoply of the bus service, the independents were forced to sell out. The six lines were purchased

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from the independents on a property valuation basis under the terms of the ordinance. A total of 40 buses were bought but only a few were serviceable.

To give the new service, the Community Traction Company purchased, during 1928, a total of 88 buses, of which 69 were new. The new buses included 3 Macks, 18 Whites, 38 Yellows and 10 Twin Coaches. These buses, which cost approximately $900,000, brought the fleet to a total of 124 at the beginning of 1929. A new garage was built at a cost of $125,000 for the purpose of centralizing maintenance and operation activities.

In addition to the numerous extensions made, the company established special services with some of its new buses. In a single month special buses operated for high school students carried 18,000 passengers and brought in a net profit of $520. The revenue of 40.074 cents per mile was the highest in the entire bus system. The buses also were substituted for street cars for owl service on certain lines, resulting in lower operating costs.

Higher Speed with Extra Motors

By adding two 35-hp. motors to 58 Peter Witt cars already equipped with two motors of the same size, the company was able to speed up its service on several lines. On the Cherry Street line the extra motors permitted the terminal schedule speeds to be raised as follows:

SCHEDULE SPEEDS IN MILES PER HOUR

	Old	New	Per Cent Increase
Morning peak	9.84	10.53	7.02
Base	10.17	11.09	9.05
Afternoon peak	8.72	10.34	18.58
Night	10.17	11.09	9.05

Incidentally, with this increase in speed came an increase of 14.3 per cent in traffic for the period from April, 1928, to February, 1929, as compared with the same period of the year previous, and a 17.5 per cent decrease in platform expenses.

Another factor in raising the speed on several lines was the rearranging of stops to give longer runs between them. When the new stops were put into effect, the schedules were announced by pamphlets. As a further aid the new stops were marked with brilliant orange stripes around nearby poles at the curbs, the color conforming to that of the cars. Two more steps to help increase the speed were the establishment of safety zones in a business district of the city and the designing of a new system of transfers. In this system colors indicate groups of parallel routes while the hour is indicated by the length of the transfer. While the new transfers shorten the time of issuance appreciably, they also have been responsible for an 8 per cent increase in purchases of the regular token fares. This is the result of the elimination of a certain amount of return riding by means of transfers.

Extensive Track Reconstruction Program

One of the most important provisions of the ordinance which went into effect in July, 1928, was the setting up of a 5-year track rehabilitation program, involving a sum of $560,000. The amounts available for this work were to be $185,000 for the first year, $181,000 for the second, $57,000 for the third, $119,000 for the fourth, and $80,000 for the fifth. These sums were to be in addition to the $230,000 appropriated for the replacement of worn out equipment in a period of three years. A great amount of street improvement work has been completed and other projects are well under way. At the end of the 5-year period, the company will have most of its track in excellent condition. Aside from actual track reconstruction the company has also eliminated a few grades and repaired some bridges.

Among the numerous steps taken by the company to move forward was the institution of a safety drive which has resulted in a very substantial reduction in accident claims and resulting charges. In the maintenance department, too, every effort has been made to lower the cost and to improve the equipment. That the equipment has been improved is best evidenced by the fact that pull-ins in 1928 were 40 per cent less than those in 1927.

Public Responds to Company's Effort

The results of the many improvements made by the Community Traction Company to better its service, reviewed at the beginning of this article, indicate that the public is responding favorably to the modernized system. The company has enjoyed increases in passengers and revenue every month since the supplemental ordinance went into effect in July, 1928, and no doubt traffic will continue to build up in the succeeding months and years.

The increased earnings and the financial readjustment provisions of the supplemental ordinance have changed this aspect of the operation materially. Prior to 1928, the earnings were falling off, riding was steadily decreasing and the deficit in the stabilizing fund, established under the terms of the Milner ordinance of 1920, was growing larger each month. In March, 1928, the company made its last sinking fund payment, retiring 20 per cent of the capital value. This sinking fund was established by the Milner ordinance to retire $1,800,000 of the 6 per cent bonds of the company and to issue an equivalent par amount of common stock to the city. The payments of 2½ per cent of the capital value amounted to approximately $28,000 each month. Relieved of this obligation the company was able to show a surplus the following month.

At the time the supplemental ordinance was passed the deficit in the stabilizing fund was approximately $1,300,000. To take care of this a provision was included for a loan to the railway amounting to approximately $900,000, representing substantially the deficit in the stabilizing fund exclusive of the $400,000 originally placed in it. Interest on this loan and payment of principal was suspended for a 10-year period subject to a shorter period should the agreement with the city be terminated. Because of the extensions of these payments it was agreed to place all surplus into a so-called "fare stabilizing fund," and to readjust the fares when this fund reaches $500,000. At the first of the year the fare stabilizing fund had reached a total of $65,032, making the actual deficit in the reserve fund $1,147,217.

The first four months of the present year showed surpluses of $18,789, $25,767, $17,634, and $20,833, respectively, raising the fare stabilizing fund to $148,055 and reducing the actual deficit in the reserve fund to $1,064,194. The lower power rate, the rebate of $150,000 for power, the lower accident charges, the lower operating expenses and steadily increasing revenue make the prospects for reducing the deficit in a comparatively short period and putting the company on a sound financial basis again, appear exceedingly bright.

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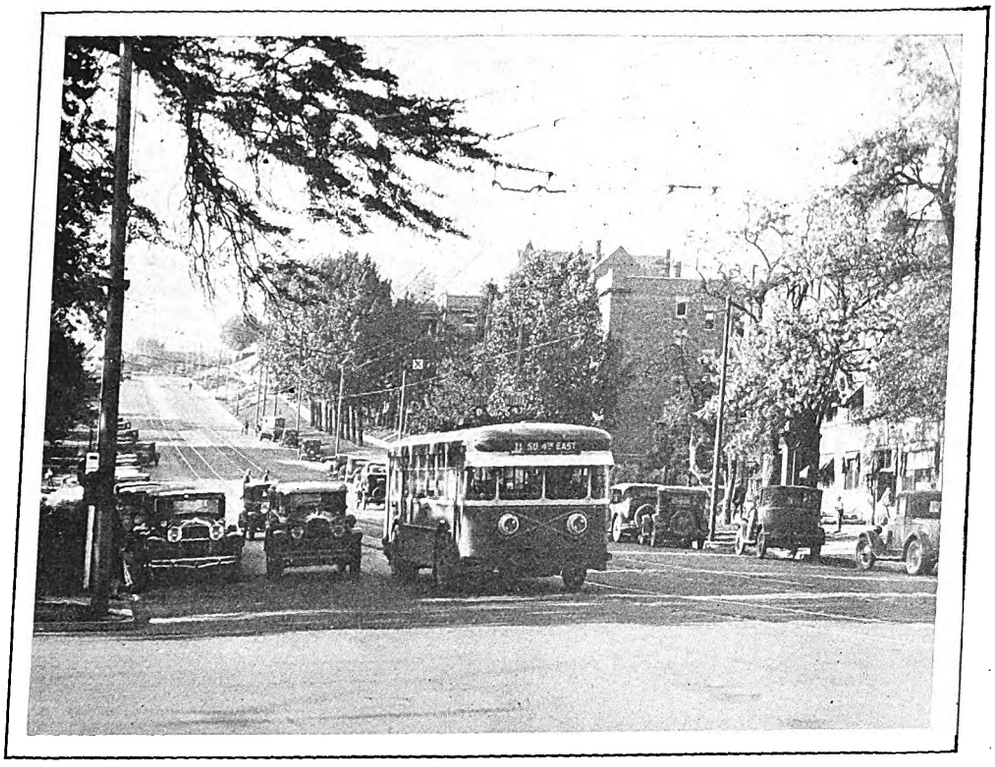

Electric coaches have no difficulty in negotiating the 10 per cent grade of Capitol Hill in Salt Lake City at a speed of 17½ m.p.h.

Trackless Trolley Questions Answered from Experience

Riding has increased steadily on Salt Lake City line. Minor difficulties which were experienced have been overcome. Operating costs are lower than for motor buses or street cars of the same capacity

By

EDWARD A. WEST

General Manager
Utah Light & Traction Company
Salt Lake City, Utah

MANY interesting developments have taken place since the inauguration of trackless trolley service in Salt Lake City on a 4.3-mile route on Sept. 9, 1928. It was recognized at the outset that there would be problems to meet in pioneering this new conception of the trackless trolley and a few difficulties actuall did arise in connection with the operation of the ten original coaches. However, the troubles were all of a minor nature and were overcome one by one. No fundamental difficulties were encountered, so that no concern is felt regarding the ultimate outcome. The operation as a whole has been entirely successful and has met with favorable public and official sentiment; in fact, because of the public's attitude the company plans to operate a second line on Ninth East Street, in place of the present railway service. Permission has been granted by the City Commission of Salt Lake City and the line will be established as soon as the Public Utilities Commission of Utah approves the abandonment of the car line and the substitution of trackless trolleys.

In the Sept. 8, 1928, issue of ELECTRIC RAILWAY JOURNAL the underlying reasons for the adoption of the trackless trolley for service in Salt Lake City were discussed. In a later issue—Feb. 9, 1929—an article was published, reporting the progress of the new service and giving details of the overhead and the ten "electric coaches," manufactured by the Versare Corporation. In February, however, the company had not had sufficient experience with the coaches to discuss with certainty the many phases of operation and the results of the new service. With nine months of experience, it now feels in a position to answer the many questions which have been asked regarding the various phases. The more important of these questions with the answers follow:

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Q—Do you recommend trackless trolleys for use on unpaved streets?

A.—This depends altogether on climatic conditions and the character of the roadbed. Experience in Salt Lake City indicates that operation on dirt streets is not satisfactory. During those seasons of the year when ruts are formed in the street surface from thawing and freezing, riding on the coaches is rough and vibrations are set up in the body which loosen electrical connections. A great deal of this difficulty doubtless would be eliminated by a more general method of insulating equipment from shocks, and steps taken along this line are proving effective. Of course, any type of road vehicle is subject to the same difficulties with unpaved streets.

Q—How flexible in traffic are the electric coaches? Is this flexibility an advantage?

A.—Coaches have a great amount of flexibility in traffic, giving them a decided advantage over the fixed-route vehicles. The following incidents show the desirability of flexibility in heavy traffic: At a busy intersection during the rush hour one evening an automobile became entangled with a street car, the front wheel of the automobile becoming wedged under the car. A coach was following the street car, and instead of waiting until the street car could be freed and proceed, the coach's trolley poles were pulled and it passed around the street car and continued on its way.

At another time a coach was crossing an intersection when an automobile approached it from the right at a high rate of speed. Had the coach been a street car confined to rails the automobile would have struck it head on in its midsection, with disastrous results. As it was the coach operator, because of the flexibility of the unit, was able to steer sufficiently from the path of the oncoming automobile to enable the driver to retard the speed of his car somewhat and to pull it to the right, with the result that only the front sides of the vehicles met. When it was found that the coach had been damaged slightly it was pushed over to the curb, where it did not interfere with other traffic. Just recently it was necessary to replace the special work at an intersection, necessitating a temporary rerouting of all lines. To reroute the coaches three blocks of temporary overhead trolley construction was installed in a short time and at small expense. This rerouting would have been impossible with street cars.

Q—Did you experience any difficulty negotiating Capitol Hill with its 10 to 11 per cent grade during the winter months?

A.—At the beginning of the winter season electric coach operators were recruited from street car service, and those selecting coach runs were not experienced in handling rolling stock not confined to rails. On two different days incidents occurred which, on account of the newness of this type of vehicle, were given undue and unnecessary newspaper publicity, resulting in some patrons becoming timorous. The incidents were as follows: One morning a horse-drawn milk wagon was driven slowly from a side street right into the path of a coach coming down the hill. The street was covered with ice. The operator of the coach swerved to the right to avoid hitting the milk wagon and in so doing pulled away from the trolley wires and onto a street with a very severe downgrade. He steered the coach into the curb and a barn crew had to right it and let it down to a street at a lower grade, from where it was pulled into the barn. No personal injuries resulted and the only damage to the coach was a broken corner post and a front window.

After a week of successful operation under similar street conditions, a second incident occurred. A new man, under instruction, who had driven gasoline buses in the suburbs of the city made a run for the grade but the rear wheels started spinning. To gain traction he backed up and tried it again. In each case he fed the motors too rapidly, with the result that the wheels spun. After these unsuccessful attempts to make the hill he decided to back the coach over to the curb and in so doing backed into an automobile, damaging it to the extent of $300. Very little damage was sustained by the coach itself.

Local newspapers, however, played up the incident to such an extent that a number of people were frightened. Because of this the company took the coaches off the hill for a period of 60

Trolley wires for the electric coaches, installed along the sides, are less conspicuous than wires over the center of the street

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days. At the end of this time operation over the same icy streets was resumed without further trouble. The experience last winter showed that a light sprinkling of cinders or sand and salt on an icy street effectively prevents slippage. The sprinkling can be quickly and economically done by special equipment for the purpose.

Q—Of what value on grades are dynamic brakes if the trolleys leave the wires?

A.—They are of no advantage. It would be necessary to rely in such cases on air and hand brakes, which in the case of gasoline vehicles are the only brakes available anyway. Thousands of heavy trucks and buses are running over streets of cities throughout the country today equipped with brakes that are no better, if as good, as the hand and air brakes on the electric coaches. The trolley poles leave the wires so infrequently, however, that it is not worth considering.

Q—Do you prefer dynamic brakes to other forms of braking?

A.—Inasmuch as dynamic braking requires but little additional equipment and has many advantages, no reason can be seen for eliminating this method of control. Among its advantages are the following:

First, dynamic brakes are effective on grades for holding the speed of the coach at practically any rate desired. This is decidedly advantageous when streets are slippery.

Second, the heat generated in accelerating and braking is utilized to heat the interior of the coaches, thus saving power in the winter.

Third, wear and tear on brake drums is minimized.

Fourth, a coach can be brought to a sudden stop in emergencies.

Fifth, rapid acceleration and retardation give to riders the effect of speed and "getting somewhere" that is necessary nowadays.

Q—Have you experienced any equipment and operating difficulties?

A.—For a new mode of mass transportation surprisingly few equipment difficulties have been experienced. Dynamic braking introduced some strains and stresses that are not present with ordinary braking and, being performed through the springs, caused some spring trouble at first. Supporting the springs in rubber permitted a reduction of the number of leaves, which improved riding and reduced vibration in the electrical and air equipment.

Operating difficulties were due largely to trolley dewirements at the outset on account of running the coaches through overhead special work used by street cars. The trolley wheels of the coaches were of different diameter than those of the street cars, therefore it was necessary to change the grooves in the overhead special work to accommodate the coach trolleys. These difficulties cleared themselves rapidly, coach dewirements being no more frequent than with street cars at the end of two weeks. The use of mechanical and electrically-operated overhead switches permits coaches and street cars to take turnouts with equal facility, so that overhead problems, locally, are solved. At one end of the route an overhead wye is installed which is negotiated without difficulty; at the other end a loop is used. As in street car operation loops are more desirable and are favored wherever possible. Each application of trolley coaches, however, will bring up its own set of problems. In Salt Lake City, nevertheless, it is felt that operating coaches along with street cars through the busiest traffic of the city with turnouts at every corner has overcome the majority of the overhead difficulties likely to be encountered.

Q—How do coach operating costs compare with those of gasoline buses of equal seating capacity?

A.—Based on carrying capacity the operating cost of electric coaches is 63 per cent of gasoline equipment. It is felt that by the end of the first year costs will be lower than at present. There is now reflected in the costs the expense of overcoming minor difficulties always accompanying pioneering. During the first few months more inspection and supervision were given than are found necessary today. During the winter the cost of keeping the ruts out of the dirt street portion of the route was rather high. This expense is in no way chargeable to the coach operation so far as the equipment is concerned, because it was done more to improve riding than for any other purpose.

Regarding fuel and energy costs, a gasoline bus of carrying capacity equal to that of the electric coach averages about 3 miles per gallon, while the coach consumes slightly more than 2.2 kw.-hr. per mile on an average.

Carhouse pits were readily adapted at small cost to meet the needs of electric coach inspection and maintenance

Q—How do electric coach costs compare with those of street cars of equal seating capacity?

A.—It is felt that electric coach operation over a period of time will show a substantial saving over street car costs. During the first six months the electric coach costs were 80 per cent those of street cars. There are a great many hidden costs in connection with street car operation not always reflected in the figures. For example, there is the periodic rehabilitation of track and paving which is usually accomplished by retiring the original investment and charging it to depreciation reserve and capitalizing the new work. As a result of this accounting

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procedure, operating accounts do not reflect the full cost of street car operation. Those companies that provide adequately for depreciation in their operating accounts are best situated to make a direct comparison between street car and electric coach operating costs. Electric coaches were introduced in Salt Lake City to avoid rehabilitating a long section of track and pavement that needed replacing. Tire expense of coaches takes the place of wheel and track and roadway street car costs. If tire expense is less than the sum of these, then there is no question that electric coach operation is cheaper.

Ten electric coaches of this type, manufactured by the Versare Corporation and equipped with Westinghouse motors and control, are operated on the Salt Lake City route

Q—What is the actual electric coach kilowatt-hour consumption per car-mile as compared with that of street cars?

A.—Energy consumption of coaches averages slightly more than 2.2 kw.-hr. as compared with approximately 4.3 kw.-hr. for street cars. This coach average is for winter operation through snow, ice and mud, and should decrease somewhat during the months of more favorable weather.

Q—Have tire troubles interfered with service?

A.—Delays on account of tire trouble have been so few as to be almost negligible.

Q—What objections, if any, were made by property owners to stringing double trolley wires on the streets in residence districts?

A. There were no difficulties connected with this installation as far as the residents on the streets were concerned; in fact, the trolley wires are less conspicuous today than they were in the middle of the streets. The foliage of the trees hides the wires and the appearance of the roadway is so much improved that this, together with the quietness of the coaches, has made this type of operation very pleasing to the property owners. It has been stated that building activity in the residential section of the city served by the coaches has been stimulated.

With respect to overhead construction in the downtown district, it has added weight to the installations already in place at intersections but is no more noticeable than the single trolley wire construction. In fact, a stranger going along the main street of the city after coming from a city having no trolley coaches would not know the difference. It requires an experienced eye to note the double overhead. At the outset there was some question by the fire department as to its ability to use tower wagons and other fire apparatus on account of two trolley wires. To overcome this an actual test was made by the line department of the street railway in company with the fire chief and his assistants. Following the test the chief withdrew all objections to the presence of two trolley wires.

Q—Can the vehicles be maneuvered about the carhouses and shops without difficulty?

A.—Fortunately it was possible to work out an overhead system in the yards which will permit increasing the number of trolley coaches to the full capacity of the carhouse without any particular overhead complications. One of the tracks in the carhouse was assigned to the electric coaches and converted for their repair. The pits were partly bridged with platforms to permit inspection of coaches, and double trolley wire was extended over the pits and track. Alemiting equipment and lines for greasing the coaches also were installed adjacent to these pits. Later on, when the number of coaches was increased, a second track was converted. The coaches enter the carhouse at the west end and leave by the east end. There is sufficient room in the building for one coach to by-pass another, to go over the pits or to leave the barn at the east end.

Q—Are electric coaches speedier on grades than street cars and gasoline buses?

A.—Yes. On the 10 to 11 per cent grade on Capitol Hill, with load of 40 or more passengers, coaches average better than 17½ m.p.h.

Q—Do electric coach accidents show an increase over street car accidents?

A.—The flexibility of the coaches permits them to deviate from a fixed path to avoid serious collisions. Their ability to stop quickly also is a safety factor of inestimable value.

Q.—Who licenses trolley coaches for operation on the streets of Salt Lake City?

A.—The tax for this operation, other than that based on property value, amounts to $25 per year per vehicle, the same as for street cars, and is payable to the city. No state license tax or vehicle registration number is required because the coaches are not self-propelled. They are confined to definite routes and obtain their energy for propulsion from an outside source, so they are classified with street cars.

Q—Has patronage on this line been affected by the introduction of electric coaches?

A.—From the outset riding on this line showed an increase over the former patronage. At first it was thought this was due to the novelty of the vehicles, but after more than nine months of operation with riding still continuing it is believed that the quiet, speedy operation of the electric coaches has brought new patrons. This is particularly interesting in view of the fact that parallel street car lines are almost a half mile distant on each side. The system as a whole shows a decrease in riding, but the electric coach route has had a substantial gain in patronage.

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Monthly Financial Reports Show Improvement

Operating statistics of 31 electric railways in the United States and Canada indicate a trend toward higher gross revenue and reduced expenses

BETTER operating conditions on the electric railways of the United States and Canada are indicated by the monthly reports which are being received. While some properties, particularly in the smaller communities, still show a decline in gross revenue, many increases are seen on properties all over the country. The trend toward higher gross which has been particularly noticeable in Canada for the past year or more continues, except on some of the smaller systems.

Operating expenses, on the contrary, show a reduction on many of the properties. Even where the gross busi-

Table I—Monthly Reports of Electric Railway Companies

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Key System Transit Co., Oakland, Cal.					
Dec., 1928	621,774	485,206	37,126	111,143	*121,990*
Dec., 1927	635,085	491,215	38,212	119,214	28,470
12 mo., Dec. 1928	7,227,958	5,647,612	464,684	1,239,065	*808,385*
12 mo., Dec. 1927	7,452,821	5,852,550	432,335	1,314,389	*579,017*
Market Street Railway, San Francisco, Cal.					
May, 1929	819,405	.....	.....	135,906	77,100
12 mo., May, 1929	9,610,060	.....	.....	1,380,522	646,735
Jacksonville Traction Co., Jacksonville, Fla.					
April, 1929	97,395	77,495	9,153	10,269*b*	.....
April, 1928	101,486	81,361	9,641	9,955*b*	.....
12 mo., Mar. 1929	1,183,310	955,396	106,735	114,759*b*	*46,707*
12 mo., Mar. 1928	1,284,114	1,054,393	108,222	114,173*b*	*51,880*
Honolulu Rapid Transit Co., Honolulu, Hawaii.					
April, 1929	87,658	51,783	10,616	26,278	13,054
April, 1928	85,494	52,759	11,514	22,119	13,315
4 mo., Apr. 1929	354,598	203,715	42,464	113,007	60,114
4 mo., Apr. 1928	338,083	207,840	42,375	92,062	60,971
Chicago Surface Lines, Chicago, Ill.					
May, 1929	5,354,248	4,157,362*a*	.....	1,196,885	902,826*c*
May, 1928	5,304,553	4,102,297*a*	.....	1,202,255	903,346*c*
United Railways & Electric Co. of Baltimore, Md.					
May, 1929	1,463,365	998,615	132,666	346,656	64,753
May, 1928	1,430,428	958,151	140,134	343,945	61,738
5 mo., May, 1929	7,022,217	4,826,449	685,703	1,580,251	161,976
5 mo., May, 1928	6,869,965	4,644,864	660,418	1,622,998	199,665
Boston Elevated Railway, Boston, Mass.					
April, 1929	2,916,473	1,946,699	147,017	.....	.....
April, 1928	2,909,354	2,044,740	164,418	.....	.....
Eastern Massachusetts Street Railway, Boston, Mass.					
April, 1929	716,162	427,669	32,766	280,222	100,085
April, 1928	727,390	453,255	26,955	270,917	89,171
4 mo., Apr. 1929	3,031,473	1,805,468	137,665	1,160,612	387,889
4 mo., Apr. 1928	3,188,174	1,878,548	133,869	1,254,169	414,960
Detroit Municipal Railway, Detroit, Mich.					
May, 1929	2,355,752	1,894,549	62,505	407,659	272,651
May, 1928	2,067,253	1,604,558	66,965	418,505	257,140
12 mo., May, 1929	26,133,685	20,751,617	759,288	4,815,579	3,065,729
12 mo., May, 1928	23,532,257	18,172,257	779,021	4,824,245	2,917,134
Kansas City Public Service Co., Kansas City, Mo.					
May, 1929	757,768	.....	.....	.....	*76,578f*
May, 1928	783,876	.....	.....	.....	*76,874f*
5 mo., May, 1929	3,804,758	.....	.....	.....	*363,301f*
5 mo., May, 1928	3,864,934	.....	.....	.....	*363,611f*
International Railway, Buffalo, N. Y.					
3 mo., Mar. 1929	2,727,179	2,283,962*a*	.....	459,885	133,826
3 mo., Mar. 1928	2,804,291	2,327,658*a*	.....	486,580	129,754
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
April, 1929	82,255	61,939	7,840	13,981	*17,833*
April, 1928	94,199	64,152	7,840	24,967	*6,701*
4 mo., Apr 1929	345,804	250,936	31,360	72,455	*54,288*
4 mo., Apr. 1928	379,561	263,638	31,360	95,180	*30,977*
Brooklyn City Railroad, New York, N. Y.					
May, 1929	1,015,769	823,769*a*	.....	192,000	152,464
May, 1928	1,022,716	847,514*a*	.....	175,202	133,836
11 mo., May, 1929	10,563,854	9,066,845*a*	.....	1,497,009	1,048,681
11 mo., May, 1928	10,696,238	9,168,526*a*	.....	1,528,712	1,054,723
Brooklyn-Manhattan Transit System, New York, N. Y.					
May, 1929	4,298,360	2,649,404	290,064	1,427,548	686,447
May, 1928	4,122,595	2,523,788	303,302	1,372,975	714,858
11 mo., May, 1929	44,418,548	28,515,519	3,091,000	13,726,948	5,914,849
11 mo., May, 1928	43,411,307	27,969,142	3,151,368	13,243,040	5,938,321
Hudson & Manhattan R. R., New York, N. Y.					
May, 1929	1,069,375	.....	.....	543,612	206,781
May, 1928	1,046,026	.....	.....	506,692	171,133
5 mo., May, 1929	5,279,986	.....	.....	2,626,334	946,164
5 mo., May, 1928	5,251,026	.....	.....	2,284,651	906,621
Interborough Rapid Transit Co., New York, N. Y.					
May, 1929	6,261,572	3,556,701	192,693	2,512,177	645,130*d*
May, 1928	5,917,170	3,405,545	233,392	2,278,232	477,764*d*
11 mo., May, 1929	64,009,736	38,891,861	2,204,008	22,913,866	3,056,661*d*
11 mo., May, 1928	61,886,727	36,121,959	2,992,043	22,772,723	2,949,612*d*
New York, Westchester & Boston Ry., New York, N. Y.					
April, 1929	203,585	127,360	23,350	53,558	*160,516*
April, 1928	193,028	117,361	20,120	57,039	*140,963*
4 mo., Apr. 1929	767,041	505,413	81,655	182,707	*660,234*
4 mo., Apr. 1928	729,196	486,688	77,506	170,537	*625,141*
Third Avenue Railway, New York, N. Y.					
April, 1929	1,317,641	993,551	83,031	260,524	811
April, 1928	1,277,044	969,053	90,325	234,249	*1,955*
10 mo., Apr. 1929	12,888,649	9,929,938	899,763	2,247,246	*318,171*
10mo., Apr. 1928	12,864,564	9,887,155	922,194	2,223,601	*117,065*
Philadelphia & Western Railway, Norristown, Pa.					
May, 1929	69,139	39,151	.....	29,988*e*	14,048
May, 1928	70,768	41,740	.....	29,028*e*	13,101
United Electric Railways, Providence, R. I.					
May, 1929	613,995	486,615	34,907	98,816	47,895
May, 1928	623,455	504,577	32,021	95,465	42,602
5 mo., May, 1929	3,086 850	2,494,899	174,534	446,311	191,582
5 mo., May, 1928	3,195,505	2,532,002	175,704	517,337	252,275
Galveston-Houston Electric Railway, Houston, Tex.					
April, 1929	47,074	27,891	2,569	16,613*b*	.....
April, 1928	54,285	32,334	2,590	19,360*b*	.....
12 mo., Apr. 1929	622,577	350,151	31,684	240,741*b*	*29,998*
12 mo., Apr. 1928	690,517	400,124	30,461	259,931*b*	*7,447*
Houston Electric Company, Houston, Tex.					
Feb., 1929	264,573	168,729	25,233	70,610*b*	.....
Feb., 1928	265,174	160,646	26,031	78,496*b*	.....
12 mo., Feb. 1929	3,355,195	2,081,378	290,707	983,109*b*	571,573
12 mo., Feb. 1928	3,127,074	1,974,179	277,386	875,508*b*	488,020
Pacific Northwest Traction Co., Seattle, Wash.					
March, 1929	72,952	60,404	4,366	8,180*b*	.....
March, 1928	67,395	60,201	4,221	2,960*b*	.....
12 mo., Mar. 1929	883,769	746,647	51,456	85,764*b*	*51,629*
12 mo., Mar. 1928	885,842	692,589	48,005	145,256*b*	*30,286*
Calgary Municipal Railway, Calgary, Alta.					
April, 1929	83,972	45,641	.....	38,331	8,140
April, 1928	75,303	41,395	.....	33,368	8,348
4 mo., Apr., 1929	349,810	190,541	.....	159,268	37,669
4 mo., Apr., 1928	313,273	183,074	.....	130,198	29,395
Edmonton Radial Railway, Edmonton, Alta.					
April, 1929	72,173	45,227	.....	29,646	1,098
April, 1928	67,088	42,710	.....	11,789	*36,532*
4 mo., Apr. 1929	306,282	180,370	.....	125,853	14,961
4 mo., Apr. 1928	286,787	177,700	.....	109,087	8,114
Lethbridge Municipal Railway, Lethbridge, Alta.					
March, 1929	5,155	4,278	.....	877	*1,708*
March, 1928	5,299	4,236	.....	1,063	*2,238*
3 mo., Mar. 1929	15,949	12,357	.....	3,592	*4,164*
3 mo., Mar. 1928	15,701	12,942	.....	2,759	*7,144*
British Columbia Electric Railway, Vancouver, B. C.					
March, 1929	1,247,795	795,927	.....	451,868*b*	.....
March, 1928	1,178,175	820,523	.....	357,652*b*	.....
9 mo., Mar. 1929	10,532,764	7,051,875	.....	3,480,889*b*	.....
9 mo., Mar. 1928	10,164,687	7,163,946	.....	3,000,741*b*	.....
Guelph Radial Railway, Guelph, Ont.					
5 mo., Mar. 1929	40,348	33,181	1,152	6,015	*9,264*
5 mo., Mar. 1928	42,153	33,270	1,125	7,757	*7,781*
Ontario Hydro-electric Railways, Essex District					
5 mo., Mar. 1929	542,290	384,144	1,946	156,200	9,321
5 mo., Mar. 1928	444,836	345,759	1,998	77,078	*29,635*
Regina Municipal Railway, Regina, Sask.					
April, 1929	33,947	21,492	.....	12,455	1,012
April, 1928	28,472	19,409	.....	9,063	*922*
4 mo., Apr. 1929	156,048	90,623	.....	65,426	19,653
4 mo., Apr. 1928	130,675	82,780	.....	47,896	7,957
Saskatoon Municipal Railway, Saskatoon, Sask.					
March, 1929	37,019	21,717	1,463	13,839	4,696
March, 1928	32,401	20,256	1,330	10,815	3,636
3 mo., Mar. 1929	120,181	69,748	4,742	45,692	20,458
3 mo., Mar. 1928	102,282	61,402	4,091	36,789	15,109

Italic figures indicate deficits.
a Includes taxes. *b* Net operating revenue. *c* Balance for return on investment *d* Subject to readjustment. *e* Before taxes. *f* Before depreciation.

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Table II—Condensed Financial Reports of Electric Railway Properties, 1927-1928

	Sacramento Northern Ry. Sacramento, Cal.		Georgia Power Co., Railway Division, Atlanta, Ga.		New Orleans Public Service, Inc. New Orleans, La.		United Rys. & Electric Co.a Baltimore, Md.		Kansas City Public Service Co.a Kansas City, Mo.	
	1928	1927	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$1,477,452	$1,541,605	$5,695,086	$5,367,510	$7,080,679	$7,440,211	$16,273,826	$16,188,669	$9,030,316	$9,369,315
Railway operating expenses	1,185,104	1,190,080	3,891,726	.....	5,030,732	5,128,997	10,885,708	10,796,439	6,903,306	7,223,811
Net revenue, railway oper	$292,348	$351,525	$1,803,360	.....	$2,049,947	$2,311,214	$5,388,118	$5,392,230	$2,127,010	$2,145,504
Net revenue, auxiliary oper	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	90,570	101,619	393,871	.....	756,954	814,405	1,579,061	1,575,938	505,530	532,790
Operating income	$201,778	$249,906	$1,409,489	.....	$1,292,993	$1,496,809	$3,809,056	$3,816,291	$1,621,481	$1,612,714
Non-operating income	61,728	59,502	.....	.....	6,320	64,231	175,041	165,656	.....	.....
Gross income	$263,506	$309,408	.....	.....	$1,299,313	$1,561,040	$3,984,097	$3,981,947	$1,621,481	$1,612,714
Deductions from gross income	278,859	237,268	.....	.....	.....	.....	.....	.....	875,974	758,175
Net income	$15,353	$72,140	.....	.....	.....	.....	$573,142	$553,365	$745,507	$854,539
Operating ratio, per cent	80.2	77.2	68.5	.....	71.5	68.9	66.9	66.7	76.4	00.0

	Interborough Rapid Transit Co. New York, N. Y.		Scioto Valley Ry. & Pwr. Co. Columbus, Ohio		York Railways York, Pa.		Memphis Street Railway Memphis, Tenn.		Houston Electric Co. Houston, Tex.	
	1928c	1927c	1928	1927	1928	1927	1928	1927	1928	1927
Railway operating revenue	$67,205,294	$63,316,088	$676,891	$763,140	$2,688,423	.....	$2,922,428	$2,900,471	$3,343,294	$3,069,597
Railway operating expenses	37,712,712	35,575,666	488,941	557,452	1,510,298b	.....	1,943,520b	1,969,329b	2,059,958	1,971,540
Net revenue, railway oper	$29,492,582	$27,740,422	$187,950	$205,688	.....	.....	.....	.....	$1,283,336	$1,098,057
Net revenue, auxiliary oper	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	3,200,615	3,506,823	37,113	38,840	.....	.....	.....	.....	291,672	268,942
Operating income	$26,291,967	$24,233,600	$150,837	$166,848	$1,178,125	.....	$978,908	$931,142	$991,664	$829,115
Non-operating oncome	297,026	257,175	.....	.....	76,519	.....	3,331	2,680	.....	.....
Gross income	$26,588,993	$24,490,775	$150,837	$166,848	$1,254,643	.....	$982,239	$933,822	$991,664	$829,115
Deductions from gross income	21,622,777	21,540,066	108,875	97,974	530,132	.....	517,551	513,293	410,701	384,951
Net income	$9,362,346	$4,968,769	$41,962	$68,874	$724,511	.....	$464,688	$420,529	$580,963	$444,164
Operating ratio, per cent	56.1	56.2	72.2	73.4	....	....	....	....	61.6	64.2

a Final revised figures. *b* Includes taxes. *c* Years ended June 30.

ness done has increased, the expenses have gone down on some of the systems. In general this is due to greater economy in operation, since in only a few instances has the increase in revenue been due to a rise in fares.

As a result of the changes in revenues and expenses, the net revenue is higher on many of the systems. In order to save space in the tables this item is not shown, but it can be obtained by subtracting the expenses from the operating revenue. Since taxes have shown only a small change, the gross income, which is the residue after deducting taxes and adding non-operating income, is up in many instances. Out of the 31 properties for which figures are given, 25 permit a comparison of the two years. Out of these 25 the gross income for the 1929 month is higher than for the 1928 in 17 companies.

Apparently there has been an increase in fixed charges and other deductions from gross income, since in only 12 reports has there been an increase in net corporate income out of 21 companies for which comparable figures are shown.

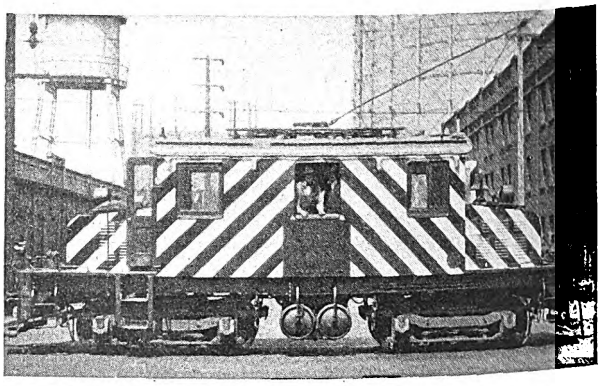
Supplementing the annual reports published in the JOURNAL for June, page 641, reports of ten companies are given herewith. These include final figures for the United Railways & Electric Company of Baltimore, and the Kansas City Public Service Company. The complete report of the Interborough Rapid Transit Company for the year ended June 30, 1928, which has just been released, is also abstracted. Additional reports will be published as they are received.

What Happens When Steel Gets Tired?

Prof. D. D. Ewing of Purdue University will tell in an interesting article appearing in the August Issue of ELECTRIC RAILWAY JOURNAL

Striped Painting Makes Locomotive Conspicuous

BY FARREN TIPTON
San Diego Electric Railway
San Diego, Cal.



Visibility of San Diego locomotive has been increased by unusual painting

AFTER the passenger cars have been pulled in for the night, freight traffic is handled over the lines of the San Diego Electric Railway. For this service a Baldwin electric locomotive is used. In order to prevent accidents, the company has painted black and white stripes on the motor car, giving it a zebra-like effect. Two series of three lamps each are mounted around the cab at intervals and connected alternately to assure illumination from all sides in case one series fails. The combination of stripes and lighting make the locomotive very conspicuous.

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Midwest Association Expands Activities

Southern and central Illinois and all Iowa were taken in at St. Louis meeting. Mechanical committee formed. Papers of interest read

ENLARGEMENT of the territory of the Midwest Electric Railway Association to include southern and central Illinois and all of Iowa was voted at its convention held at the Chase Hotel in St. Louis on June 13-15. Among the more important systems that become members under this change are the East St. Louis & Suburban Railway and its affiliated companies and the Illinois Terminal Railroad. It also was voted to form a mechanical committee that will gather and disseminate data of interest to the mechanical departments of the member companies. A proposed merger of the association and the Midwest Claims Association has been deferred to determine what changes, if any, should be made in the constitution and by-laws if such a reorganization is effected.

Approximately 275 delegates attended the meeting, which in many particulars was the best ever held by the organization. The retiring president, F. G. Buffe, was highly complimented on his administration, as was the committee on arrangements, headed by B. W. Frauenthal.

Powell C. Groner, president of the Kansas City Public Service Company, in his address on "The Trend of Utility Regulation," ventured the prediction that eventually the theory of "prudent investment" will be adopted as the basis for determining the rate-base valuation of public utilities. "And I am not so sure that it wouldn't be best for us in the long run," he continued.

Still not definitely advocating the theory of "prudent investment" as the proper basis for fixing valuations, he then pointed out that it is almost impossible to obtain an up-to-date valuation on the reproduction-cost-new basis, since much time is consumed in arriving at costs, depreciation, etc., so that very often valuations are from six months to a year or more behind the date of the final decision. With the actual investment definitely known it is possible to fix a valuation for the present, he said.

Stanley Clarke, president of the St. Louis Public Service Company, who spoke on the subject, "Future of Urban Transportation in the Metropolitan Areas," would not venture a guess as to the actual future of transportation. However, he contended that in the future mass transportation will prove more and more necessary, and that if air transport comes into general use it will tend to centralize rather than decentralize metropolitan areas. This will mean more mass transportation. He expressed the belief that the street railway car is still far more economical in operation than is the bus. The cost of bus operation is 9.8 cents per passenger and would be 10.5 cents if the bus were handicapped with the same burdens of taxes, wages, etc., as is the street railway, according to Mr. Clarke.

Regarding the future treatment of street railways he said that apparently there are two schools of thought—one which seems to hold the view that the utility should be so harassed and handicapped as to make economical and profitable operation impossible, thus forcing public ownership of the utility, and the other holding that the utility should be permitted to go ahead earning a fair return on its investment until such time as it shall no longer prove necessary to the public, when it shall be forced off the job.

Touching on the possibility of public ownership being forced through the process of starvation of the private company, he said, that the period of years necessary to bring about this change would witness great losses to investors in utilities and also to merchants, other industries and real estate values.

Eugene S. Hight, chief engineer of the Illinois Terminal Railroad System, in an address on "Building for the Future" touched on the proposed subway and elevated system his company plans to construct in St. Louis. The actual building of this $5,000,000 project will get under way in the near future.

Means of Increasing Car Speed

A. J. Fink, director of transportation St. Louis Public Service Company, in his talk on "Transportation Efficiency" told how more rigid mechanical care and inspection of the St. Louis street cars has within the past year increased the number of miles each car runs before being turned in for repairs about 1,100 per cent. In June of last year pull-ins were one in every 10,342 car-miles, while in April of this year the average was one in 114,872 car-miles, he said.

"Frequent and reliable service, speed and comfort are what the general public demands of street cars," he continued, and he then pointed out that in St. Louis the average speed of the cars had been increased from 9.87 m.p.h. in January, 1928, to 10.30 in May, 1929. This was accomplished by a tightening up of schedules, fewer stops and a campaign designed to educate motorists as to the street car's traffic rights. Prior to the installation of the designated stop plan on the University-Olive line the average speed was 10.4 m.p.h., including layover, and the present average is 11.34 m.p.h. Excluding the layover, the average terminal-to-terminal run is made at the rate of 12.13 m.p.h.

He also reviewed the results obtained during a period when parking of automobiles was prohibited on important thoroughfares in the city's downtown congested district. It was found the no-parking rule had speeded up the movement of street cars as much as 47 per cent in the district east of Twelfth Boulevard.

Labert St. Clair, advertising director American Electric Railway Association, spoke on the subject, "Pack Up Your Troubles." At the annual banquet, Leslie Vickers, economist of the American Electric Railway Association, was the principal speaker. Round-table conferences at which matters of mutual interest were informally discussed featured the luncheons on Wednesday and Thursday.

At the closing session the following officers were elected: President, R. J. Lockwood, assistant general manager St. Louis Public Service Company; first vice-president, C. A. Semrad, vice-president St. Joseph Railway, Light, Heat & Power Company; secretary-treasurer, J. A. Weimer, superintendent of transportation Kansas City, Clay County & St. Joseph Railway.

Executive committee: For two-year terms—J. N. Shannahan, Omaha; S. W. Greenland, St. Louis; E. A. Roehry, St. Louis; G. W. Welsh, East St. Louis; E. B. Meissner, St. Louis, and F. O. Grayson, St. Louis. For one-year terms—O. E. Turner, St. Louis and B. W. Stemmerich, St. Louis. Under a change in the by-laws all former presidents of the association become ex-officio members of the executive committee.

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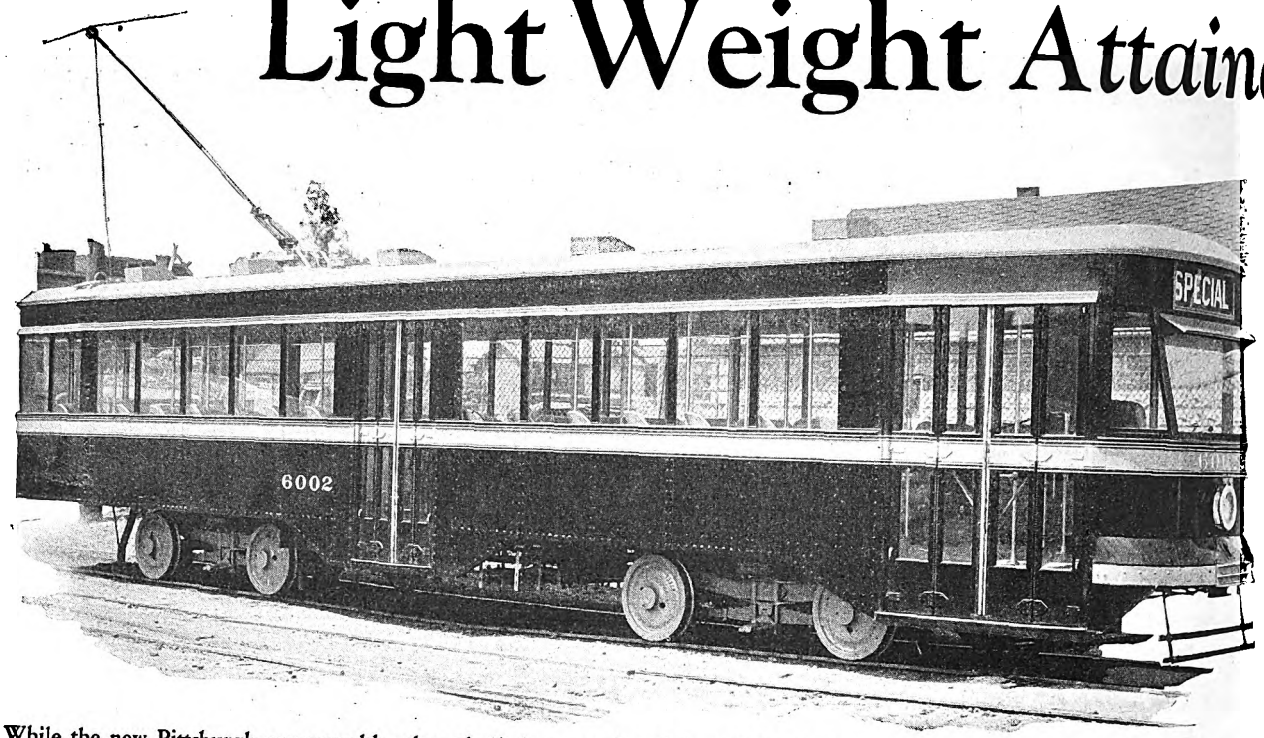
Light Weight Attained



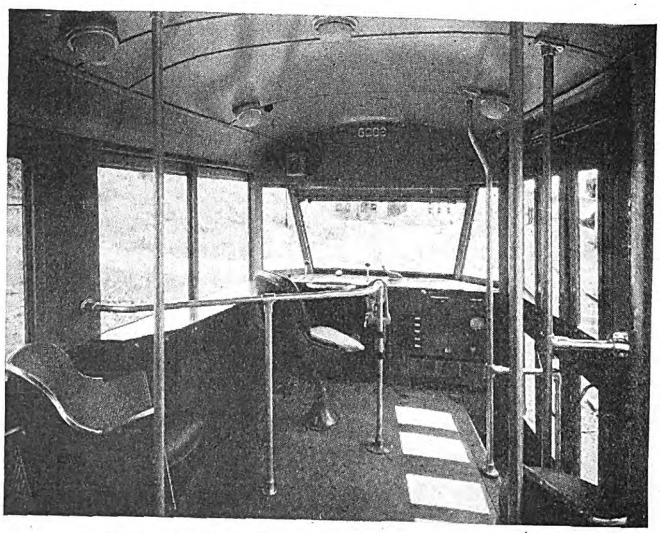
While the new Pittsburgh car resembles those built last year it weighs 27,000 lb. as compared with 36,500 lb. for the earlier model and the exit is at the center instead of the rear

EXTREMELY light in weight, equipped with electro-pneumatic control with pedal-operated accelerator and dynamic brakes, powered with four 50-hp. motors and designed to appeal to the riders, the latest experimental car of the Pittsburgh Railways, recently delivered by the Osgood-Bradley Car Company, represents another forward step in the development of modern cars to meet present-day needs. The car is in general similar to the two Pittsburgh experimental cars supplied by the same builder last year and described in detail in the June 2, 1928 issue of the ELECTRIC RAILWAY JOURNAL. The principal differences are the use of aluminum in the framing, the locating of double cross seats on one side of the rear half of the car instead of a single row of bucket seats at an angle, the substitution of a center exit door for a rear door, and modifications of the control and braking equipment. The step and floor heights, and the inside and over-all height dimensions also have been modified.

The car was built with the lightest possible car body framing construction consistent with the necessary strength and regard for manufacturing considerations. All metallic parts of the body construction and the various items of equipment have been made of aluminum wherever possible. Special aluminum alloy was used throughout the structure where special strength requirements are important, while commercial aluminum was used for the various items of interior finish such as wainscoting, cabinets, headlining, etc., where lightness only is the desirable consideration. The Aluminum Company of America manufactured the various aluminum alloy items and standard rolled sections such as I-beams, channels, tees, etc. The company also produced numerous special sections. The floor of the car is made up of aluminum Chanarch covered with Flexolith, the safety treads at the steps being of "Alumalun."

The weight of the entire body structure including the aluminum Chanarch floor plates and the complete roof with roof canvas, but exclusive of Flexolith flooring, doors, windows, window regulators, furrings, inside finish, and all items of equipment and trimmings, is 3,900 lb. The balance of 10,100 lb. entering into the weight of the complete car body is made up principally of items of miscellaneous equipment and specialties. The trucks weigh 13,000 lb., so that the car completely equipped weighs only 27,000 lb. The trucks at present under the car are the standard Timken No. 52 trucks of steel construction. Special trucks of the same type embodying aluminum wherever possible in their construction are now being developed by the Timken-Detroit Axle Company. With these the weight of the car will be still further reduced.

The exterior and interior of the car throughout are finished with Duco pyroxlin lacquer, a unique color scheme having been developed. The exterior of the car including side



All control equipment is encased in a cabinet

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t Attn New Pittsburgh Car

Extensive use of aluminum reduces body weight of Osgood-Bradley car to 14,000 lb. Four 50-hp. motors provide rapid acceleration and high speed. Accelerator and dynamic brakes are pedal-operated

Bucket seats are used throughout. Behind the center door there is a double row on the left side

sheathing, posts, and letterboards, is in black, the space between the belt rails being Karnak green with double aluminum stripes on the upper and lower belts. A Karnak green stripe and two aluminum stripes also are located on the bottom of the letterboard. The entire roof of the car also is of green.

The interior of the car from floor to advertising card molding is in a two-tone green, the darker color being used from the floor up to and including the window sill capping. The headlining is in ivory. The floor is of green Flexolith, no paint being required.

The seats are of the special bucket type similar to those used in the two experimental cars last year and were developed by Hale & Kilburn, using aluminum in their construction wherever possible. The stanchions at each of the diagonal bucket seats and elsewhere in the car are of alloy aluminum tubing.

The window construction is similar to that used on the two previous Pittsburgh cars except that the post spacing has been reduced from 3 ft. 10½ in. to 2 ft. 6 in., and ⅛-in. glass with aluminum frames has been used instead of $\frac{3}{16}$-in. plate glass.

The following items of special equipment are installed in the car:

Consolidated Car Heating Company heating equipment, the heater cases and backs being of aluminum.

National Pneumatic door operating equipment with light-weight differential engines arranged to be interlocked with the electric control and air brake equipment.

Ohio Brass dash illuminating headlights.

Economy meters.

Ohio Brass light-weight trolley bases.

Keystone trolley catchers.

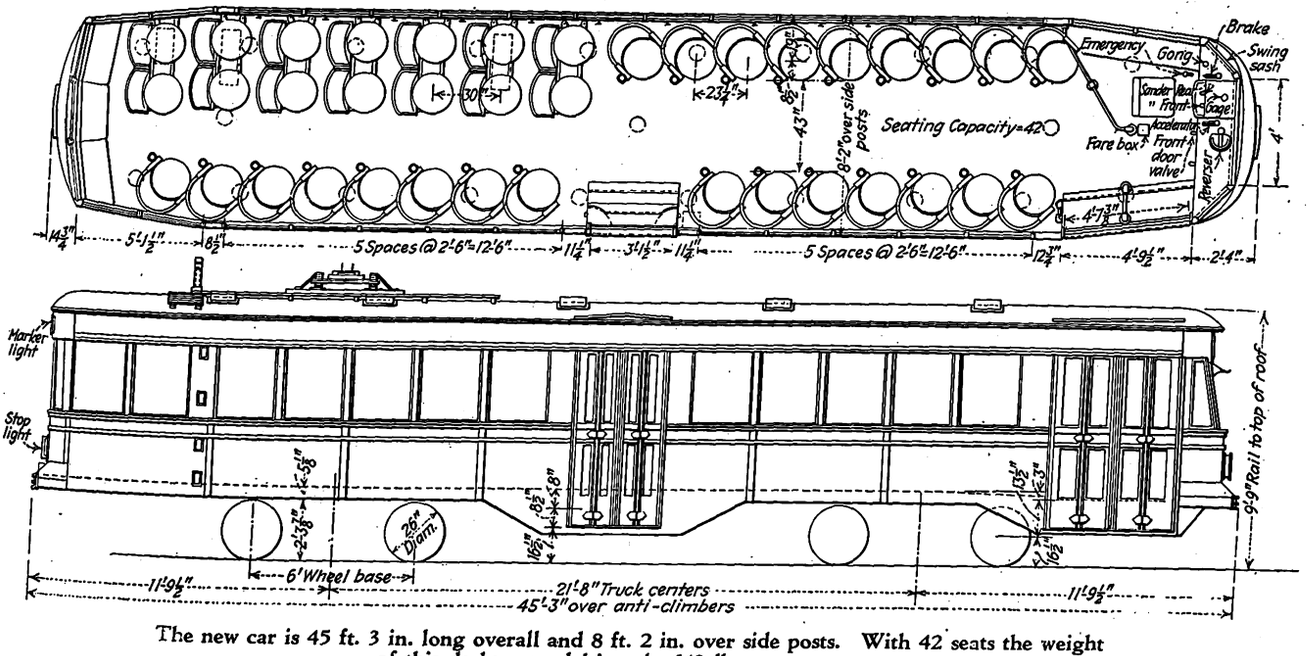
Osgood-Bradley ventilators.

Electric Service Supplies Company pull switches for signal system.

Electric Service Supplies Company dome lamp fixtures arranged with short-circuiting sockets for lamps, 20 in series from the main power circuit, and with dome emergency light fixtures operated through suitable relays and Philco storage battery.

Ternstedt heavy bus type window regulators.

Faraday buzzer equipment.



The new car is 45 ft. 3 in. long overall and 8 ft. 2 in. over side posts. With 42 seats the weight of this de luxe model is only 643 lb. per passenger

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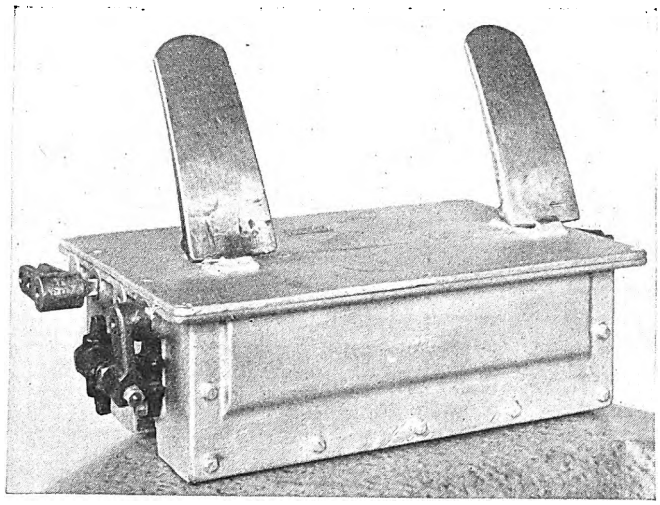
Cleveland fare box.
Nichols-Lintern sand traps.
Nichols-Lintern stop light equipment.
Pittsburgh Railways standard Hunter illuminated sign.
J. L. Howard & Company ball bearing hinges.
Osgood-Bradley life guard.

Four Westinghouse type 1426 motors, rated at 50 hp., are installed on the car. They are geared 4.4:1 to 26-in. wheels. The free running speed of the car on level tangent track is approximately 45 m.p.h.

The control is Westinghouse electro-pneumatic, actuated with line current, with variable automatic acceleration and dynamic braking. Air brakes also are included in the equipment. The main control is through fourteen unit switches. Twelve of these are type UM and are mounted in the platform cabinet. The other two, type



This pedal control for power and brake is mounted in a recess on the cabinet

806, are mounted beneath the car. One is the line switch and the other is the main switch in the braking circuit. The use of 300-volt motors reduces the number of switches necessary, since the fields and armatures are interconnected during dynamic braking with fewer connections than would be possible with 600-volt motors. The type M resistor is mounted beneath the car. It is divided into three parts, one for the main circuit, one permanently in the braking circuit, and the third in the braking field circuit. All of the control apparatus in the cabinet was mounted on a panel and the connections were made before it was inserted in place.

The master controls, both for acceleration and braking, are foot-actuated through two pedals. They have been designed to resemble the controls of an automobile. Variable rates of acceleration and braking may be obtained, and are approximately proportional to the distance the proper pedal is depressed, the maximum being obtained with full depression. The range is between the minimum practical values and the adhesion limit. If the braking pedal is depressed as far as possible, not only is the maximum dynamic braking rate obtained, but the air brakes are applied by means of a mechanical connection with the pedal. This permits the use of the air brake should the trolley pole come off the wire and the dynamic brakes become inoperative temporarily because the emergency switch had not been set. A latch which holds the braking pedal in the fully depressed position permits the operator to leave the car with the air brakes set. If for any reason the operator should remove his feet from both pedals suddenly the power supply would be cut off and the dynamic and air brakes applied to bring the car to a stop. In ordinary service either pedal may be depressed alone and its motion arrested at any desired point. There is a holding position so that either acceleration or braking may be arrested at any point desired. In order to permit track switches to be thrown the brake pedal may be depressed past the dynamic to the air braking position while the car is drawing power.

The proper action of the control energy on the various switches is obtained by an air-operated sequence drum which gives twelve accelerating notches and eight dynamic braking notches. It also automatically applies the air brakes when the dynamic braking has reduced the car speed to approximately 3 m.p.h. To prevent any lag in dynamic braking while the motors are building up their fields, the braking connections place two of the fields across the line in series with a resistance. Since the fields and armatures are interconnected this excites the entire circuit and permits the braking action to start without any lag.

The reverser is of the drum type and is hand operated, being placed with its handle convenient to the operator. It has an emergency position in which dynamic braking will be obtained regardless of the direction of motion of the car or absence of power. This gives a quick and reliable means of stopping the car under practically any conditions. The ordinary control switch is omitted, since moving the reverser handle from either of the operating positions opens the control circuit.

The air brake equipment was specially designed by the Westinghouse Traction Brake Company to operate in connection with the pedal electric control.

The car body is mounted on Timken-Detroit Axle Company No. 52 worm-drive trucks with disk brakes operating directly on the armature shafts. The disk brake for each motor is provided with two sets of shoes operated by special air brake cylinders mounted directly on the trucks. One set of shoes is operated by suitable mechanism through a hand lever adjacent to the motorman.

The Most Complete

Analysis of New Car Economics

Ever Published

BACK in 1922 the management of a comparatively small interurban property comprising 70 miles of track divided into four lines, made a complete replacement of equipment with twelve light-weight cars. The following year, all of the cars on a small city system comprising 17 miles of track in a city of approximately 60,000 population were replaced with 27 light-weight one-man cars. Automobile competition has made serious inroads on the traffic of the interurban. The city system has held its own. Under these conditions the new cars on both properties have been operated long enough so that the *complete* record of the results is available. Was the investment in new cars justified? Look for this article by the management of these properties, in the August number of ELECTRIC RAILWAY JOURNAL. It presents the most interesting, complete and authoritative analysis of new car economics ever published.

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Third and concluding article of the survey of new car experience

New Cars

PAY FOR THEMSELVES

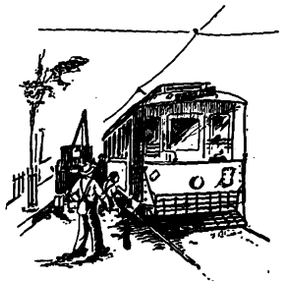
on Many Properties

By

MORRIS BUCK
Engineering Editor
Electric Railway Journal

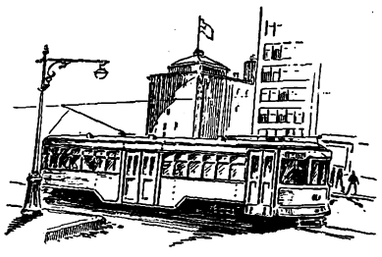
Definite savings of $1,268 in equipment maintenance and power can be made with new cars. Additional savings are certain in maintenance of way and in transportation. Speeding up the service not only reduces costs but makes the ride more attractive and so increases revenue.

PRACTICALLY every new car that has been purchased in the past few years is capable of making faster schedules than the older ones on the same property. The motors are more powerful in proportion to the weight and, taking less power from the line, the loss of voltage in the distribution system is less. Brakes are better designed. The new cars can be brought up to speed more quickly and can be stopped more quickly. Moreover, attention to design of doors, steps, and aisles has made it possible to reduce the time for passenger interchange. Unfortunately, the roads using the new cars have not obtained the full advantage in schedules. Those which have given actual figures in the new car survey by ELECTRIC RAILWAY JOURNAL have shown increases in speed up to 6 per cent, which can be credited directly to the new equipment. Depending on conditions such as length of line, headway, number of stops and length of run in the congested section, modern cars, when segregated on definite routes, should make possible increases in schedule speed of 10 to 20 per cent above those common on the average city road. This in itself will make a material reduction in the cost of service, both in the total and on a car-mile basis. The majority of the expenses vary but little as the speed is increased, so that the additional car mileage that can be obtained will require less investment in equipment and in the facilities needed to care for it.



As to the maintenance expenses, few properties keep separate records for the various classes of cars. Some companies that have made an accurate separation show remarkable savings in the maintenance of new cars as against the other rolling stock. The five-year average of equipment costs in Birmingham, Ala., for new cars is 1.15 cents per car-mile less than the system average, even though the average age of all cars is fairly low. In Detroit, the Department of Street Railways shows that maintenance of new 52-seat Peter Witt cars is 1.04 cents less than for equivalent seating capacity in older double-truck cars that they replace. Over a period of five years the Brooklyn City Railroad finds the cost of maintaining new cars is 2.5 cents less than for the old ones. Chattanooga shows a reduction of 1 cent per car-mile as compared with the general system average. Grand Rapids has found that over a three-year period, an average reduction in maintenance cost for new cars of 2.49 cents.

From the figures analyzed in this study, it is quite conservative to state that on many properties that still are operating heavy equipment of ancient vintage—patching, repairing and rebuilding as best they can, a saving of 2 cents per car-mile in equipment maintenance alone may be expected to result from the purchase of new cars. Consequently, if the new equipment is used for the base schedules, operating approximately 40,000 miles per year, the saving in maintenance alone amounts to $800 per car per year.



Replacement of a car weighing 40,000 lb. with one weighing 24,000 lb. will reduce the total load, including 40 passengers, from 46,000 lb. to 31,000 lb., or one-third. Tests made at various times have shown that the propulsion energy used is practically in proportion to weight, other things being equal. Without making allowance for higher efficiency of the new equipment,

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this energy saving is reflected directly in power costs. In 1928, the average cost in the power account was 4.38 cents per car-mile for all the companies reporting to the American Electric Railway Association. Deducting 20 per cent for car heating and lighting and for shop and miscellaneous uses, the industry average cost for propulsion was 3.5 cents per car-mile. A saving of one-third of this, or in proportion to the weight alone, is 1.17 cents. For an annual mileage of 40,000 the saving is $468 per car.

Without making allowance for other savings which are bound to come in connection with the replacement of old cars with new, the definite savings of $800 for equipment maintenance and $468 for power can be credited to new equipment. The total of $1,268 represents 8.5 per cent on an investment of $15,000 in a new car. While this is in itself sufficient to justify the replacement of an old car, no account has been taken of the ability of the new equipment to make a greater daily mileage, which will be obtainable both on account of the higher speed possible and the greater reliability and smaller shop time needed. Neither does it make any allowance for the lower transportation cost due to the higher schedule speed possible. The reduction in the number of cars which are needed to give a specified service causes a decrease in the capital invested, reducing the interest and depreciation charges, although these items do not lower the operating expense.

When the opportunities for speeding up the system, saving in track maintenance, and stimulation of riding are considered, no management can afford to overlook the possibilities of new equipment.

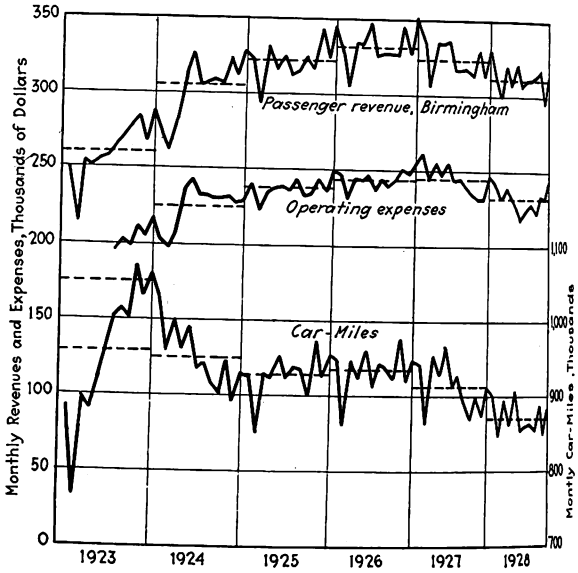
Although the properties included in the survey were selected solely on the basis of the record for purchases of new cars during the past few years, without regard to location or management, it is significant that every winner of the Charles A. Coffin award since it was first offered in 1923 is included in the list. On all of these properties the financial results have been good. All but one of them, which was the winner in one of the early years of the contest, have reduced the operating ratio. The one company has been able to maintain an operating ratio between 60.5 and 64 per cent throughout the six years, or more than 12 points below the average for the country.

More Results from Individual Properties Show Definite Benefits

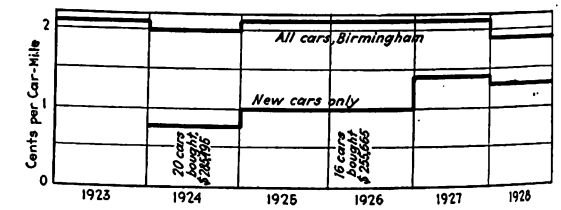
The summaries of information published in this and the preceding articles on the subject of new cars give briefly the results that have been obtained by the properties included in this survey. They all report definite benefits from the new equipment, greater or less according to the proportion of new cars and the effectiveness with which they have been placed. Numerous other properties have obtained advantages from the use of new equipment equal in magnitude, although on many of them it has not been possible to segregate the figures to show the relative revenues and expenses of the various classes of equipment.

Twin City Rapid Transit Company, Minneapolis-St. Paul, Minn.—This company has built 35 cars of an entirely new design, and has modernized more than half of the 1,000 cars already on the system. There has been a good psychological effect in aiding public relationship, although it has not been possible to see any effect on the gross revenue. It is the belief of this company that good riding qualities and pleasing appearance are of value, but that it is even more important to have sufficient motive power and an adequate braking system to insure a material increase in schedule speeds. This will bring substantial reduction in labor costs and the total number of cars operated, and will minimize as well the ever-present criticism by patrons of a "dragging ride."

Birmingham Electric Company, Birmingham, Ala.—This company purchased twenty cars in 1924 and sixteen more in 1926. Although a rerouting of the system in 1927 made possible a considerable reduction in system car-miles, the new cars were maintained at lower costs



Passenger revenues have held up well in Birmingham in the face of a severe industrial depression, while operating expenses have been reduced



Maintenance costs in Birmingham have been consistently less with the new cars as compared with the average of all equipment

than other equipment. The following maintenance expenditures for bodies, trucks and electrical equipment from 1923 to 1928, inclusive, show the advantages of the new cars:

MAINTENANCE COSTS OF CAR BODIES, TRUCKS AND ELECTRICAL EQUIPMENT, BIRMINGHAM ELECTRIC COMPANY

	Cents Per Car-Mile					
	1923	1924	1925	1926	1927	1928
New cars	...	0.8	1.0	1.0	1.4	1.3
All cars	2.1	2.0	2.1	2.1	2.1	1.9

The maintenance cost per car-mile for the system in 1928 was reduced in part because of the influence of the materially lower cost for repairing the new cars.

Improved financial results were obtained in Birmingham despite a severe industrial depression which caused a falling off in traffic. Increased operation of one-man cars has tended to counteract an increase in wages.

Greenfield & Montague Transportation Area, Greenfield, Mass.—Under public ownership this street railway serves the communities of Greenfield, Montague City

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nd Turners Falls, all in the northern part of the state. Of eight cars on the property two were bought in 1927 at a cost of $27,834. These new cars have given 65 per cent of the service on the main line since May 1, 927. They replaced older and much heavier cars without any change in schedule speed, rates of fare or routing. In November, 1927, the flood which overwhelmed arge areas in the Connecticut Valley made it necessary o co-ordinate the car service with a bus for fifteen days, which reduced the passenger revenue and increased expenses. In 1928 the discontinuance of a local freight rard caused the loss of considerable business. However, he passenger receipts in 1926 were 10.01 per cent more han in 1925, in 1927 were 8.56 per cent more, and in 1928 were 1.82 per cent more. The management cannot say that the new cars have brought any new revenue, but they may have checked a decline in revenues. The patrons are very much pleased with them.

The new cars show a decided decrease in maintenance cost from the old cars. The costs of car maintenance, not including depreciation, were 4.61 cents per car-mile in 1925, 4.84 cents in 1926, 3.94 cents in 1927 and 3.27 per cent in 1928. A 6-ton difference in weights of the new cars as compared with the old cars under test showed a 15 per cent saving in energy at the car. At the substation the alternating current input was 4.45 kw.-hr. per car-mile in 1926, the last full year with the old cars and 3.97 kw.-hr. per car-mile in 1928, the first full year with the new cars.

Modernization Brings Gains in Tennessee

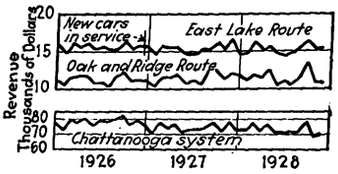
Four Tennessee properties have shown remarkable results from modernization in the past few years. These are the systems at Chattanooga, Knoxville, Memphis and Nashville. Each has purchased new cars in the past few years, although all have been consistent purchasers of equipment over a long period. In 1926 new cars were delivered in Chattanooga, Memphis, and Nashville, while the new cars were received in Knoxville in the following year. The latter property, however, had purchased 44 cars in 1923-1925. In order to make a comparison of the operating results on these four systems, the revenues and expenses have been combined for the years 1926-1928 as against 1923-1925, both inclusive. While there was a slight recession in gross revenue, amounting in the aggregate to $582,350, or 2.7 per cent, on the four properties for a period of three years, there was a reduction of $1,064,845, or 7.3 per cent, in operating expenses in the same period. This was accomplished despite an increase in car-miles operated of almost 7 per cent and an increase in platform wages of 2 cents per hour on all the properties. In fact, the net revenue was 0.3 cent per car-mile more in the latter period, even with the extra car mileage run. The gross saving of $1,064,845 in three years is more than the amount spent for the cars, which was approximately $967,700 for the four properties. While not all of the saving can be credited to the new cars, the managements are agreed that they have been a material factor in improving conditions, and that without them the saving would not have been possible.

SUMMARY OF RESULTS ON FOUR TENNESSEE PROPERTIES

City	Cars Bought	Year	Total Cost
Chattanooga	10	1926	$146,350
Knoxville	12	1927	175,000
Memphis	32	1926	500,000
Nashville	10	1926	146,350
A total of	64 cars		$967,700

Operating results:	1926–7–8	1923–4–5	Difference
Railway operating revenue	$20,793,837	$21,376,187	$582,350 less
Railway operating expenses	13,490,384	14,555,229	1,064,845 less
Net revenue from railway operation	$7,303,453	$6,820,958	$482,495 more
Car-miles operated	56,391,990	52,752,989	3,639,001 more
Cents per car-mile:			
Railway operating revenue	37.6	40.5	2.9 less
Railway operating expenses	24.4	27.6	3.2 less
Net revenue from railway operation	13.2	12.9	0.3 more

Tennessee Electric Power Company, Chattanooga, Tenn.—In October, 1926, this company purchased ten modern cars at a cost of $146,350. At the beginning of 1927 they were placed in service on two lines, the East Lake and the Oak and Ridge, without changes in headways, schedule speeds, rates of fare or method of operation. While revenues in Chattanooga have fallen off in the past few years the lines with new cars showed up much better than the remainder of the system, as may be seen from the following comparison:



Two lines in Chattanooga with new cars show better earnings than the rest of the system

REVENUES ON CHATTANOOGA RAILWAY LINES, TENNESSEE ELECTRIC POWER COMPANY

Year	System	East Lake Route	Per Cent	Oak and Ridge Route	Per Cent	Remainder of System	Per Cent
All old cars							
1926	$934,136	$188,381	20.2	$135,060	14.4	$610,695	65.4
		—New Cars—		—New Cars—		—Old Cars—	
1927	890,561	185,981	20.9	$136,521	15.3	568,059	63.8
1928	866,578	183,609	21.2	138,166	15.9	544,803	62.6

The car-miles operated on these two lines, as well as on the remainder of the system, have changed less than 1 per cent during the three-year period. The difference in revenue is, therefore, attributable almost entirely to the new cars.

Operating expenses have taken a sharp drop from $587,757 in 1926 to $571,165 in 1927, and again to $558,244 in 1928. A considerable portion of this is due to the saving in maintenance expense with the new cars, which for the two years have averaged 1.22 cents per car-mile, while the costs for all cars were 3.12 cents per car-mile in 1926, 3.19 cents in 1927 and 3.25 cents in 1928. The ten cars, naturally, are not a great enough proportion of the 74 cars in daily service to make a material difference, since the cost of maintaining the old cars is increasing each year.

According to the company the new cars have stimulated riding and have improved public relations.

Nashville Railway & Light Company, Nashville, Tenn.—In October, 1927, new cars of an improved type were put in service on one of the heaviest two-man lines. While there was no increase in revenue, the improved feature of the new cars as to comfort and convenience enabled the company to change to one-man operation, making a considerable saving. At the time the substitution was made the company staged a "Pageant of Street Railway Progress." More people viewed this parade than any previous event of the kind in Nashville.

The company believes that the new cars have improved public relations materially.

Memphis Street Railway, Memphis, Tenn.—This company purchased 32 new cars in 1926 at a cost of approximately $500,000, adding them to 199 already in service and retiring eleven, leaving 220 active cars on the system. The new cars were placed on the Peabody

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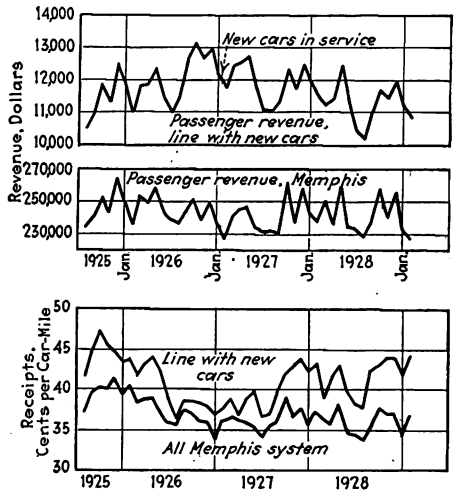


One Memphis line that has been equipped with new cars is doing better than the average, both in total and on a car-mile basis

line in August, 1926, and the revenue showed an immediate increase, which continued during 1927. In 1928, when the revenue for the entire system was off, the line with new cars showed comparatively less loss. The car mileage has been varied from time to time to meet the demands, but there has been no radical readjustment.

Records of maintenance costs are not kept separately for the various types of cars. They were 1.66 cents in 1925, 1.55 cents in 1926, 1.61 cents in 1927 and 1.80 cents in 1928. The low cost in 1926 was due to rebuilding 40 of the older cars into one-man cars.

Public relations unquestionably improved with the installation of the new equipment. There have been no franchise or fare changes during the period since the new cars have been in service, so no test has been made of their value in this respect.

Large Savings in Massachusetts

Springfield Street Railway, Springfield, Mass.—Fifty new cars were purchased at a cost of $786,227 and placed in service in 1927 on four lines, with only minor changes in headways and speeds. Routing and fares have remained unaltered. The revenues on these lines held up better if anything than those for the remainder of the system during the general depression which has existed in the city during the past two years. From 1926 to 1928 there was a reduction of $595,205 in the cost of operation. While accounts are not kept separately, the cost of maintaining equipment dropped from 4.41 cents to 3.66 cents per car-mile. Part of this reduction of 0.75 cent is due to the use of new cars for one-fifth of the total service.

The company feels that much of the improvement of public relations in the community is due to the expenditure for new equipment.

RESULTS WITH NEW CARS, SPRINGFIELD STREET RAILWAY

Year	Annual Passenger Revenue: System Total	Lines with New Cars: Amount	Lines with New Cars: Per Cent	Lines without New Cars: Amount	Lines without New Cars: Per Cent
1926	$2,885,631*	$607,674*	21.07	$2,277,957	78.93
1927	2,585,359	551,846	21.34	2,033,513	78.66
1928	2,398,270	551,126	23.0	1,847,144	77.0
Annual Car-Miles					
1926	6,488,453*	1,184,689*	18.26	5,303,764	81.74
1927	6,064,766	1,172,645	19.33	4,892,121	80.67
1928	5,668,353	1,195,410	21.08	4,472,943	78.92
Cents per Car-Mile					
1926	44.7*	51.21*	.....	42.94	.....
1927	42.7	47.07	.....	41.57	.....
1928	42.2	46.10	.....	41.29	.....
System Operating Expenses					
1926	$2,475,889*	.....	.....	.....	.....
1927	2,190,511	.....	.....	.....	.....
1928	1,880,684	.....	.....	.....	.....

*Before new cars were installed.

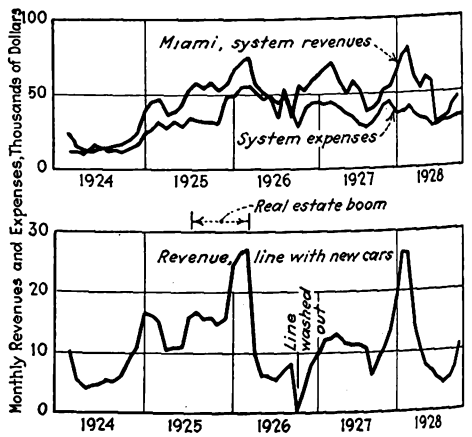
Worcester Consolidated Street Railway, Worcester, Mass.—As in Springfield, 50 cars were bought in 1927 at a cost of $787,679 and placed on four routes. Schedules were unchanged. The revenue has remained practically constant, having a reduction in 1928 of 5.6 per cent from 1926, whereas the lines without new equipment have dropped off 17.1 per cent, or more than three times as much. While costs are not segregated, there has been a reduction of $816,913 in the total from 1926 to 1928. Equipment costs have gone down from 5.75 cents per car-mile to 3.75 cents in the two years with the modern equipment, making about 22 per cent of the total. As in Springfield, the new cars, representing a very vital part of the rehabilitation program which the company is putting through, have improved public relations.

RESULTS WITH NEW CARS, WORCESTER CONSOLIDATED STREET RAILWAY

Year	Annual Passenger Revenue: System Total	Lines with New Cars: Amount	Lines with New Cars: Per Cent	Lines without New Cars: Amount	Lines without New Cars: Per Cent
1926	$2,922,099*	$781,651*	26.74	$2,140,448	73.26
1927	2,685,857	763,476	28.42	1,922,381	71.58
1928	2,512,280	737,944	29.37	1,774,336	70.63
Annual Car-Miles					
1926	6,072,892*	1,300,754*	21.42	4,772,138	78.68
1927	5,446,097	1,282,179	23.54	4,163,918	76.46
1928	4,953,359	1,282,500	25.89	3,670,859	74.11
Cents per Car-Mile					
1926	48.11*	60.09*	.....	44.86	.....
1927	49.31	59.54	.....	46.17	.....
1928	50.72	57.54	.....	48.34	.....
System Operating Expenses					
1926	$2,729,220*	.....	.....	.....	.....
1927	2,353,880	.....	.....	.....	.....
1928	1,912,307	.....	.....	.....	.....

*Before new cars were installed.

Miami Beach Railway, Miami Beach, Fla.—This property has been affected in the last few years by the land boom in the city. The great increase in business in the winter of 1925-1926 prompted the purchase of twelve new cars, which were placed on one route. In addition twenty new cars were taken over from the Coral Gables Corporation.



In Miami, Fla., one route with new cars is doing as well now as it did during the real-estate boom in 1925-1926

The new cars began service in January, 1926. The revenues went up immediately from $16,900 in December to $24,600 in January, with further increases in February and March. With the collapse of the boom the riding fell off sharply. There was a further setback in October, 1926, when the hurricane washed the line off the causeway into Biscayne Bay. Hence the receipts for October and November were far below normal. In

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order to handle the traffic the line was double-tracked in July, 1927, and the headway was changed from ten and twenty minutes to five and ten minutes, the schedule speed being increased from 9.8 to 16.6 m.p.h.

The cost of car maintenance in 1924 and 1925 was 2 cents per car-mile. In 1926, when it was necessary to use all available equipment on account of the boom, and when repairs were abnormal as a result of the hurricane, the cost went up to 4.1 cents. In 1927, however, it fell to 2.6 cents and in 1928 remained at 2.8 cents. The new cars, of course, are of greater capacity than many of the single-truck cars in former use on the property.

Public relations have improved on the whole as the new cars are large and roomy, with ample motor equipment. The new cars have been so popular that the patrons of some of the other lines on which there is less riding have requested the new type cars.

Wheeling Traction Company, Wheeling, W. Va.—This road purchased a total of 23 new cars in 1924, at a cost of $322,432. These have been in service ever since, carrying about one-third of the total traffic. There has been a marked improvement in public relations, notably evidenced by the passage of many better new franchises. The progressive attitude of the management in the rehabilitation of the property has been largely responsible for this result.

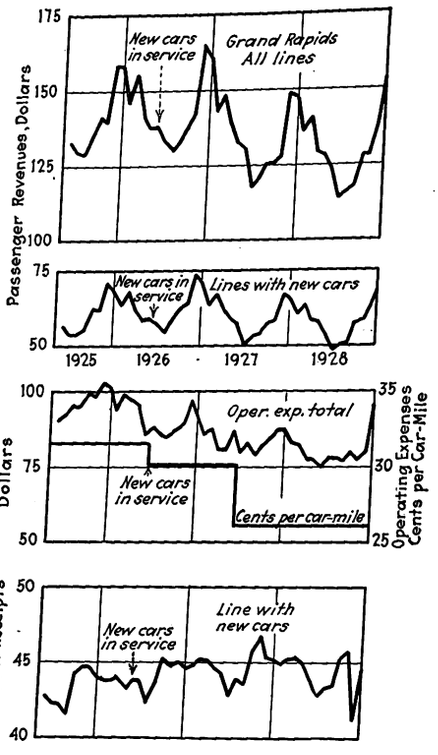
Wheeling Public Service Company, Wheeling, W. Va.—Fifteen new cars were placed in service on this system in January, 1927. For approximately six months the gross revenue showed an increase of 2.5 per cent. Afterward, owing to industrial conditions, the revenue fell off and is not yet up to normal. The new cars were designed for one-man service, making a saving of about 30 per cent in conducting transportation. The maintenance of equipment cost compared with that of cars which had been in service for fifteen to twenty years is estimated by the management at about 25 per cent less. Taken as a whole, the costs for the year show a decrease of about 27 per cent. Not all of this can be attributed to the new cars, as considerable construction work in the way and structures department is now resulting in a saving.

The public relations have improved with the new equipment. It is possible to give better service with fewer delays, and this naturally creates a better feeling on the part of the riding public.

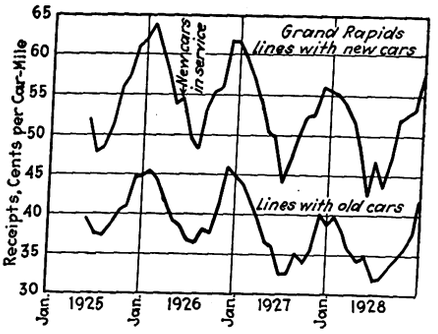
Brooklyn City Railroad, Brooklyn, N. Y.—New cars have permitted this company to speed up its schedules on all lines where they have been installed, reducing the duration of the stop from an average of 8.2 seconds to an average of 6 seconds, and have done their part in reducing accidents of all kinds. On lines where other conditions such as the opening of subways have not complicated the situation they have materially reduced the cost of maintenance. Over a period of approximately five years this reduction has been 2.5 cents per car-mile.

Revision of some surface lines on account of the opening of new subway routes and the addition of express service to others has resulted in a reduction in gross revenue. The net, however, has been about the same since the installation of the new cars, despite the increases of wages of trainmen and shopmen. The economies are attributed to the new cars. In the opinion of the management they have had a great deal to do with creating more favorable relations, both with the public and with the employees. On the whole there is no question but that their purchase has been a wise investment.

Grand Rapids Railroad, Grand Rapids, Mich.—Following the experimental installation of three cars in 1925 in an effort to determine what features were of greatest benefit, this company bought 27 new cars in 1926 at a cost of $359,544. These cars were placed in service on two lines. There were no material changes in headways, speed, fare or routing, although two-man operation was replaced by one-man operation. The immediate effect of the new cars was an increase of revenue as compared with the year before. For the first twelve months the lines with the new cars showed an increase of $15,448, while the lines using the old cars showed a decrease of $15,956. The new cars thus were able to keep the system revenue practically up to the level of the year before, although they only produced 36.8 per cent of the car-miles. Although in the last two years revenue has fallen off, principally on



Two Grand Rapids lines with new cars are bringing in a higher proportion of the gross revenue than they did in the old days, while the operating expenses, both total and in cents per car-mile, are much less. Receipts per car-mile are shown below in comparison with the rest of the system



RESULTS WITH NEW CARS, GRAND RAPIDS RAILROAD

	Before New Cars	After Installation of New Cars		
	June-May 1925-1926	June-May 1926-1927	June-May 1927-1928	June-January 1928-1929*
Passenger receipts:				
Routes with new cars...	$743,418	$758,865	$709,426	$453,857
Routes without new cars	967,215	951,261	873,428	569,403
Sys' m total.....	$1,710,633	$1,710,126	$1,582,854	$1,023,260
Per ce nt of total receipts, routes with new cars...	43.3	44.3	44.9	44.3
Car-miles run:				
Routes with new cars...	1,327,147	1,373,577	1,378,239	916,270
Routes without new cars	2,350,385	2,373,454	2,415,452	1,613,066
System total.....	3,677,532	3,747,031	3,793,691	2,529,336
Per cent of car-miles, routes with new cars..	36.1	36.8	36.4	36.2
Earnings, cents per car-mile:				
Routes with new cars...	56.0	55.1	51.4	49.5
Routes without new cars	41.1	40.2	36.2	35.1
System average.....	46.6	45.7	41.7	40.5
Operating expenses:				
Total.....	$1,163,691	$1,048,740	$986,430	$663,406
Per car-mile, cents.....	31.7	30.2	26.1	26.1

*Eight months only.

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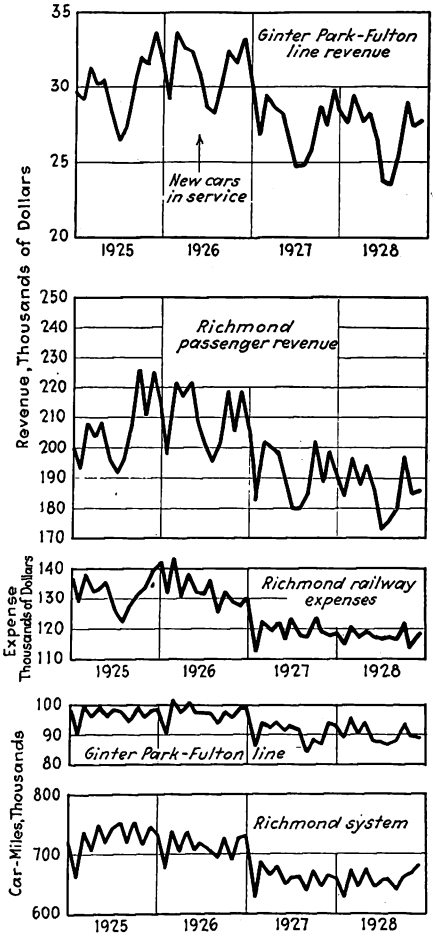
account of unfavorable industrial conditions in the city, the management contends the decrease would have been even greater had it not been for the modern equipment.

Maintenance costs of the new cars have been very low, as may be seen from the following table:

ANNUAL COSTS OF CAR MAINTENANCE IN GRAND RAPIDS

	Cents Per Car-Mile	
	New Cars	All Cars
1925	....	4.79
1926	0.75	4.24
1927	0.99	3.16
1928	0.95	2.80



The Ginter Park-Fulton lines in Richmond, Va., with its new cars, has done much better than the average of the system in revenue. The expenses of the system have been reduced sharply in the past two years

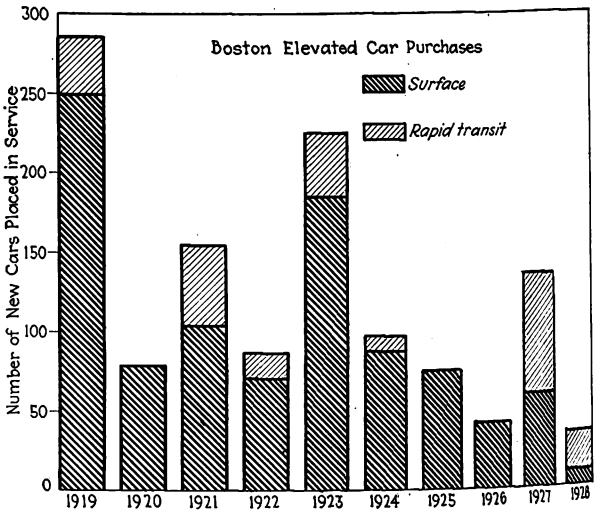
Virginia Electric & Power Company, Richmond, Va. — In June, 1926, fifteen new cars were purchased at an approximate cost of $216,000 and placed in service on the Ginter Park - Fulton line. It is rather difficult to determine the effect of the cars on revenues, since there was a rather complete rerouting and co-ordination of rail and bus service in January, 1927. The line also was paralleled for approximately 0.9 mile by a bus line which was started in January, 1927. This took away considerable revenue.

The earnings on this line have held up proportionately higher than for the system as a whole. While the headways, routing and fares have remained substantially the same there has been a slight saving in car-miles during 1928 on the line. There also has been an increase in speed, from 9.21 m.p.h. to 9.31 m.p.h. While exact data are not available for maintenance cost on the new equipment the company estimates a saving of 1 cent per car-mile with the light-weight double-truck cars as compared with heavy equipment. The total car maintenance for the system has been reduced year by year as follows: In 1925 it was 4.47 cents, in 1926, 4.12 cents, in 1927, 4.0 cents and in 1928, 3.87 cents.

The new cars have been of considerable value in fostering good public relations in that section of the city served by them.

Arkansas Power & Light Company, Little Rock.— Thirty new one-man cars were purchased in 1926 as part of a modernization program. Immediately afterward the company changed over all of its cars for one-man service. It was found possible not only to hold the schedule speed, but to increase it slightly with the advent of the one-man service, while the accidents were reduced materially.

Boston Elevated Railway, Boston, Mass.—There is no comparison between the modern equipment on this system today and that in 1918. During the past ten years this company has spent $19,000,000 for new cars and buses. In this time there have been placed in service 906 new surface cars of modern type, 165 steel elevated and tunnel cars, 95 Cambridge Subway-Dorchester Tunnel cars, 48 East Boston Tunnel cars and about 300 buses. The company has retired 1,476 out-of-date cars, and 72 of the new cars have been sold or destroyed by fire. With fewer cars in service, the number of seats furnished has been increased due to the larger capacity of the modern cars and to more frequent headways, in part made possible by the use of one-man cars. The new cars have wider doors and lower steps, thus serving convenience and reducing accidents.



Consistent purchases of cars, both for surface and for rapid transit lines, have marked the program of the Boston Elevated Railway during the past ten years

Of course the substitution of modern cars for old has resulted in substantial economies. Their use is, however, only one of many changes made during the ten-year period, and it is not possible to allocate economies in dollars to the modern equipment.

Purchases of new cars by years are shown in the accompanying diagram. A consistent program has called for additions every year. With the adoption of public control an adequate depreciation fund has been set aside, amounting to between $2,000,000 and $3,000,000 per year. This makes it possible to provide for future renewals. An accompanying table shows how the new cars have been put to good use. The box cars, articulated and earlier types of semi-convertible cars which previously made up the surface rolling stock have virtually been retired except for emergency duty.

SERVICE WITH VARIOUS EQUIPMENT, 1918 AND 1928, BOSTON ELEVATED RAILWAY

	Per Cent of Total	
	1918	1928
Modern cars	7.1	49.4
Semi-modern cars	19.4	....
Obsolete cars	46.2	10.1
Rapid transit	25.0	29.1
Foreign cars	2.3	1.0
Buses	....	10.4

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Pacific Electric Expands

Pick-Up and Delivery Service

Co-ordinated rail and truck freight service, established by means of contract arrangement with independent truckmen, meets demands in satisfactory manner

Independent truck owners are glad to accept contracts with Pacific Electric Motor Transport Company

By

PAUL T. PORTER

Editor Bureau of News, Pacific Electric Railway
Los Angeles, Cal.

TO GIVE better service to the shipper and at the same time meet the inroads of motor truck competition, the Pacific Electric Railway, through a separately organized and operated subsidiary, the Pacific Electric Motor Transport Company, last March inaugurated a store door, freight pick-up and delivery service. The Transport Company publishes rates from store door at point of origin to store door at point of destination. It issues a single through billing from and to both points and undertakes the performance of the entire service. At originating points the Transport Company's trucks pick up shipments at the merchant's store door and haul them to the station where they are loaded on cars of the Pacific Electric Railway and hauled by rail to the station of destination. At such destination station the shipments are transferred again from the rail cars to the motor trucks and delivery is made to the store door of the consignee.

In addition to store-door to store-door delivery, the tariff of the Transport Company in some instances includes rates from or to the station; that is, from the station at originating point to store door at point of destination; or from store door at point of origin to

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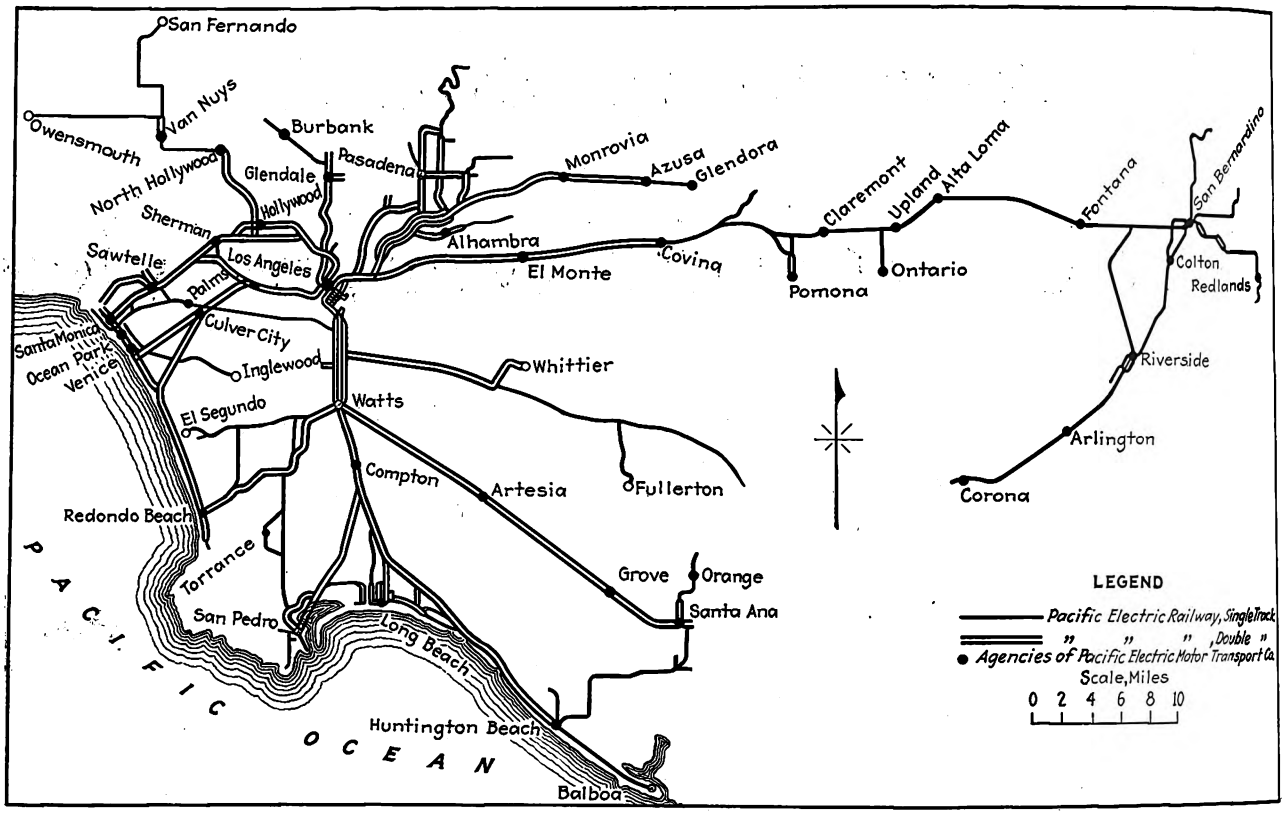

Map of territory served by Pacific Electric Motor Transport Company

station at point of destination. The object of these alternative rates is to enable the Transport Company to render service similar to that supplied by private truck carriers. In no instance does the Transport Company publish station-to-station rates. The contract of the latter company with the Pacific Electric Railway provides for the new company to make joint use of the railway's freight stations and station employees, the Transport Company participating in payment of salaries to such employees and paying rent for the use of facilities employed.

A combination waybill and expense bill is used, the complete document being made out by the agent at the forwarding point. An outstanding advantage of this practice is that the expense bill is ready to go with the truck driver who makes delivery at door of consignee. The plan of operation also provides a c.o.d. service for the shipper, the truck driver making the collection. In the case of regular customers, whose financial status is unquestioned, the Transport Company's agent makes collection for services rendered.

In recognition of the fact that the C.O.D. shipper is pleased with the quick return of collections for merchandise so shipped, the Transport Company management conceived and perfected a plan whereby such collections are paid over to the shipper within from 24 to 36 hours after pick-up of the shipment. This feature of the service has been commended most highly by many of the shippers.

Use of the rail car for the line haul between origin and destination points is simply an operating convenience, and so far as the shipper and receiver are concerned, the railroad does not enter into the performance of the service contract. The rail service is carried out by the railroad for the Transport Company under a private contract. Under the plan of operation now in effect the Pacific Electric Motor Transport Company has not found it expedient to purchase its own motor trucks, contracts to date having been made with local truck operators within the towns or districts being served. Sensing the possibilities for increased business, truck operators have been quick to enter into contracts. The large tonnage which promises to develop has also been an incentive to truck owners to seek a contract arrangement with the new company. Rates of the new company are not gaged or based upon existing rail rates between the same points. Necessarily, they are designed to meet on common ground motor truck carriers operating in the same territory, and while the Transport Company's rates are in some instances the same as station-to-station rail rates, in most cases they are higher.

The large number of freight trains operated by the Pacific Electric Railway makes possible a one-day delivery. Shippers are urged to notify of pick-up not later than 3 p.m. and when this is done guarantee of delivery is made for early the following morning. Failure to notify of pick-up by 3 p.m. does not necessarily imply that a truck will not call the same afternoon and accomplish delivery the next morning, and arrangements have been made whereby shipments, picked up as late as 5:30 p.m., have been delivered early the following morning. Many shippers find it necessary to keep their floor space clear and insist that shipments be taken as soon as they are ready. To meet this condition contracts with truck operators stipulate that they shall make pick-up within two hours after being notified to call.

Operators of the truck fleets have shown both a willingness and even desire to obtain contracts in the various cities where the pick-up and delivery service has been put into operation. For the most part they look upon a tie-up with the new Transport Company as a medium for increasing their tonnage and providing business that will permit the maximum use of their equipment. In not a single instance to date has a truck owner abrogated his contract. What effect the new concern will have upon long-distance hauling has not yet

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been determined, but the truck fleet owners evidently feel no alarm, due to the fact that much of their business is of a character that cannot be duplicated or performed by the Transport Company.

The ultimate success of the undertaking cannot be gaged until the operation shall have been continued for a number of months. However, since the service was inaugurated on March 11, each month has witnessed a gratifying increase in the tonnage handled, and the Transport Company's management has expressed itself as being enthusiastic over the reception accorded the service of the new organization.

While tonnage increases have not been made public, evidence that the service has met a receptive welcome among shippers is reflected in the fact that on June 1 twenty additional southern California cities were added to the original list of 24—there now being 44 cities within a 70-mile radius from Los Angeles to which the service is available. The business already being handled is said to compare favorably with many of the larger transportation agencies which have been in business for many years. It is also stated that in the short time since the service was begun 245 industries have been served, of which 210 were not previously users of the rail service of the Pacific Electric Railway. It is estimated that a business of 500,000 tons per year will be developed.

The service was inaugurated without any special advertising nor were additional solicitors put out to introduce it. Freight solicitors of the railway are lending their assistance during the routine of their calls upon industrial firms, and agents in many of the cities aided to some extent in acquainting the shippers of the districts with the new type of service.

Canadian Association Celebrates Silver Anniversary

Program of Montreal convention reflects progress in the dominion's transportation and growth of electric railway service

MONTREAL, the scene of the formation of the Canadian Electric Railway Association 25 years ago, witnessed the 25th anniversary convention held June 4-7. The meetings were held in the newly-completed stadium, while most of the social events took place at the Windsor Hotel. In the absence of the president, D. W. Harvey, the meetings were presided over by Vice-President C. H. Dahl.

The annual address of Mr. Harvey, read by the secretary, pointed out the growth of the electric railway business in Canada in the 25 years during which the association has been in existence. That this growth is continuing is shown, according to the speaker, by the increase in gross revenues of the member companies of $3,000,000 in 1928 as compared with 1927. Further, there were no abandonments of city service last year. Faith in the future growth and development of the electric railway, he said, has been shown during the year in cases where suburban single-track lines have been changed to double-track. There has been a steady increase in route-miles operated by the Canadian companies by the extension of permanent track and motor bus routes. Nevertheless, the speaker feels that the companies must be at least one step ahead of any conditions which might adversely affect the upward trend in the matter of revenue passengers carried. The plants—the only ones of their kind in each community—are surely adapted to earn revenues other than those from carrying passengers. An increase in the profitable use of the transportation plant will make it possible to produce better transportation.

Four committees presented reports. These covered motor buses and trucks, rail corrugation, publicity and merchandising of transportation, and safety and accident prevention. The committee on rail corrugation recommended that an intermediate manganese alloy, preferably sorbitized, offers the most hopeful solution from the standpoint of the rail. In the discussion it was pointed out that this recommendation, made independently, confirms that of the similar committee of the International Association.

New sources of revenue and further uses of equipment were investigated by the motor bus and truck committee. It was stated that the most outstanding ways of getting more business are interline operation, night operation of coaches, and package express. It was pointed out that the latter business can be handled on early and late trips when the passenger load is light, so that the service is interfered with but little.

Two formal papers were read during the meetings. The first was on the subject of developments in track design, construction and maintenance, by A. T. Spencer, general superintendent construction and maintenance, Montreal Tramways, and O. C. Rehfuss, chief engineer Canadian Steel Foundries. Experience with various types of track structure, both in Montreal and elsewhere, was given. In the discussion which followed considerable difference of opinion developed as to the merits of various kinds of ties. Experience in thermit welding of joints under traffic was given by E. M. T. Ryder of the Third Avenue Railway, New York City. A method has been developed in which a maximum of three minutes is needed for pouring the weld. Others said that pre-cast rail filler has been valuable in reducing noise, but that in some instances it has had a tendency to break down and leave an opening alongside the rail.

Three Distinct Classes of Transport

R. N. Graham, manager of railways Penn-Ohio System, Youngstown, Ohio, read a paper on the relation of urban transportation to suburban and interurban traffic. In a territory with a central city surrounded with suburban communities and smaller cities with independent business and trade activities three classes of transportation must be given. While the cities themselves are vitally dependent on mass transportation, and in them the effect of the private automobile is least, it is a more serious factor in suburban transportation and is most serious of all in its effect on interurban traffic, according to the speaker. The urban resident saves the least in time and money with his automobile. The suburban resident saves more in car fare to offset the high price of running

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his automobile, and the interurban passenger can so time his infrequent shopping and entertainment trips as to use his automobile to the best advantage. As a direct result the greatest mileage of abandoned street railway lines is in the interurban classification.

Suburban lines should not be cut off at the end of the city system, said Mr. Graham, but the cars should be run through to the center. The city cars should be speeded up so that the suburban cars will not be delayed unduly, and the headways should be so chosen that the suburban cars, making infrequent stops, can gain the space between city cars. Loading platforms, shelters and illumination all help to popularize the service. If one-man cars are used, signals, switches and fare collection should all be designed to require a minimum of time on the part of the operator. Buses have been found useful in suburban transportation, and the speaker held that their use is not an alternative but is supplementary. Buses can be run express through city streets and so can make superior speeds. Since buses cannot be operated economically on long lines at a flat rate of fare, the suburban bus must charge a higher fare, not as an equivalent service to the street car but as a supplementary service. Interurban service is not supported by regular, every-day riders, being merely a convenience to the casual rider. Nothing can be gained by commutation fares or other reduced rates. Fares must depend on mileage, and so the bus, from the standpoint of riding capacity, is as fitted to produce a profit as the street car.

A feature of the Canadian Association's meetings is the discussion of "Timely Topics." Much interest developed on the subject of follow-up training and grading of car men. D. E. Blair, Montreal, brought out that the early training of the man is likely to crop out in after years, so that a close follow-up is needed. Since some men are more prone to accidents than others, they should he watched and have their occupations changed if necessary.

Records of the Montreal Tramways show that a relatively small proportion of the men have a large share of the accidents. H. O. Allison, Pittsburgh, Pa., corroborated this statement. He has found many men of ten to twenty years' service who have needed reinstruction.

On the subject of systematic maintenance of rolling stock, A. M. Lindsay, Montreal, pointed out that adequate records, standardized methods and practices, regular inspection and periodic overhaul are all needed to prevent failures. W. R. McRae, Toronto, feels that it should be unnecessary to point out the need for systematic maintenance when there is no argument whatever to be made against it.

Increase of Schedule Speed Held a Vital Need

G. E. Waller, Hamilton, and W. F. Irvin, Toronto, discussed ways and means for increasing schedule speed. It was pointed out that many factors are within the control of the company, such as the track, cars and power. Other conditions that are beyond the direct control of the company are traffic, parking, etc. The principal means of improving schedule speed are increases in rate of acceleration and braking, reduction of time of passenger interchange, elimination of stops, installation of electric switches, substitution of loops for wyes, etc. In Toronto the standard spacing of stopping places is now six per mile in the residential areas and seven per mile in the business districts. The public is becoming appreciative of the improvement in schedules afforded by the changes. Installation of automatic synchronized signals caused a reduction of 10 per cent in speed from the manual system. Replacement of this with the co-ordinated system caused an increase of 9 per cent in speed, but did not bring it back to what it was with the manual system. Long signal cycles have been found very bad, causing added congestion and reducing the speed.

Trolley Maintenance Saves Delays

Preventing delays to traffic by the use of modern methods in the overhead department were discussed by G. H. Cartwright, Quebec, and J. F. Neild, Toronto. According to Mr. Neild, the control of the system comes down to the keeping of accurate records. The location of wire is important. Use of a plumb-bob has not been sufficient, since there are sections of track where the rails are not parallel horizontally. A better method is to inspect the side wear on the wire and adjust the position to equalize this. It was considered better to remove trolley wire with a reduction of 35 per cent in area in congested districts rather than to risk breaks, as the cost due to loss of service may easily outweigh the value of the wire.

W. E. Massie, St. Catharines, and W. R. Robertson, Toronto, spoke of the comparison between cost of steel and cast-iron car wheels. In Canada the cost, including all factors, does not differ greatly. Experiments on a one-wear heat-treated rolled-steel car wheel on the Niagara, St. Catharines & Toronto Railway, have proved satisfactory. It is expected to get 100,000 miles with one wear at a cost comparable with that of the other types of wheel.

As is customary, three formal luncheons were held on the three days of the convention. The first was devoted to short talks by those of the founders who were able to be present. They included J. E. Hutcheson, Acton Burrows, E. A. Evans, R. M. Hannaford and D. E. Blair. The second day the audience was addressed by Leslie Vickers, economist of the American Electric Railway Association, who discussed trends in local transportation. On the third day the address was by J. F. Saint-Cyr, chairman of the Montreal Tramways Commission.

Officers were elected at the closing meeting to serve for the ensuing year, as follows:

Honorary president, J. F. Saint-Cyr, chairman Montreal Tramways Commission.

Honorary vice-president, Acton Burrows, president Acton Burrows, Ltd., Toronto.

Honorary advisory council, Hon. T. Ahearn, Ottawa; Edward Anderson, Winnipeg; Lt.-Col. J. E. Hutcheson, Montreal; C. A. Magrath, Ontario; W. G. Murrin, Vancouver; J. C. Smith, Montreal.

President, C. H. Dahl, assistant general manager Winnipeg Electric Company.

Vice-president, G. E. Waller, vice-president Dominion Power & Transmission Company, Ltd., Hamilton.

Treasurer, H. C. Patton, comptroller Toronto Transportation Commission, Toronto.

Auditor, J. E. Richards, manager and treasurer London & Port Stanley Railway, London, Ont.

Executive committee: The president, the vice-president, the treasurer, the immediate past-president (D. W. Harvey, Toronto), and D. E. Blair, Montreal; T. W. Brackinreid, Port Arthur; F. D. Burpee, Ottawa; W. S. Hart, Three Rivers; D. W. Houston, Regina; W. B. Powell, Montreal; W. R. Robertson, Toronto; L. Tait, London; K. B. Thornton, Montreal, and H. E. Weyman, Levis.

In connection with the convention an exhibit of electric railway materials and supplies was held. The leading manufacturers of this class of equipment in Canada were represented, as were several of the principal American bus builders. The Montreal Tramways also showed typical examples of its latest rolling stock.

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Vision of Local Business Men Puts Oklahoma Railway on PAYING BASIS

Passenger traffic has **increased** 25 per cent in three **years on** the co-ordinated **street car** and bus system **operated** by the Oklahoma **Railway** in this **rapidly** growing **southwestern** city

Improvements costing $2,000,000 have been made during the past three years. New equipment has been purchased and new carhouse and shops built. Number of passengers carried has increased 25 per cent. Facilities for freight handling have been greatly improved

EMERGING from its financial difficulties, the Oklahoma Railway is now able to meet all fixed charges and earn a small net revenue. During the past three years there has been a steady increase in patronage and it appears that the company has successfully passed through the period of depression which has been generally felt by electric railways throughout the country. The company was first organized in 1903 as the Metropolitan Railway, with only 6 miles of track. Today it has more than 150 miles of track and is the largest electric railway in Oklahoma. Since 1926 the number of passengers carried on its lines has increased 25 per cent. Although the company has steadily increased the number of buses in service, the proportionate increase in the number of street car passengers has been more rapid than in the number of bus passengers. In 1926 bus passengers constituted 25.4 per cent of the total traffic, while last year the bus passengers were only 24.4 per cent of the total.

These results have been achieved under the management of Oklahoma City business men. In 1927 the Oklahoma Railway was purchased by Hubert R. Hudson and his associates, William Mee, banker; Dr. G. A. Nichols, real estate man; T. C. Thatcher, miller; A. E. Monroney, merchant and A. O. Campbell, contractor and builder. Prior to that the company had been in the hands of receivers for about three years. The new owners have expended nearly $2,000,000 in the purchase of new cars and buses, making extensions to city lines, enlarging and remodeling the terminal station and building a new carhouse and shops.

The latest step in the company's program of equipment improvement was the purchase early in the present year of six new buses and ten new street cars for city service. The cars are being built by the St. Louis Car Company at a cost of $110,000. They are double-truck, four-motor, one-man cars with a seating capacity of 36 and weight of 24,000 lb.

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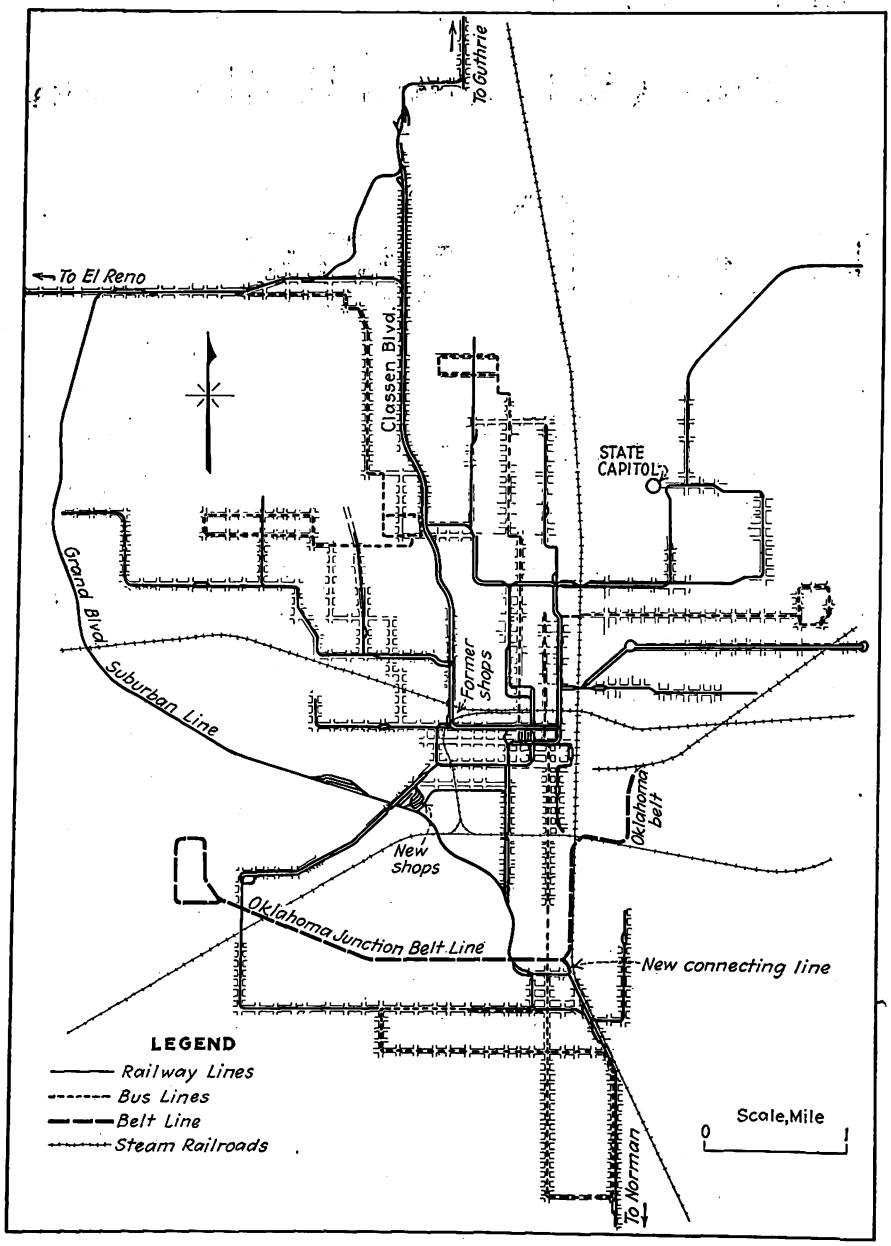

Oklahoma City is served by some 75 miles of street railway track, besides the new Grand Boulevard electric freight line, the recently electrified belt lines and numerous motor bus routes

During 1928 the company remodeled its downtown terminal station at an expenditure of approximately $25,000. The roof of the station was extended, a number of ticket and concession stands constructed, additional entrances and exits provided and other minor improvements made to permit more rapid handling of car and bus traffic. This station has been a feature of the company's service for many years. A majority of the 125 street cars and 40 buses operated by the company are routed through the terminal, which is located in the business center of the city. During the early days of the receivership an effort was made to partially dispense with the terminal by through routing certain cars. This was done in the hope of speeding up crosstown service and eliminating as far as possible transfer of passengers. The plan was later abandoned and the terminal station is again being used as before.

Approximately $250,000 has been spent on new carhouses and shops located in the southwestern part of the city. These stand on property which once was the most widely patronized amusement park in Oklahoma City. The buildings consist of a main structure, including paint shop, carpenter shop and garage. The old location of its shops near the center of the city, will be made available for industrial sites.

The new owners recently abandoned the operation of the railway power station at Belle Isle on the Guthrie-Oklahoma City interurban line just north of Oklahoma City. This plant has been owned and operated by the company for many years, together with high-voltage lines extending to the towns of Yukon, Cashion and Edmond. The Belle Isle property also included 90 acres of lakes and small streams which for nearly three decades served as one of Oklahoma's chief playgrounds. This land, including the site of the amusement park, the lakes and streams, the generating plant and the high-tension lines, was sold recently to the Oklahoma Gas & Electric Company.

Freight Brings Added Revenue

Under the receivership various steps had been taken to cut operating expenses and increase revenue. The new owners realized, however, that a large amount of additional business must be created in order really to put the property on a paying basis. The most promising means of securing the necessary additional revenue was thought to be by expansion of freight business. The company owns and operates interurban lines centering in Oklahoma City, extending to Norman, El Reno and Guthrie and intermediate points over which passengers, express and freight have been carried for years. These three lines, constituting a total of about 85 miles of track and radiating to the southward, westward and northward, respectively, are connected with the city transportation system, which includes about 75 miles of track.

Shortly after the Hudson interests took over the property a plan was devised for increasing freight revenues by constructing a freight line around the northwestern, western and southwestern suburbs to tie together the three interurban lines and enable the company to carry freight more rapidly and with less interference to and from city traffic than was possible with existing facilities. At that time all freight originating on or consigned to the three interurban lines was being carried over the Classen Boulevard city line, which also served for carrying city and interurban passenger traffic. Classen Boulevard is one of the main outlets from the business district to the northern environs of the city, and for most of its length is lined with fine residences. One of the reasons for building the new line was the opposition of a number of Classen Boulevard property owners to the operation of freight trains through this district.

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PASSENGERS CARRIED BY YEARS

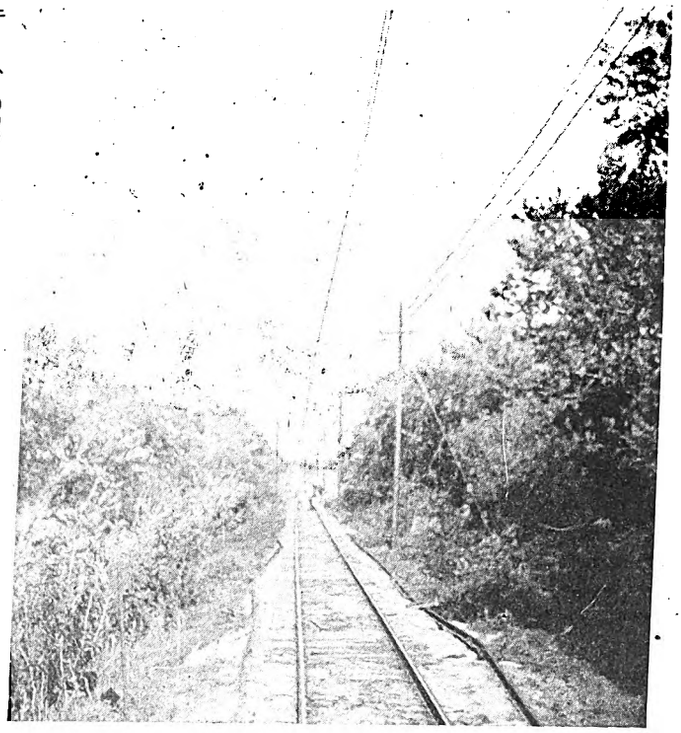
Year	Number of Passengers — Street Car	Bus	Total
1926	13,000,000	3,300,000	16,300,000
1927	14,682,000	3,900,000	18,582,000
1928	16,424,000	4,000,000	20,424,000

Many difficulties were encountered in negotiating an agreement satisfactory to the City Council, Classen Boulevard residents and to the company. Several months expired before a final agreement was reached in March, 1928, providing for construction of the new Grand Boulevard line. Officials of the railway, however, showed their good faith by beginning construction before this agreement was finally signed, and in rushing the work to early completion with a large force of men as soon as all difficulties were out of the way. This line was completed and put into operation in December of last year, at a cost of approximately $1,250,000, including relocation and construction of new shops, terminal yards, switching facilities, and purchase of new equipment.

For several reasons the Grand Boulevard line was located for the most part outside of Oklahoma City. The company desired to locate the line where it would not interfere with future growth of the city, and also where land values were relatively low and industrial sites and switching facilities could be acquired at reasonable prices by individuals, firms and corporations. While the company is not sponsoring any industrial real estate developments along this line, it is encouraging the sale of manufacturing and other industrial sites.

Belt Lines Leased and Electrified

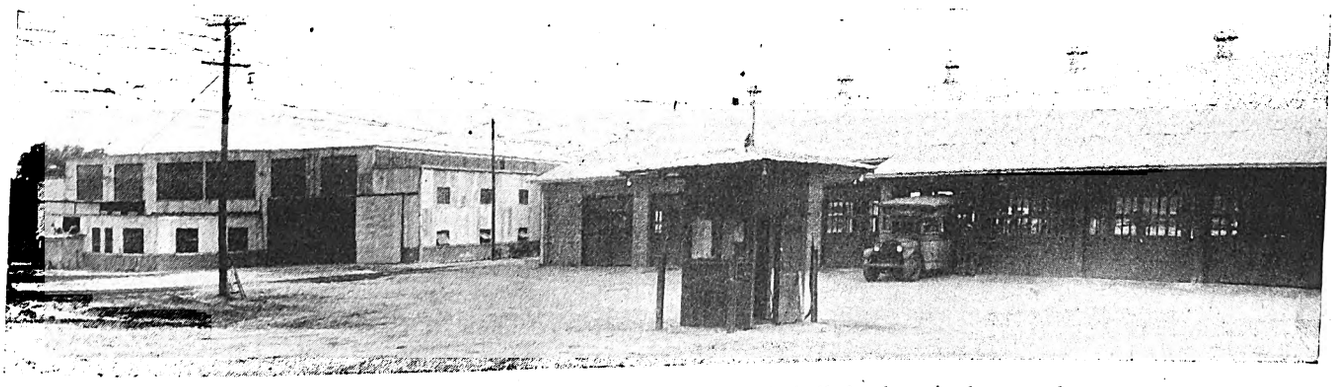
About a year ago the new owners secured a ten-year lease on the Oklahoma Belt Line Railway, approximately 5 miles in length, at that time steam operated and connected to the principal trunk line railroads entering Oklahoma City. This belt line connects with the Oklahoma Junction Railway, which has about 5 miles of switching and side tracks in the packing-house district. The Oklahoma Railway acquired a 99-year lease on this property also. The principal reason for acquiring these roads was to secure freight terminal facilities to handle business from the packing-house district and also other business originating on or consigned to steam railroads connecting with the belt lines. Oklahoma City has an extensive packing-house industry and stock yard facilities, and a great deal of business is handled to and from the packing-house district. The volume of traffic resulting from acquiring the belt lines and constructing the new freight line is steadily increasing, and the management believes that these various acquisitions will prove to be a profitable investment.



Right-of-way of the new Grand Boulevard freight line which partially encircles the city through its outskirts

In addition to the packing-house business, the Oklahoma Railway handles much freight and express traffic of many kinds that originates at points along the interurban lines. The company also serves several sand pits which have a large output, located northwest of the city near its El Reno and Grand Boulevard lines.

In addition to the connections between the two belt lines, the Grand Boulevard line and steam railroads already mentioned, the other city and interurban lines connect with the new line at many points. At some of these points freight is diverted over city lines to its place of destination or delivered to outlying lines from points of origin in the city. The company is still permitted to carry freight over some of the city lines in the southern section of the city, a district which is largely industrial and where there are comparatively few residences of the better class. The belt lines and the Grand Boulevard line are so connected with the city system that they may be used for passenger traffic if that should be desired.



New car and bus shops of the Oklahoma Railway recently built in the suburbs to replace the old shops in the center of the city

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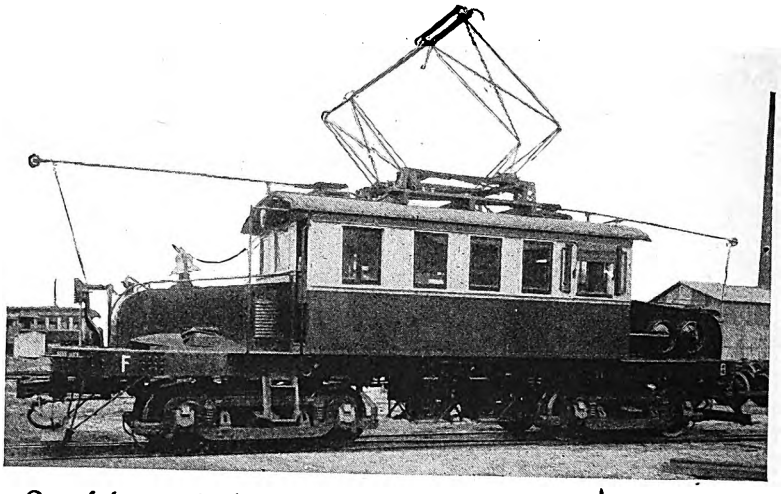
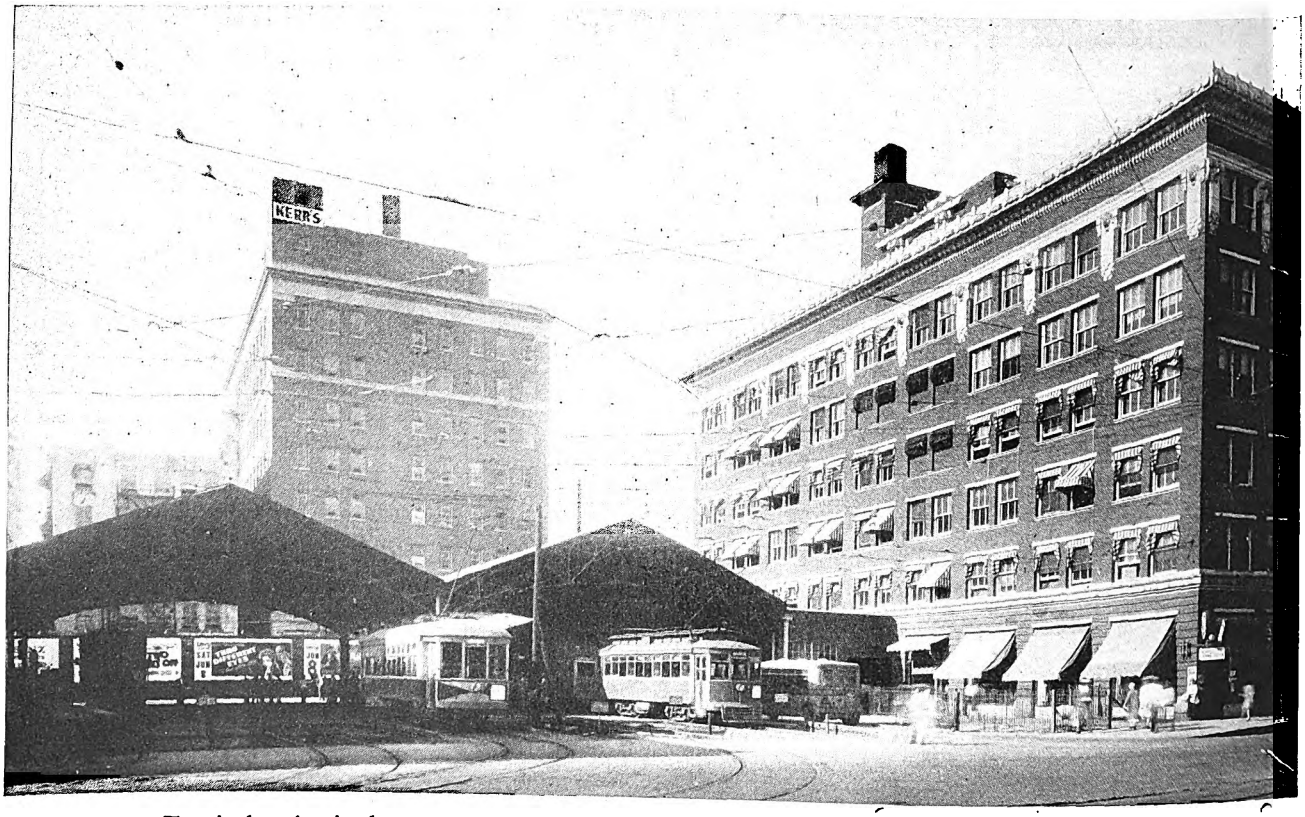


One of the new 600-hp. electric freight locomotives equipped for either pantograph or trolley operation

When the company assumed operation of the two belt lines on May 1, 1929, it immediately put into service two 600-hp. electric locomotives. Three more of these locomotives have been built in the shops of the company. Each engine has four 150-hp. motors and weighs about 75 tons. The motors were manufactured by the Westinghouse Electric & Manufacturing Company and the trucks by the Standard Motor Truck Company. All other construction was done in the railway shops. The company also has several older 400-hp. electric locomotives, making a total of eight. Pantographs are used on the freight and belt lines and ordinary trolley equipment on other lines.

The general situation in the territory, in which the company operates, is extremely favorable. Oklahoma is enjoying a rapid commercial development along all lines. This is particularly true of Oklahoma City and surrounding territory. Building permits have exceeded $1,000,000 per month for more than 2 years. Industrial development is moving forward, as is truck farming, poultry raising, dairying and other industries which create new freight and passenger business for transportation lines. A new oil and gas field has been opened almost in the southeastern suburbs of the city.

The Oklahoma Railway has adopted an aggressive policy in securing new freight business. It has also secured a permit from the Oklahoma Corporation Commission to operate interurban passenger motor buses along the highway paralleling its interurban line between Oklahoma City and Norman and has applied for bus permits to carry passengers parallel to its other interurban lines. Judging by the results so far accomplished, prospects are bright for a continued increase in both passenger and freight business.



Terminal station in the central business district of Oklahoma City serves both car and bus passengers. The building at the right houses the offices of the Oklahoma Railway

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The Readers' Forum

Requirements of Materials for Car Flooring

Johns-Manville Corporation
New York, N. Y., May 7, 1929.

To the Editor:

An article appeared on page 687 in the Oct. 13, 1928, issue of Electric Railway Journal telling of the use of car flooring material, one of the constituents of which was a bituminous material.

In the March 23, 1929, issue of Electric Railway Journal in The Readers' Forum section, there appear some comments by R. C. Brett, research engineer of the Trundle Engineering Company, Cleveland, Ohio, under the title "Asphaltum Not Advantageous for Car Floors." The author of these comments makes a sweeping condemnation of car floors using asphaltum, on the basis of tests presumably conducted as part of his research engineering work. The unfortunate part of the author's comments is that by making his conclusions so specific and positive, he indicates very clearly that his tests have not been sufficiently comprehensive to include some of the more refined compositions of flooring, and show lack of familiarity with the subject of car flooring in general.

Simply by way of rebuttal, it might be well to state that it is not only possible but entirely feasible to furnish composition flooring composed of filler ingredients such as coke breeze, held together with a bituminous binder which will not exceed a unit weight of 0.9 lb. per square foot per $\frac{1}{8}$ in. thickness. "The type of flooring now commonly used by railroads," as expressed by the author, rarely has a lighter weight than the figure mentioned, and if it does, this lighter weight can be secured only through the introduction of sawdust, wood fiber or other deleterious ingredients, which not only weaken the structure of the floor itself but increase its porosity to such an extent that water will readily pass through the floor.

With regard to the thickness of composition floorings now in general use, one would hardly be so optimistic as to expect a $\frac{3}{8}$-in. thick composition flooring to give satisfactory service over a period of years, unless this composition flooring had sufficient mechanical strength to withstand in itself the stresses placed upon it, or else was sufficiently flexible to accommodate itself to these stresses without fracture.

To condemn a flooring material because it will soften under the heat produced by the combustion of the car is hardly justified by a consideration of contingent factors. It should be significant that composition flooring will not burn unless its temperature has been raised above 550 or 600 deg. F. To produce this temperature other combustible materials would have to be present. In modern steel car construction this is barely possible. In old wooden construction the car would be consumed by fire beyond the point of further usefulness before the flooring would be seriously affected. Thus the composition flooring does not constitute a fire hazard, but, rather, it is a fire retardent, as you may learn from the Chicago Board of Underwriters.

The test results and scientific deductions or conclusions of research engineers are extremely valuable contributions to engineering literature and trade publications. Obviously, such information is of value only if it reflects an unbiased or uninfluenced consideration of facts.

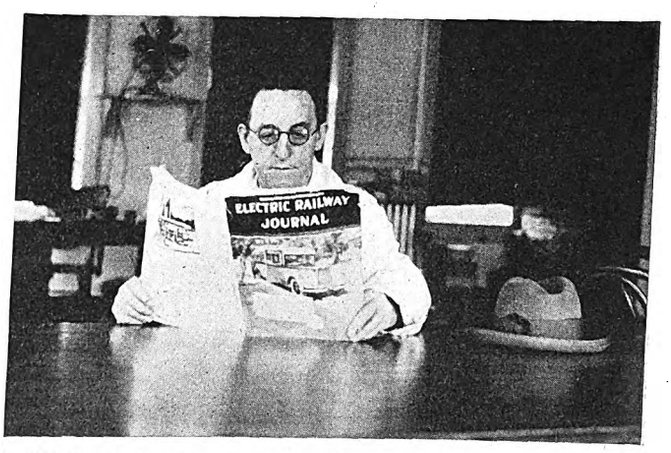
P. D. Mallay,
Chief Engineer General Railroad Department.

Maintenance Contest Teaches Better Methods

Virginia Electric & Power Company
Norfolk, Va., May 15, 1929.

To the Editor:

Every subscriber to Electric Railway Journal is introduced to solutions of the other fellow's problems that not only teach him better and more efficient methods, but actually make for better maintenance all over the industry, in that each and every subscriber has before him a periodical review of such improvements throughout the electric railway field. The present maintenance contest, designed specifically for that purpose, is proving one of the most interesting and far-reaching ventures of its kind known of by the writer since his connection with the industry. In Oct. 27, 1927, issue the Journal said editorially of a similar contest:



T. W. Sanderlin, carpenter shop foreman in Norfolk, Va., studying the practicability of a special clamp for preventing theft of rear-vision mirrors

> The many articles submitted show an earnest desire on the part of the men who submitted them to lower maintenance costs, to provide more efficient and better methods, to eliminate fatiguing operations and manual labor, to overcome troubles experienced in the various operations and to provide improved equipment to do the work.

That is just what the present maintenance contest is doing. For instance, the Virginia Electric & Power Company at Norfolk for some months past was troubled with the theft of rear-vision mirrors from the cars. In the Oct. 20, 1928, issue a contest item described a special clamp designed to stop such losses which had been tried out successfully on another property. Its adoption in Norfolk stopped the thefts.

This particular instance is but one that shows how a free interchange of ideas surely will bring to light methods that can be adopted with good results on any property.

C. B. Hall,
Chief Clerk, Mechanical Department.

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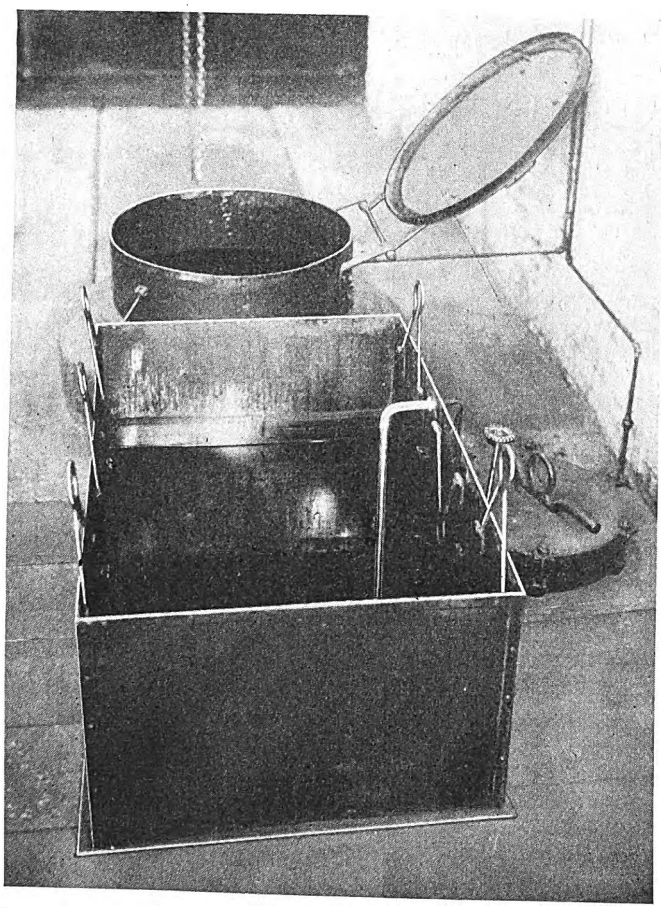
Improved Armature-Dipping Methods Developed

By F. V. Skelley
Superintendent of Equipment Des Moines City Railway
Des Moines, Iowa

DIFFICULTY in obtaining proper penetration of varnish when armatures were dipped led the Des Moines City Railway about two years ago to undertake a series of experiments from which the methods now used have been developed.

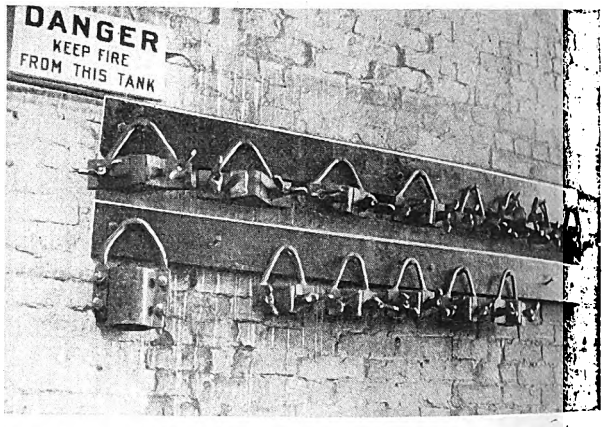
At first armatures were dipped in a tank of varnish for twenty minutes and after draining were baked for 48 hours. It was found that the varnish did not penetrate to the bottom of the slots although the coils were known to be loose. This condition was verified by tearing out the coils of several armatures after they had been dipped and baked. Other experiments were then made to improve conditions. A steel tank was built large enough to hold an armature. With the vat filled to the proper level with baking varnish of a standard make and the armature under test sealed in the tank, a vacuum of 25-in. gage measure was applied, followed by a pressure of 110 lb. per sq.in. After ten minutes of this treatment the armature was removed and the coils torn out. The results obtained were little better than with the twenty-minute dipping at atmospheric pressure.



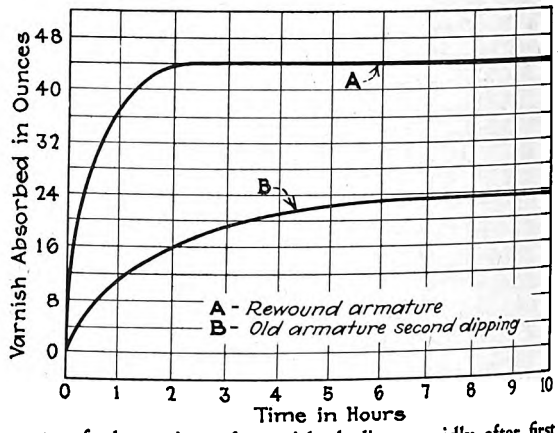
Rectangular varnish vat in shop of Des Moines City Railway will accommodate six G.E.247-I armatures at one time. Circular tank in rear is used for larger armatures. Between rectangular vat and the wall is a 17-in. diameter pressure tank, 45 in. deep, for storage of surplus varnish

Soaking the armature in varnish was then tried, starting with 24 hours' duration and decreasing the time to 18, 16, 12, and finally 6 hours, tearing the coils out each time to determine the amount of varnish in and around the bottom coil in the slot. As the penetration of the varnish was satisfactory for armatures soaked six hours or more, it was decided to test the rate of penetration up to six hours so that the time might be reduced to as short a period as possible for performing a satisfactory job.

A rewound G.E. 247-I armature was preheated as usual and submerged up to the commutator in a tank of varnish placed in a room where a constant temperature of 104 deg. F. could be maintained. The result as shown by curve *A* on the accompanying chart indicates that 2 lb. 12½ oz. of varnish was absorbed in two hours and that practically no further absorption took place up to ten hours. Next an old G.E. 247-I armature, that had received a previous dipping of twenty minutes, was soaked for ten hours. The rate of penetration was found to be much slower and the varnish continued to be absorbed for six hours. The temperature in this test was held constant at 112 deg. F. Only 1 lb. 3 oz. of varnish was absorbed by the armature during its second dipping period. The thickness of varnish adhering to a clean metal plate was one mill. The second soaking of the armature added two and one-half mills, or gave a total of three and one-half mills thickness of varnish on all metal surfaces.



Armature shaft clamps of various sizes are neatly stored on a rack located directly above varnish vats



The rate of absorption of varnish declines rapidly after first 60 minutes as shown by armature test curves

As a result of these experiments, the armature-dipping equipment now in use consists of a rectangular metal tank 48x32 in., and 40 in. deep, in which six G.E. 247-I

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armatures can be soaked at one time; a circular tank of 6 ft. depth and 30 in. diameter, in which all large armatures are soaked; and a pressure tank of 45 in. depth and 17 in. diameter, for the storage of surplus varnish. Air under pressure is admitted to this latter tank and varnish forced through a connecting pipe and valve into the rectangular vat. When the valve is opened and air pressure removed, the varnish flows back by gravity. It is thus possible to maintain 30 in. of varnish in the large vat irrespective of the number of armatures being dipped at one time. Hinged brackets along each side of the vat slip over the end of the armature shafts to hold them in a vertical position. The method of operation with this equipment is to take an armature that has been in service 80,000 miles, tighten the bands if necessary, and soak in varnish for six hours or more; then bake until the insulation resistance is satisfactory.

Some Essentials for Trolley Wheels

By Dr. James Silbestein
Metallurgical Engineer, Chicago, Ill.

INVESTIGATION of service obtained from trolley wheels shows that the mileages obtained vary from 1,400 to 17,000 and that the cost per 1,000 car-miles varies from 2 cents to 33 cents. This wide variation indicates that more knowledge is needed regarding desirable characteristics for making trolley wheel castings and that their purchase should be subject to rigid inspection.

There are a number of factors which influence the life obtained from trolley wheels. Among these are electric conductivity, arcing properties, hardness, wear resistance and soundness of castings. Trolley wheels are made of copper-basic alloys. Their electric conductivity ranges between 10 and 70 per cent, the International Annealed Copper Standard being 100 per cent. While a high electrical conductivity naturally is desirable, this property is not as essential for long life as some other factors, and an electric conductivity of 10 to 20 per cent may be considered satisfactory.

The destructive action of arcing should be as small as possible. Alloys high in zinc result in more arcing and so are not suitable. A small percentage of zinc, up to 5 per cent, is beneficial since it has a deoxidizing and cleansing effect upon the metal. It has been found that the service performance of alloys containing 5 per cent of zinc is just as satisfactory as the phosphor bronze alloys. Lead which is added to bronzes to improve their wearing qualities is undesirable in trolley wheel alloys. Extensive tests have shown that the destructive action of arcing is greater for alloys containing lead than for lead-free and that the life of the wheels is less in the former case.

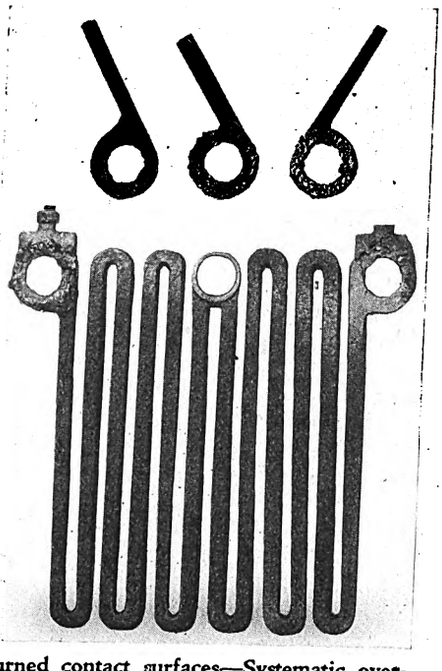
Hardness is not an essential quality of a trolley wheel alloy and a greater hardness is no indication of better wearing resistance or longer life. In general, the Brinell hardness of trolley wheel alloys ranges from 40 to 55. Service tests have been conducted with alloys having a Brinell hardness as high as 75 and the results of these tests indicate that the harder alloys were no better than the softer ones. The fact that hardness is not a measure of wear-resisting qualities has lead to extensive investigations on methods of testing abrasion resistance of metals. Finality in methods of testing for this purpose has not yet been attained and different types of abrasion testing still yield results which are not comparable. In view of the great importance which the rate of wear has for parts such as trolley wheels, trolley wires, rails, treads of wheels, axles and bearings, a satisfactory abrasion test would be highly desirable, but so far it is necessary to resort to the slower method of testing in service.

Overhauling Cast Grid Resistors

By R. S. Beers
Railway Engineering Department General Electric Company Schenectady, N. Y.

WHEN car equipments are overhauled the motor resistors should receive the same attention that is given the remainder of the equipment. They should be put in shape so that they will operate without further attention until the next overhauling period. Whether it is necessary to dismantle and rebuild the resistors may often be told by a visual inspection of them.

This inspection should be followed by an insulation test, a bank of lamps and trolley voltage between the grids and the resistor frame being used for this purpose. After this the resistance of the resistors should be measured. A simple means of checking the accuracy of the resistance measurements is to measure the total resistance and also the individual steps. If the individual steps do not add up to the total, some error has been made.



Burned contact surfaces—Systematic overhaul of grid resistors discloses conditions of this kind when they exist

If the resistance is a good deal higher (30 per cent or more) than called for by the manufacturer's connection diagram, it is desirable that the resistors be torn down and the grids restacked. The grid bosses, if they are rusty or if they have tiny pieces of mica sticking to them, should be thoroughly cleaned. The easiest, quickest and most successful means of cleaning them is with a sand blast. If the sand used is not too coarse, this method cleans off rust and any foreign matter, leaving the contact surfaces of the grid boss just as clean and parallel with one another as they are on new grids. Filing or grinding cleans the contact surfaces of the grid boss, although it usually reduces the conductivity because the surfaces are no longer parallel.

Grids with badly burned contact surfaces should be discarded. Where trouble from this cause is excessive it can be reduced by using a thin copper (about 0.01 in. thick) washer between the contact surfaces.

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Design of
Maintenance Contest Trophy
Completed

IN KEEPING with the purposes and spirit of ELECTRIC RAILWAY JOURNAL'S maintenance contest, the design has been completed of the trophy to be awarded to the company rendering the most outstanding contribution, through participation in the contest, to the improvement of maintenance practice of local transportation companies. The final design is the beautiful example of the silversmith's art illustrated on this page.

The trophy takes the form of a wall plaque of bronze, mounted on polished wood. In relief across the upper part of the shield is an emblematic representation of the various phases of transportation maintenance work. The heroic size of the figures is symbolic of the importance of the human element in maintenance performance. This design, together with the lettering and the decorative border, are worked in sterling silver on the bronze shield.

After the final meeting of the judges, following the close of this year's contest on July 15, the name of the winning company will be inserted on the trophy in the space provided. The actual presentation will be made at the coming convention of the American Electric Railway Association at Atlantic City this fall, and the trophy will be on display in ELECTRIC RAILWAY JOURNAL'S booth in the new Atlantic City Auditorium.

In addition to the company trophy, there will also be awarded at the convention the individual cash prize of $200 to the electric railway man submitting the best single item in the contest. Departmental certificates of merit will go to each of the four departments — equipment, way and structures, electrical, and bus—which receive the highest rating from the judges under the same terms as those used for selection of the company winner. At their coming meeting the judges will also select the winners of individual departmental prizes of $25 each for the final period of the contest which closes on July 15. Winners of these cash awards will be announced in the August number of ELECTRIC RAILWAY JOURNAL.

ENTRIES ELIGIBLE TO JULY 15

ITEMS submitted in this contest up to midnight July 15 are eligible for all of the prizes listed above. These entries are now coming in at a rapid rate as the closing date approaches. There is no limit on the number of items that can be submitted by any individual, department or company, and the total number of items entered by a department or company is one of the factors to be considered by the judges in awarding the departmental certificates of merit and the beautiful company trophy. The JOURNAL will pay $5 for every item published which does not win a prize.

Full details of the contest were published in the Oct. 20, 1928, issue of ELECTRIC RAILWAY JOURNAL. There are also available for the asking printed folders giving the conditions of the contest and suggestions for preparing entries. There is still time available for individuals, departments and companies to make a bid for these prizes. But the time is getting short, and this is the last announcement in the JOURNAL before the close of the contest on July 15.

Mailed items must bear a postmark up to midnight of that date. Be sure to mark entries "Maintenance Contest."

Present Standing of Companies and Departments in Maintenance Contest

Company	Department	Prizes	Winners
Cleveland Ry.	Track	2	F. E. Davidson, Joseph Croyle
	Line	1	Angus Scott
	Bus	1	L. Rose
	Total	4	
San Diego Electric Ry.	Bus	1	Charles Herms
	Equipment	1	Arthur C. Clegg
	Total	2	
Toronto Transportation Commission	Line	1	L. H. McAdam
New York Central R.R. (electrified section)	Equipment	1	Harvey L. Bullock

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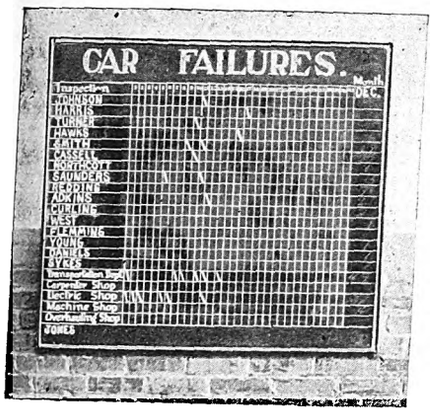
Devices and Practices Found Useful in Expediting

MAINTENANCE WORK

Many maintenance ideas have been received which have proved of great value to men in the railway industry. What can you contribute?



Blackboard used to classify car failures and to charge them against the employee responsible

Pull-Ins Charged to Men Responsible*

By C. B. Hall

Chief Clerk Mechanical Department Virginia Electric & Power Company, Norfolk, Va.

AN ENERGETIC campaign against car pull-ins is being carried on by the Virginia Electric & Power Company, Norfolk, Va. One means which has proved successful in reducing car failures on the road is the use of a blackboard upon which pull-ins are charged against the particular inspection employee responsible. The blackboard is 43x49 in. in size and is placed at a conspicuous point on the wall of the inspection shop.

This has caused a feeling of personal responsibility for the failures when they occur, and as a result pull-ins have been reduced 46 per cent during a period of three months. This reduction reflects the extent to which better maintenance is carried out, and the more careful work done toward eliminating sources of trouble that would cause failure on the road.

Use of a special inspection form together with the inauguration of a system of classifying pull-ins has reduced car failures considerably. The inspection form provides for signatures of the entire inspection force. In another column the work done is listed. Use of this has played a large part in bringing about the good performance figures.

The average miles per pull-in during the last six months of 1928 were as follows:

Month	Average Miles Per Pull-In.
July	10,019
August	11,134
September	15,088
October	16,510
November	16,889
December	18,432

With one exception, the December figure is the best showing made on the property during the past ten years, certainly a convincing argument for close supervision.

Submitted in Electric Railway Journal Prize Contest.

INSPECTION

Car No. _____ Date Due _____ Date Inspected _____

ITEM	WORK DONE	SIGNATURE
Trolley		
Light and Heater Circuits		
Cables		
Lightning Arresters		
Circuit Breakers		
Controllers		
Relays and Contactors		
Rheostats		
Electric Bells		
Motors		
Armature & Axle Bearings		
Air Brakes		
Hand Brakes		
Brake Rigging		
Draft Rigging		
Sand Boxes		
Foot Gongs		
Fenders		
Gates, Screens, Etc.		
Doors		
Grab Handles		
Registers and Fittings		
Car Body and Fittings		
Trucks		
Journal Boxes		

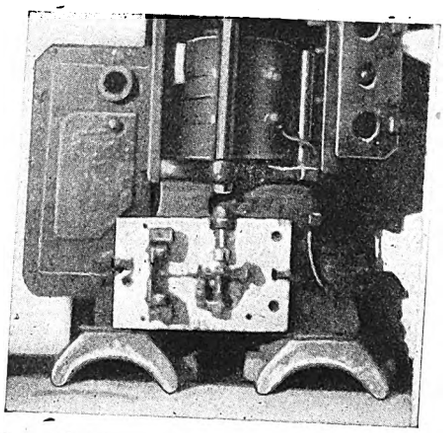
Inspection form used by the Virginia Electric & Power Company

Delayed Break Interlock for Circuit Breakers*

By Harvey L. Bullock

Superintendent of Electrical Equipment Cleveland Union Terminal, Cleveland, Ohio

A DELAYED break interlock has been found of particular advantage on multiple-unit control equipment of the New York Central Railroad for preventing the burning out of operating coils by opening the circuit automatically. Its use also guards against broken operating switches and improper handling by the operator. It prevents burning of operating switches in the cab by distributing the arc over each individual unit of car equipment in long trains.



Type of delayed break interlock for remote control automatic circuit breakers and overload coils

The interlock is mounted on the side frame of the circuit breaker and is operated by connecting to a special main solenoid hinge pin with an insulated operating rod. This latter is connected to a contact lever under which is located a cushion spring.

Submitted in Electric Railway Journal Prize Contest.

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The action of the interlock is delayed by the use of a toggle latch on the contact lever and is timed to unlatch at the moment of locking the circuit breaker in the closed position. The cushion spring, being compressed, then throws the lever to the unlatching or trip position if the operator desires to use the hand control in emergency. Two contacts are provided—an upper and a lower one. These are used for set and trip circuits. Magnetic blow-out coils to extinguish the arc have also been provided.

This device is now standard on New York Central cars with DB-102 circuit breakers and is also embodied in the late type of PC-10 controllers. It has practically eliminated circuit breaker troubles of this nature and consequent delays to trains.

Group Form for Testing Equipment*

By William J. Hankey
Substation Division, Power Department Cleveland Railway, Cleveland, Ohio

ROUTINE work of testing and calibrating equipment in automatic and manual substations of the Cleveland Railway has recently been arranged in group form. Use of the form not only enables the chief inspector to tell at a glance what particular piece of apparatus or mechanism is to be tested, but it also enables the test crews to prepare for the next test period or next apparatus to be tested. In the arrangement of the form, consideration was given to minimizing the transportation of test equipment from one plant to another. If several operations are necessary on some one piece of equipment, provision is made on the form to do this while the equipment is out of service.

A schedule of testing and calibrating equipment in ten automatic and five manual plants is carried out by two men working but three days each week on this type of work. The remainder of their time is devoted to biweekly and detailed inspection, testing experimental hookups, graphic clocks and meter maintenance.

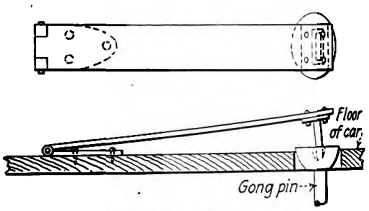
The group form sheet lists the various apparatus in their respective groups, the necessary testing equipment required for the work, the next date the apparatus is to be tested, the station involved, and the date the work is completed. In this way a complete yearly record of all testing and calibrating activities is recorded on one sheet.

Submitted in Electric Railway Journal Prize Contest.

Pedal Gong Ringer*

By Felix E. Reifschneider
Engineer Ithaca Traction Corporation, Ithaca, N. Y.

THE forward location of the gong pin on one type of car of the Ithaca Traction Corporation was such that the motorman could only use his toe. If the pin were turned halfway it was locked to prevent ringing on the rear platform. Various circumstances caused the pin to be locked when it should have been available for operation by the motorman. To eliminate this serious trouble, a pedal was devised as shown in the accompanying drawing. A 6-in. hinge was screwed to the floor with the staple bolted to the underside at one end, which fitted a depression in the top of the pin, preventing accidental turning.



Pedal used to ring warning gong on cars of Ithaca Traction Corporation

The increased leverage has two ad-

Submitted in Electric Railway Journal Prize Contest.

GROUP FORM FOR TESTING EQUIPMENT

Group #1	Date Due	Equip. Required	Sta. Completed
Manual Overspeed			
" Reverse Current			
Automatic Relay #18			
" " #24			
" " #29			
" " #32			
Group #2			
Automatic Relay #1			
" " #2			
" " #9			
" " #13			
" " #14 & #15A			
" " #23			
" " #27			
" " #42			
" " #50			
" " #65			
Inspection automatic current limiting resistance			
Manual DC Breaker Setting			
Group #3			
Automatic & Manual Pole Piece Clearance			
Armature Wedges			
Automatic Relay S-2-3 & 4			
" " #13			
" " #14 & #15A			
" " #34			
" " #42			
" " #50			
" " #53			
" " #65			
Graphic Meters			
Megger Rotaries			
Sequence Drum #38			
Calibration of Rotary Flashover Relays			

Group #4	Date Due	Equip. Required	Completed
Automatic Relay #25			
" " #28			
" " #62			
Current Limit Resistance			
Group #5			
Manual DC Breaker Setting			
Automatic Relay #1			
" " #2			
" " #9			
" " #13			
" " #14 & #15A			
" " #27			
" " #42			
" " #50			
" " #65			
" " #70			
Group #6			
Manual AC Overload and Reverse Power			
Group #7			
Automatic Relay "S"2-3 & 4			
" " #13			
" " #14 & #15A			
" " #27			
" " #34			
" " #42			
" " #45			
" " #46			
" " #49			
" " #50			
" " #53			
" " #65			
Graphic Meters			
Megger Rotaries			
Sequence Drum #38			
Calibration of Rotary Flashover Relays			

Type of group form used for testing substation equipment of the Cleveland Railway

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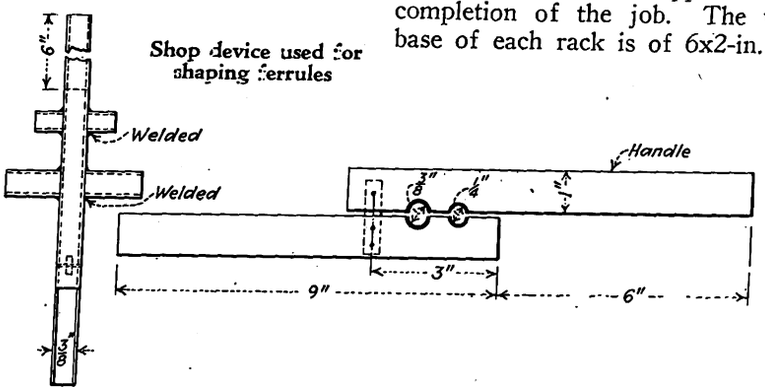
vantages, it produces a more intensive ring and the motorman also is able to locate the pedal sooner without looking for it, thus greatly reducing the chance for accident. The cost of placing this pedal on each car is $1, which includes labor and material.

Form for Shaping Ferrules*

By H. J. Beadle

Engineer of Equipment Dallas Railway & Terminal Company, Dallas, Tex.

IT IS THE practice of the Dallas Railway & Terminal Company to use ferrules over the ends of leads where they go into terminals. The ferrule is cut from tin and is pushed under the rubber covering of the wire for a distance of about ½ in. Instead of using a pair of pliers to shape the ferrule on the lead, so that an accurate fit will result when the lead is placed in the round terminal hole, a form for shaping the ferrules is employed. This consists of two blocks 1 in. square and 9 in. long, the upper one being hinged to the lower so that the ferrules can be inserted and removed quickly. An extended section a little longer than the ferrules is welded to the two blocks so that pressure for shaping can be applied the full length of the ferrule. This forming tool makes the ferrules round and results in a close fit and satisfactorily soldered job.



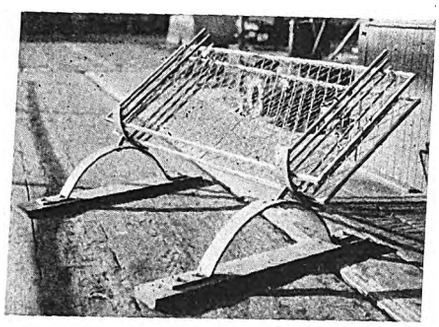
Shop device used for shaping ferrules

Reversible Screen Holders

By D. L. Patison

Foreman Paint Shop
Omaha & Council Bluffs Street Railway
Omaha, Neb.

RACKS have been designed to facilitate the painting of street car window guards by the Omaha & Council Bluffs Street Railway. These racks hold the screens in such a position that after one side has been painted the whole frame can be turned over approximately 90 deg. to bring the other side uppermost for completion of the job. The wood base of each rack is of 6x2-in. timber, 30 in. in length. Six ⅝-in. rods, 24 in. long, project from a curved metal base, made of ½-in. stock, 3 in. wide. Details of the loose-pin coupling between upper and lower "rocker" iron sections are shown in the accompanying pictures.



Reversible holder which permits painting of both sides of window screens with a minimum of handling of wet surfaces. Five screens at a time can be accommodated

*Submitted in Electric Railway Journal Prize Contest.

New Test Rack for Air Equipment

By J. A. Duffy

Superintendent of Equipment
Monongahela West Penn Public Service Company, Fairmount, W. Va.

AIR equipment of the cars of the Monongahela West Penn Public Service Company is subjected to rigorous tests after overhauling before it is allowed to pass for installation. A test rack has been designed to duplicate all the brake operations of every piece of apparatus of the automatic air equipment. This rack is used also for detail tests of safety car equipment and triple valves. The arrangement of the apparatus for these tests is shown in the accompanying diagram.

Among the various valves which can be tested on this rack are: brake valves, brake valves with selector valve, emergency valves, combined foot and cutout valves, pilot valves, and main reservoir cutoff valves. Other tests which may be made are the friction tests, the opening tests, the capacity tests, the test for ball check valve leakage, closing tests and porosity tests. In testing triple valves for railway service, an application and a release test will indicate roughly whether or not the triple valve should be removed for closer inspection or repaired on account of packing ring leakage, resistance, opening through ports, etc. The tests are made with 70 lb. in the supply line and with the test apparatus shown on the Westing-

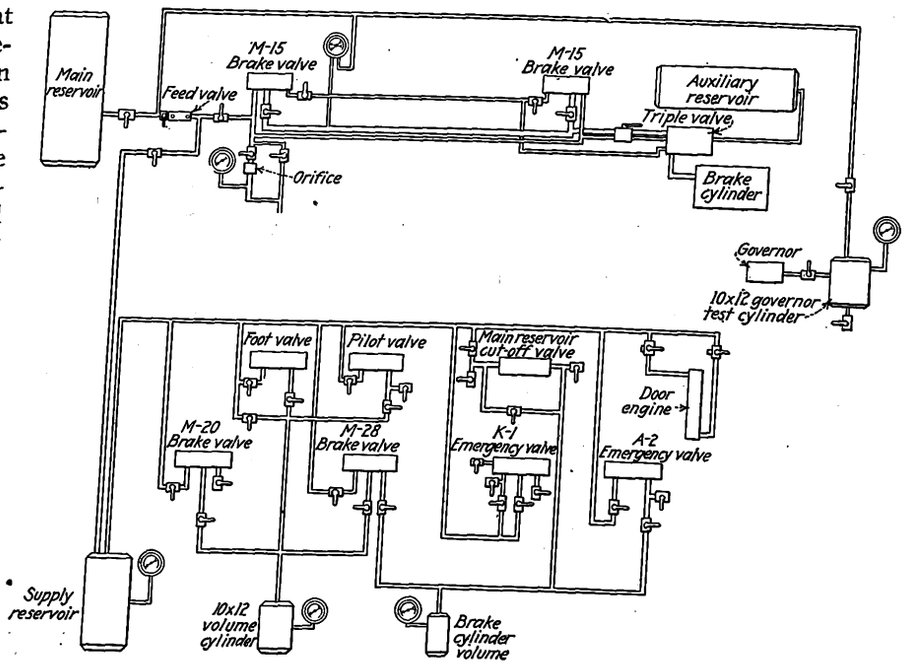


Diagram showing arrangements of valves, gages and reservoirs and the piping of a test rack for air equipment of the Public Service Company at Fairmount, W. Va.

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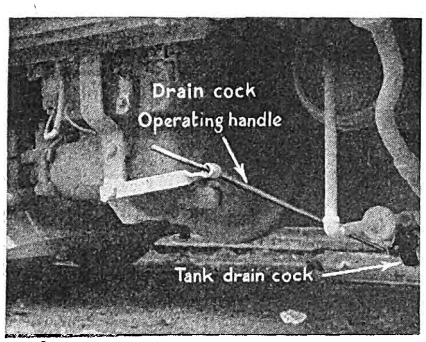
house Air Brake Company's drawing F-31968.

In the event that a valve is removed from a car for test without first being overhauled, it should be taken down and inspected to make certain that the working parts are in good condition.

Particular attention should be given to the clearance of the lower valve stem and its bushings. Door engines and air compressors may also be tested satisfactorily with this test rack.

Reservoir Drain Valve Operating Rod

DRAINING of air reservoirs on the cars of the Richmond Railways, Inc., Staten Island, N. Y., is on a definite time basis so as to prevent brake trouble. Still greater care is exercised during the winter months



Since this operating rod has been in use all tanks are kept drained

to guard against freezing. The reservoirs are installed in the center of the cars and it has been found very inconvenient to reach the drain valves unless the car is over a pit. When pit storage was impossible there was a tendency for the men to neglect the draining. As a result freezing troubles were encountered.

A special operating mechanism was installed, as shown in the accompanying illustration to make the valve accessible and to assure drainage. It will be noticed that a $\frac{3}{8}$ in. round rod with an eye in one end is attached to the drain valve handle and extends outward toward the side of the car. This rod is supported by a $\frac{1}{4}$x1-in. eye bracket 12 in. long fastened to the compressor supporting bracket. With this arrangement the reservoirs can be drained without the car being over a pit.

The possibility of accident has been reduced with this arrangement, as a man does not have to crawl beneath the car.

Testing Friction Tape

By G. H. McKelway
Distribution Engineer Brooklyn-Manhattan Transit Corporation, Brooklyn, N. Y.

WHEN it is desired to compare samples of rubber friction tape, or to obtain an approximate idea of their value, the usual method is to rub together pieces of the tape and then to pull them apart. It is a popular belief that the value of the tape can be determined by noting its stickiness or "tackiness." This is a mistaken theory, however, as the stickiness of a tape is not proof of its quality but, on the other hand, may be an indication of its worthlessness. The best tapes are those that have been compounded with a large percentage of new, high-quality rubber, and such tapes are seldom so "tacky" as those made up with less crude rubber and more rubber substitutes.

Another mistaken assumption is that tape of a light color is not as good as black tape. The color of rubber is gray, while the color of most of the cheaper substitutes is dark brown or black. Sometimes coloring matter is added purposely to the rubber compound to make it darker but, unless that has been done, the lighter colored tape is likely to be the better.

Still a third mistake in regard to tape is the belief that, when two pieces are pulled apart, the fibers of the compound should be long. The fiber of good quality rubber compound, on the contrary, is quite short.

To decide upon a good make of friction tape, there are three things that must be decided: (1) The strength of the fabric; (2) the holding power, not the mere stickiness, of the compound; (3) the insulating properties of the tape. There are standard laboratory tests which will determine accurately all of these qualities and, if possible, such tests should be made before purchasing large quantities. However, when only a small amount of tape is wanted, it is desirable to have some easy test which can be made by anyone and which will give approximate results.

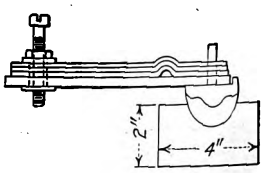
For deciding on the strength of the fabric, a comparatively narrow strip of tape, say $\frac{3}{4}$ in. wide, should be taken in the hands and the two ends pulled apart until the tape breaks. By noting how much pull must be exerted to break it, an approximate idea of its strength can be gained. This is a very rough test, but any tape that breaks easily should be rejected.

For the second test, another strip of the tape should be bent back on itself and then forward again, so as to make a "Z" about 1 in. in length and made up of three thicknesses of tape. These three layers should be squeezed together firmly and the pressure maintained for three minutes. Then take hold of the ends of the tape and attempt to pull out the "Z" lap. It will be found that with a good quality of tape the fabric will break before the lap will open. The purpose of the "Z" lap is to insure that the compound on both sides of the tape is tested. Occasionally, a tape will be found with a better grade of compound or with it applied better on one side than on the other. A single lap will test only one side of the tape, whereas with the "Z" lap both sides come into contact with each other.

The voltage of railway circuits is so low that any well impregnated fabric will withstand it. Therefore, unless a higher voltage is available and can be used easily and safely, there is not much reason for making a voltage test; especially, since the tape might be good at the point tested and much poorer at a point an inch or two away. To make sure that the tape is impregnated well and uniformly, it should be held up to the light and any "pin holes" in it counted. There should be none, or, at the most, only one or two in a strip a foot long.

Form for Riveting Controller Finger Tips

RIVETING new tips to controller finger springs used to be a troublesome job in the shop of the New York & Queens County Railway, Woodside, N. Y. The new tips often caused heavy arcing after they were installed in the controller. Careful analysis of the cause of this arcing disclosed the fact that it was due to improper contact. This was brought about by the existence of abrasions on the tip contact surfaces,



This fixture for riveting tips on controlling fingers has speeded up the riveting process and eliminated arcing failures

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which were made by the vise jaws during the riveting process, a condition which needed to be eliminated.

The riveting form shown in the accompanying sketch was developed for riveting the tips to the fingers and to prevent damage to the tip surface. It is made of steel and is 2 in. square and 4 in. long. The top surface is provided with a groove of such width, depth and contour as to conform exactly to the surface of the tip to be riveted. The tip is placed in the groove and the finger spring and shunt are placed over the rivet. The force exerted on the riveting process is distributed evenly over the tip surface and thereby prevents the formation of any abrasion.

Labor and Time Saving Pole Racks*

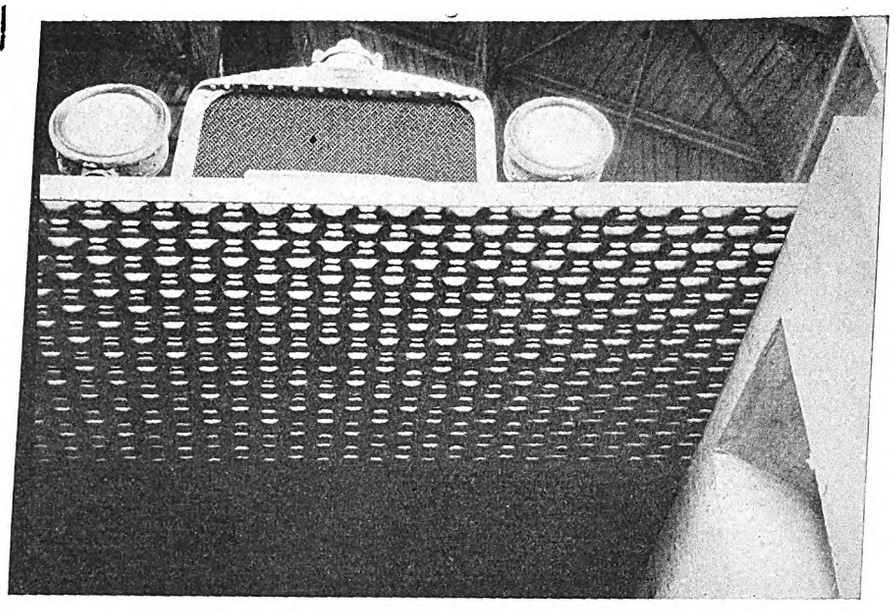
By C. B. Hall

Chief Clerk Virginia Electric & Power Company, Norfolk, Va.

A NEW type of pole rack recently adopted by the Line Department of the Virginia Electric & Power Company at Norfolk, Va., has resulted in a saving of approximately 50 per cent in time and labor. Poles, needed by linemen, can now be rolled off the racks onto pole wagons or line cars, instead of being hauled from a pile in the yard. Five of these special racks have been erected along the company's yard siding.

Poles 15 ft. long, or less, are placed in the ground at a depth of 6 ft. resting on a base of concrete. These supports are braced with 12 x 12 in. obsolete bridge timbers and old T-rail, and hold an assorted stock of poles ranging from 30 to 50 ft., each rack accommodating about 100 poles. The project, built entirely of discarded materials and by company employees at odd times, was completed at a cost of $200.

**Submitted in* Electric Railway Journal *Prize Contest.*



Removable gratings used to cover pits

Overhaul Pits Covered by Grating

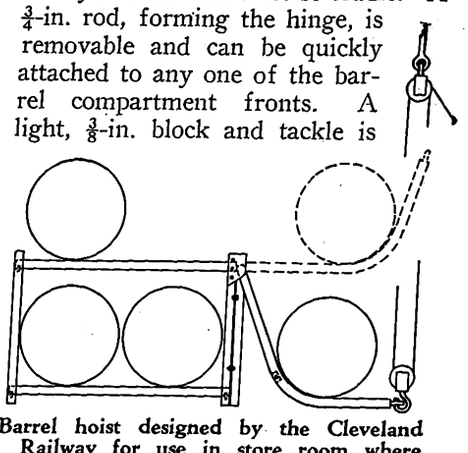
ALL pits in the shop of the Surface Transportation Company, New York City, bus subsidiary of the Third Avenue Railway, are covered by means of removable iron grating. This grating is made in sections 24 in. wide and 63½ in. long. Each section is composed of nineteen strips of $\frac{3}{16}$x1$\frac{1}{16}$-in. flat iron spaced 1½ in. centers and braced by strips of $\frac{1}{8}$x1$\frac{1}{16}$-in. flat iron zigzagged through the space and riveted to each $\frac{3}{16}$-in. strip. These sections can be removed readily to provide access to any part of the bus desired. This arrangement has been found very satisfactory and has prevented the men from accidentally falling into the pits.

Portable Barrel Hoist*

By F. W. Braund

Superintendent of Power Conversion Cleveland Railway, Cleveland, Ohio

A ONE-MAN barrel hoist has been installed by the Cleveland Railway for use in an oil room where transformer oil is stored on a double-deck rack, and where head room is insufficient to accommodate a portable crane. Eye bolts of ample size are anchored in the ceiling, mounted forward of the oil rack and directly over the eye of the barrel-hoist cradle. A ¾-in. rod, forming the hinge, is removable and can be quickly attached to any one of the barrel compartment fronts. A light, ⅜-in. block and tackle is used as the hoisting medium, swinging the barrel cradle slightly above center, thus allowing the barrel to roll without the help or guidance of workmen. With this equipment, full barrels of material can be hoisted and placed several tiers high on a rack.



Barrel hoist designed by the Cleveland Railway for use in store room where space is lacking for the operation of cranes

Improved appearance of the pole storage yard of the Virginia Electric & Power Company was obtained by the erection of racks

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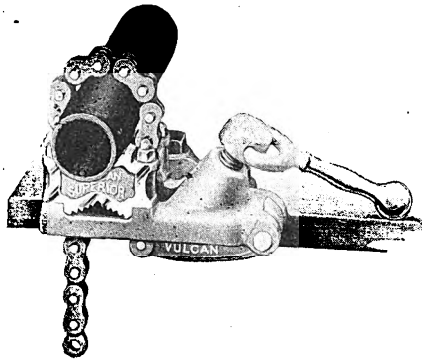
New Products

Convenient Chain Pipe Vise

THE new Vulcan Superior vise, recently placed on the market by J. H. Williamson Company, Buffalo, N. Y., has two outstanding advantages over previous models. The handle for adjustment is on top of the vise where it is easy to operate, while the jaws are reversible; i.e., when the teeth are worn the bolts



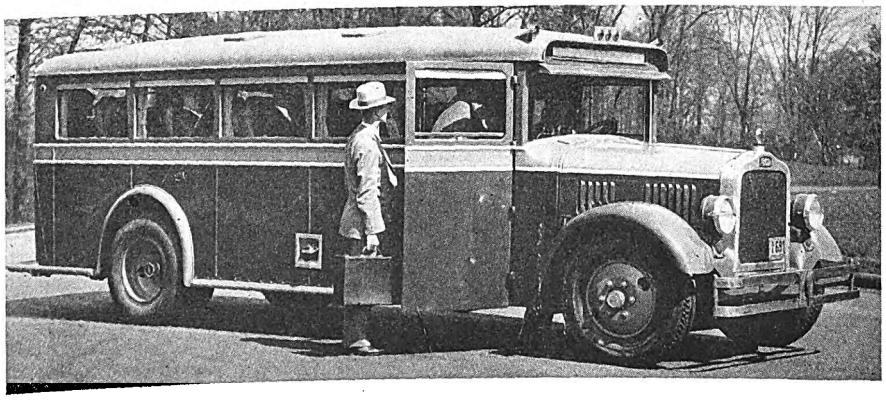
Chain pipe vise with reversible jaws has many advantages over previous models

have to be unscrewed and the jaws turned over. This feature prolongs the life of the vise considerably. In addition, the vise accommodates pipes which are $\frac{1}{2}$ in. larger than previous models could take care of. The vise is made from tough wrought steel, drop forged base, jaw, handle and chain arm. It is finished in chrome plate and furnished in two sizes for $\frac{1}{8}$ and $4\frac{1}{2}$-in. pipe.

White Designs 18-21-Passenger Bus

EXCEPTIONAL flexibility and safety under all operating conditions are claimed for a new bus recently put out by the White Company. The bus has four-wheel hydraulic brakes with Westinghouse vacuum servo to insure positive contact. The seating capacity in this six-cylinder bus, known as model 65, varies from 18 to 21 passengers. From the standpoint of the operator it meets the popular demand for a medium-sized vehicle. Much attention has been given to accessibility of parts, making inspection and maintenance unusually convenient and economical.

Numerous orders have already been received for the new model, including an order for five from the Union Pacific Railroad for carrying tourists to the National Park of southern Utah.



Medium size bus for intercity service recently put on the market by the White Company

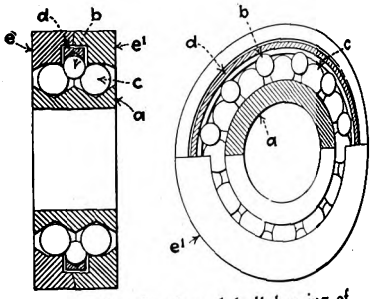
Buzzer for Electric Railway Cars and Buses

IN A NEW buzzer recently put on the market by the Consolidated Car Heating Company, the sound is transmitted to the moulded base which acts as a sound box, thus permitting the use of a totally enclosed cover which protects the mechanism from dust and moisture. Aside from its neat appearance, the construction is simple and rugged, and consists of a steel frame with a grounded coil, an armature and contact strip, Swedish blued spring steel, and tungsten contacts which are provided with a solid locking adjustment. The terminals are arranged for leads to enter from the back or from below, which reduces to a minimum the possibility of damage. The cover screws, terminals, and adjusting screw are all accessible from the front. The finish is in dull black. The buzzer is mounted vertically and is only $4\frac{3}{4}$ in. long, $2\frac{5}{8}$ in. wide and $1\frac{7}{8}$ in. high, with rounded ends. Usually one or two are installed in series with the standard fuse and resistance box for trolley voltage, or direct from any battery voltage, in which latter case the resistance box might be omitted.

Compact car buzzer recently brought out by the Consolidated Car Heating Company, Inc.

Bearing Has Three Rows of Balls

IN GERMANY a new type of ball bearing with three rows of balls has been put on the market recently. The main feature in this new bearing is that a third row of small balls is used instead of a ring between the two rows of bearing balls, serving solely to keep the larger balls in the two main rows from touching each other. The small balls, which are called distancing balls, are held in place by a grooved ring which revolves freely inside the body of the bearing. The construction of the bearing is shown in the accompanying illustration: "a" is the inner race having two grooves, one each for each row of bearing balls "c" and "c'."



Recently developed ball bearing of German design

The distancing balls are indicated by "b" while "d" is the ring holding them, and the outside race consists of two halves, "e" and "e'." The illustration shows that sliding friction is replaced by rolling friction.

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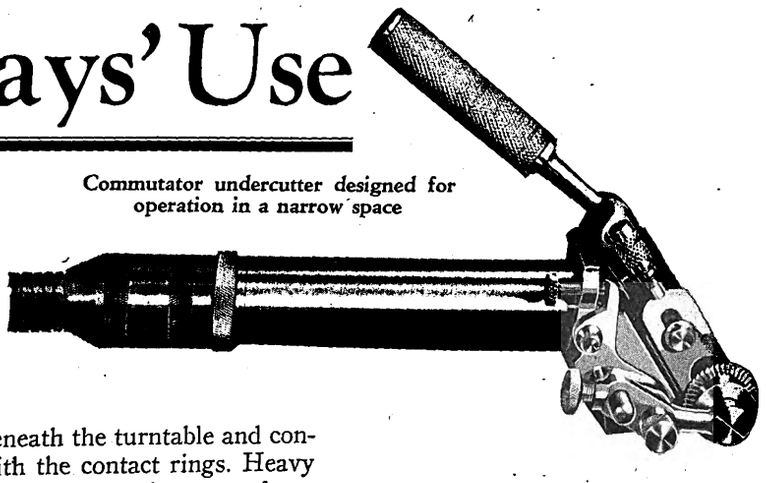
Products for the Railways' Use

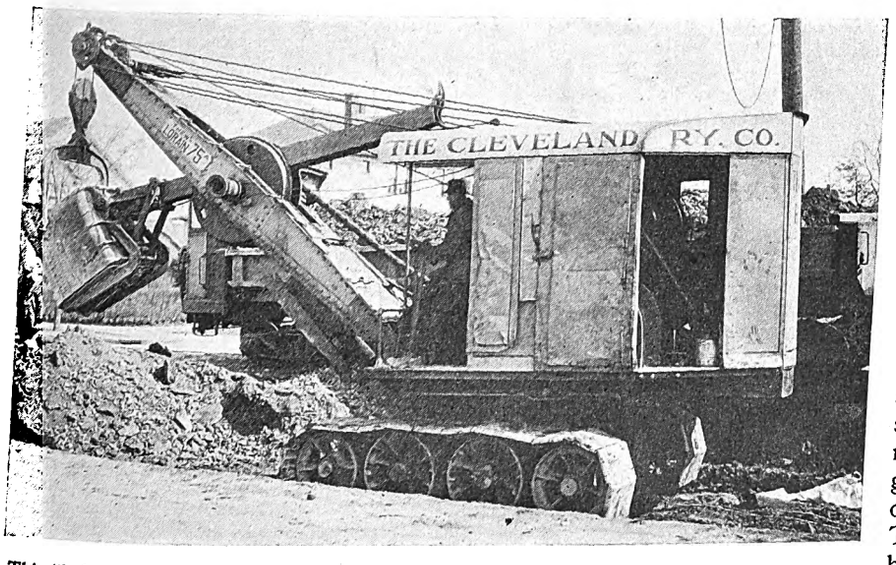


Commutator undercutter designed for operation in a narrow space

Bob-tailed Shovel Has Reduced Clearance

TWO electric shovels recently purchased by the Cleveland Railway are unusual because they have been "bobtailed" to reduce the clearance required. The standard tail-swing of 10 ft. 10 in. of the Lorain 75 has been reduced to 8 ft. 9½ in. Further reduction in clearance has been obtained by cutting off the left rear corner of the cab and rotating the platform on a diagonal, thus enabling the unit to swing further without fouling the adjacent track. In making these modifications, nothing has been radically changed on the crawler or superstructure, each of these retaining the Thew "center drive."

The new electric shovel is equipped with a 12-ft. or 14-ft. boom and a 10-ft. or 12-ft. stick, giving reduced swing and height clearances desirable for street railway work. The electric motor used is a 50-h.p. a.c. or d.c. unit furnished in a range of types suitable for any ordinary current. Control of the motor is by means of an automatic push button just to the right of the operator. Power for the motor is taken through the truck and delivered to substantial brass contact rings bolted to the steel crawler frame and thoroughly insulated from it. Power is then transmitted up to the turntable by means of brushes suspended beneath the turntable and contacting with the contact rings. Heavy leads in conduit carry the power from the brushes to the electric motor.



This "bobtailed" shovel gives additional clearance between shovel and passing street car when excavation is continued during regular operating hours

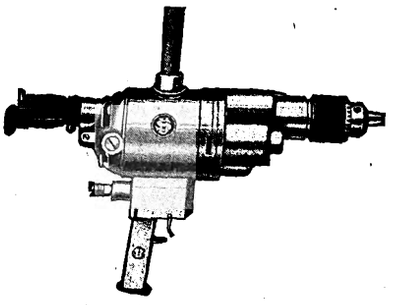
Compact Commutator Mica Drill for Heavy-Duty

A NEW undercutter manufactured by the Ideal Commutator Dresser Company, can operate in a space only 3½ in. wide, and, therefore, offers an advantage over the previous model, because its use does not necessitate dismantling brushes, brush boxes, brush rigging, etc., and because no time is lost in reassembling them before putting the motor back in service. This saves from one to three hours on every job, and this time can be spent in undercutting, instead of getting ready to undercut and to reassemble.

It is claimed that this new cutter will not heat, jump, or chatter. A set screw is available to lock the depth gage, while a micrometer adjusting screw will raise and lower this gage. The roller guide can also be raised or lowered by a micrometer screw to conform to size of cutter used. The distance from the saw to the roller guide is less than the width of the average small copper bar, and thus permits the guide to be used on the next slot, requiring but one slot to be cut by hand. Another feature of this undercutter is the depth gage adjacent to the saw so that the actual depth can be easily measured. It will not mar the copper but will give a bearing support.

Drill for Heavy Duty

FOR heavy duty a low speed, ¾-in. drill has been developed by the United States Electrical Tool Company, Cincinnati, Ohio. An alternating-current or direct-current universal motor of 60 cycles or less operates the drill at 400 r.p.m., load speed. It has S.K.F. ball bearings, special thrust bearings in chuck spindle, and extra heavy chrome nickel steel gears which run in a grease-tight case. The armature is double silk insulated and enameled. The body frame and commutator head are made in one piece of aluminum.



Heavy-duty drill has a two-pole trigger switch and a three-jaw screw back chuck which can hold straight shank drill bits

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NEWS *of the Industry*

Governor Vetoes Missouri Enabling Act

Governor Caulfield of Missouri on June 25 vetoed the terminable permit bill passed by the recent Assembly and applicable only in St. Louis, Mo. The measure was recommended by the St. Louis Transportation Survey Commission, Mayor Miller, other city officials and leading civic and business organizations. It was supported by the St. Louis Public Service Company and the People's Motorbus Company. The opposition was led by the St. Louis *Post Dispatch*.

Governor Caulfield held that the measure was an evasion of the St. Louis charter, which restricts public utility franchises to a period of 50 years, and that it did not confer any additional powers on St. Louis, but authorized the Missouri Public Service Commission to grant permits or franchises for an indefinite length of time. The Governor said:

"I would sign this bill were I not convinced that it is an unnecessary and unwise evasion of the charter-making power of St. Louis. All other cities, and even St. Louis County, are excluded from its provisions. It confers upon the State Public Service Commission powers that it can only exercise as to St. Louis.

"It would seem that the bill was not passed upon its merits but upon assurance to the Legislature that St. Louis, and St. Louis only, wanted it. It is called an enabling act, but I do not find that it confers upon the city of St. Louis any power which it does not now have, except the power to enable the Public Service Commission to grant such utilities a 'terminable permit' or 'indeterminate franchise' for a longer period than fifty years. The city may include in a franchise granted by itself all of the features contemplated by the proposed law for contract ordinance precedent to the issue of the terminable permit."

The Governor also stated that the people of St. Louis alone should decide whether the city charter should be amended to grant the issuance of terminable permits or indeterminate franchises for a period in excess of 50 years. He pointed out that it is important the friendly relations between the people and public utilities be maintained.

Committee Awaits Seattle Mayor's Efforts

Plans of the Traffic Research Committee at Seattle, Wash., engaged in maturing a program for rapid transit, will be held in abeyance pending the result of Mayor Frank Edwards' effort to re-finance the municipal railway system. The committee is in sympathy with the Mayor's plan, and it does not wish to embarrass him by the injection of other plans while negotiations are pending looking toward the improvement of the present system. The committee found the physical and financial conditions of the system to be serious, and agreed that rehabilitation of the railway is the first necessary step. It is not enthusiastic over railway extensions unless the matter of what is to be done about them is first studied in connection with rapid transit needs.

Chicago to Hasten Draft of Settlement Franchise

According to the present plans, the Council's committee will lay out the fundamentals upon which the new ordinance looking toward unification in Chicago should be drawn. This plan will then be submitted to the attorneys for the companies, the citizens' committee and Attorney Fisher, who will be asked to work with lawyers representing the City Council in the actual writing of the draft under the authorization contained in the enabling legislation passed by the Legislature and signed by the Governor. When a skeleton draft has been completed the lawyers will be asked to submit it to the Council's committee. Then it is planned to hold extended public hearings on this draft, at which those who desire to present views on the ordinance will have an opportunity to do so.

Unification Recommended

San Francisco city engineer would bring private and municipal lines together under a five-cent fare with deficit met by taxpayers

CITY ENGINEER M. M. O'Shaughnessy of San Francisco, Cal., on June 5 submitted to the Board of Supervisors, through the Board of Public Works, his "Report on the Street Railway Requirements of San Francisco, with Special Consideration to the Unification of Existing Facilities," together with his valuation of the Market Street Railway properties. His report on the California Street Railway system was filed in December, 1928. The report on the transportation requirements is in a single volume of 400 pages, while the valuation of the Market Street Railway system occupies 7 volumes, approximating 3,500 pages, and the volume on the California Street system covers some 300 pages.

The preparation of the report required nine months' work on the part of a staff of experts and assistants under the direction of the city engineer. In a foreword to the report, Mr. O'Shaughnessy says:

"It is almost axiomatic that, from the standpoint of the riding public, the best service can be provided by a unified street railway system with universal transfers; also that, on a given wage scale, such a unified system, under a single management, can provide a given standard of service most economically.

"San Francisco, under mandate of the people, as expressed in our charter, is committed to the proposition of municipal ownership of its public utilities.

"The municipality, in the operation of its own railway, after due consideration and by proper legal procedure, has adopted a standard of wages for its railway employees. In this report, in the endeavor to evolve an operating plan, looking toward the continued maintenance of the 5-cent fare, no consideration has been given to the obvious possibility of a reduction of the wage scale, which has been considered as a fixed quantity.

"As a result of the studies made, it is obvious that even the unified system cannot be operated on the municipal wage scale on a 5-cent fare, nor can the private company maintain its tracks and equipment in a satisfactory operating condition and render a proper standard of service on a 5-cent fare.

"The recommendation to cover any deficit, in the operation of a combined municipal system, by a subsidy from taxes, is considered to be sound in principle, and not without precedent, as witness New York. A plan of this kind is believed to be far more desirable than an increase in the rate of fare."

The following recommendations are made in this report:

RECOMMENDATIONS TO PURCHASE

1. That a Public Utilities Commission be established for the purpose of administering the utilities of San Francisco, as is now being done in New York and Detroit.
2. That the city acquire by purchase the properties of the California Street Cable Railroad and the Market Street Railway at the most advantageous figure possible to be arrived at through the negotiations authorized by Ordinance No. 8125.
3. That the negotiations with the California Street Cable Railroad be on the basis of purchasing it on its earning value, namely, $604,463, as set up in my report on that company, and that negotiations with the Market Street Railway be held with a view to securing their property for $17,500,000.
4. That the properties of the Market Street Railway and the California Street Cable Railroad, if and when secured, be combined and operated with the Municipal Railway.
5. That the fare be retained at 5 cents with a universal transfer privilege.
6. That deficits resulting from the unified operation and retention of the 5-cent fare be met by additions to the tax rate.

Mr. O'Shaughnessy says that to carry out these recommendations, it will be necessary to reach an agreed price with the two companies and to submit to the electors a proposal to issue bonds to cover the cost of purchase of the two private systems, and provide sufficient money to cover all deferred maintenance and the additional facilities which have been recommended. Further bonds should be authorized to be sold from time to time, as the necessity arises, to meet the increased capital cost incident to rehabilitating the tracks of the

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company. The amount of these bonds should be sufficient to allow an expenditure of approximately $500,000 annually for several years.

Operating Recommendations

The following additional recommendations are made, contingent on the acquisition and unification of the three roads, with the idea of securing the most economical, efficient, and satisfactory operation of the combined system.

1. That the rerouting plan set up in this report, with such modifications as developments may show to be necessary, be placed in effect.
2. That, in order to speed up the transportation in the downtown district during the rush hours, all parking of vehicles be prohibited between 7 a.m. and 10 a.m., and between 3 p.m. and 6 p.m., on the streets north of Howard Street, south of Bush Street, and east of Larkin Street, with extensions on Mission Street to 12th Street, Market Street to Valencia Street, McAllister Street, O'Farrell Street, Geary Street and Sutter Street to Van Ness Avenue.
3. That all licenses to operate jitney buses be withdrawn and their operation be prohibited.
4. That the practice of exchange of transfers between buses and street cars be discontinued.
5. That the railroad system be relieved of all costs of paving except those incidental to making track repairs and any additional cost of street paving occasioned by the presence of track.
6. That the skip-stop method of operation be placed in effect where street spacing permits.
7. That the United States Post Office Department be required to pay the transportation of its employees on duty now carried free.

In making his recommendations, the city engineer has given careful consideration to the possibility of acquiring the private roads piecemeal as their franchises expire, but has determined that such a procedure would be contrary to the best public interest, as it would inevitably lead to poor service and further deterioration of the properties remaining in the hands of the companies. Without the consent of the companies to a universal transfer system, many patrons would be forced to pay double fare.

In discussing the situation at hand, due to the expiring franchises of the Market Street Railway and the California Street Railroad, the city engineer points out that the time has now arrived when, through the expiration of these franchises, it becomes necessary for the city to make a definite decision and plan of action. The city should either carry out the charter mandate by taking over and operating the systems of the private companies or adopt a plan whereby the private organizations can continue to render the character of service necessary, keeping in mind the ultimate acquisition by the city. The city engineer's studies show that the Market Street Railway has already been compelled to defer track reconstruction to such an extent that $550,000 should be expended at this time to catch up this deferred maintenance. In addition a definite program of reconstruction should be carried out over a period of years.

The study of the Market Street Railway finances and its track condition makes it evident that on the basis of a 5-cent fare the private company cannot indefinitely maintain its tracks and equipment in condition to render satisfactory service, and that a continuation of the operation on the 5-cent fare under private ownership means that both the quality of the service and the condition of the property will deteriorate year by year.

A high standard of street railway service is essential to the continued growth and prosperity of San Francisco, and the city engineer points out that this high standard of service can best be rendered under a unified system, with universal transfers, and if the 5-cent fare is to be maintained, with the high standard of wages paid by the municipality, this can only be done through a contribution from taxes. This follows, of course, only if the present trend in street railway traffic continues, as it has for several years, distinctly downward.

The city engineer justifies this recommendation for contribution from taxes as being sound, in that it puts a portion of the burden of maintaining this high standard of service on the taxpayers whose properties and business are directly benefited by such service, instead of leaving the entire burden on the riding public.

Valuation of the Market Street Railway Properties

The city engineer finds the value of the Market Street properties as of June 30, 1928, on the reproduction cost basis, as $46,625,506, which, after making allowance for the depreciated condition of the properties, reduces it to $29,369,331. Certain of the company's properties would be eliminated if the city were to take them over. The value of the properties to be taken over on the reproduction cost less depreciation basis would be $27,997,344.

The market value of the outstanding securities of the Market Street Railway, based on the high price for the first three months of 1929, was $16,273,496, and the low price for the same period, $13,206,769.

The city engineer suggests that in his opinion a figure of $17,500,000 would be a fair price for the city to pay for the properties which it would desire to take over. In his report on the California Street Cable Railroad's properties, the city engineer found the reproduction cost of the entire properties to be $2,252,458, and after allowance for depreciation this figure was reduced to $1,097,404. After eliminating property which the city would not require, the reproduction cost less depreciation was reduced to $903,704. In this report the city engineer recommended a purchase price not to exceed $604,463 for the properties which the city desired to secure.

The city engineer has made a comprehensive survey and study of the traffic of the Market Street Railway lines. On the basis of the data secured, he has worked out a plan combining the Municipal Railway system, the Market Street Railway system, and the California Street Cable Railroad system into a single unified system involving a complete re-arrangement of routes and designed to give an excellent and improved service to all sections of the city. Such a plan will materially improve traffic conditions on Market Street and effect economies of operation, while improving the service. The number of lines operating on Market Street east of Sutter Street under this plan would be reduced from 20 to 13, and between 4th Street and Geary Street from 13 to 9, with corresponding reductions in other sections. The city engineer also points out additional necessary changes in routings which will further improve Market Street conditions if the transbay bridge is built.

Details of 53 proposed new routes are presented which show that it will be possible to operate service equivalent to or better than that now operated, with a reduction of between 3,500,000 and 4,000,000 car-miles per annum—approximately 10 per cent of the total car mileage now operated by the three systems. On the basis of the operating cost of the Municipal Railway system, $750,000 to $1,000,000 a year would be saved on this particular item on the unified system.

Tables show estimates of the financial results of municipal operation of the combined systems on the basis of continuing the 5-cent fare, and making allowance for the estimated loss of revenue occasioned by universal transfers. On the basis of these estimates, under the present municipal wage schedule, the unified system, with the proposed rerouting of cars, after providing adequately for depreciation of the properties, would indicate an operating deficit of $869,667 annually, as compared with an operating deficit of $1,623,648, if the present service were to be continued under the municipal wage scale. These deficits do not take into account interests and ultimate fixed charges. When the interest and fixed charges are added to the operating deficit, on the basis of the purchase price suggested by the city engineer, the gross deficit would be $2,741,867 annually. This figure would be reduced to $2,346,867 as the result of certain increases in revenue and decreased operating costs which would result if certain other of the city engineer's recommendations were put in effect. On the basis of an assessed valuation of $850,000,000, this latter figure would amount to 27.6 cents on the tax rate.

Changes in Southwestern Association's Plans

At a recent meeting, the governing body of the Southwestern Public Service Association, Dallas, Tex., made several changes in the constitution, so as to permit and encourage even greater cooperation in the future, than in the past, with the other associations with which the Southwestern is affiliated. Most important of these were provisions to waive separate Southwestern conventions and encourage attendance by the membership at suitable regional conventions of their craft; especially the Southwestern division, Natural Gas department, American Gas Association, Southwest Geographic division, and National Electric Light Association. Provision will be made, however, to have group or sectional meetings at such times and places as will be profitable for any of the groups or sections which constitute the association.

As for the past 35 years the Southwestern will represent the interests of the gas, the electric, the railway, and the telephone companies, in Texas and Louisiana. An advisory council, to consist of one representative from each of the member companies, is to convene from time to time to consider the general affairs and policies of the association, and elect an executive committee.

The officers and executive committee selected for 1929-1930 are:

President, Knox Lee, Southwestern Gas & Electric Company, Marshall, Tex.

First vice-president, chairman gas section, Frank L. Chase, Vice-president, Lone Star Gas Company, Dallas, Tex.

Second vice-president, chairman electric section, J. W. Carpenter, president, Texas Power & Light Company, Dallas.

Third vice-president, chairman railway section, W. B. Tuttle, president, San Antonio Public Service Company, San Antonio, Texas.

Other members of the Executive Committee are: George H. Carter, vice-president, Texas Utilities Company, Marlin, Texas; J. G. Holtzclaw, vice-president, Gulf States Utility Company, Beaumont, Texas; W. L. Prehn, general manager, Southwestern Bell Telephone Company, Dallas, Texas; treasurer, R. G. Soper, vice-president, Dallas Gas Company, Dallas, Texas; secretary, E. N. Willis, Dallas, Texas.

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New Youngstown Grant

Service-at-cost continued under an arrangement designed to secure a liberal flow of capital for investment

JUNE 21 marked the date of operation by the Youngstown Municipal Railway, Youngstown, Ohio, under its new 25-year franchise passed by Council on May 22 and signed by the Mayor on May 25. Among the outstanding features of the grant are the following:

1. Continuance of service-at-cost arrangement in effect during past ten years.
2. A new provision regarding repairs in paved streets, under which the company is required to repair only such paving as may be damaged or disturbed on account of operation of cars or damaged or disturbed on account of necessary repairs to tracks, rails, or joints in the rails.
3. A provision regarding new paving or reconstruction of paving by which the company shall be assessed only that amount which represents the increased cost of paving foundation under its tracks in excess of what the cost would be to the city in paving in case there were no car tracks.
4. A provision that all expense of change in tracks, pole lines and paving necessitated by public improvements shall be borne by the city and paid by city.
5. The company is authorized to operate over all bridges and grade separation viaducts now owned or controlled by the city of Youngstown. In case of the construction or reconstruction of bridges over which the tracks of the company exist or may hereafter be laid, the company is to pay only for the tracks and appurtenances thereto and only such part of the cost of the bridge or viaduct as shall actually be occasioned by the construction of the track or tracks.
6. A provision that on and after Jan. 1, 1930, all expense in connection with the office of the Street Railroad Commissioner including salary of the commissioner and any employees of his office, shall be borne and paid by the city.
7. A provision that should the city suffer, aid, permit or foster competition in transportation except by such companies as are now operating under franchises heretofore granted by the city to such companies, individuals or partnerships as are now operating or may operate under present existing city ordinance, the city shall then lose control of the service and rate of fare provided for in this franchise and such loss of control shall continue so long as competition is permitted by the city.
8. Provision is made that the company shall be allowed to earn (after taxes and depreciation) 6 per cent on its present capital value, 7 per cent on all additions to capital, and one-half of any excess above such permitted return after $100,000 is accumulated in the surplus fund of the company.

The new franchise was prepared by a committee of fifteen of the most prominent citizens of Youngstown, appointed for the purpose by the City Council in May, 1928. The chairman of this committee was the president of the largest financial institution of the city and other members of the committee represented in an executive capacity other financial institutions, other large industrial concerns and other business interests of the city. The committee commenced to function actively in September, 1928. Public hearings were held.

Against Hasty Action on Pittsburgh Subway

George S. Davison, chairman of the City Transit Commission, at Pittsburgh, Pa., has asked delay on any action in the nature of a commitment on any subway plan at this time. It is pointed out that on June 25 the special election will take place on the metropolitan city question and that in the new charter plan consideration has been given to the district assessment plan of financing such improvements.

Mr. Davison regards it as desirable that the city get the proper start in the financing of subway construction, "by utilizing the special assessment method to help pay for its initial subway construction and thereby make less difficult the application of this plan to later subway projects."

Specifications Out for Lackawanna Electrification

Equipment specifications for the multiple-unit cars for use on the Lackawanna Railroad electrification out of Hoboken, N. J., are now in the hands of the manufacturers, and it is anticipated that bids will be received in the near future. Bids already are in for the catenary structure and the contracts may be awarded within the next month.

As noted previously, power contracts have been signed with the Public Service Electric & Gas Company, the Jersey Central Power & Light Company and the New Jersey Power & Light Company for supplying power for the entire electrification. The contact line will carry 3,000 volts direct current.

$10,000,000 Annual Parking Loss in St. Louis

Elimination of all parking in the downtown sections of St. Louis, Mo., is being considered by the Traffic Committee of the St. Louis Safety Council. Oliver T. Remmers, chairman of the committee, personally favors the elimination of parking, saying that the Council's contention is right that the streets were designed for the movement of traffic rather than for the storage of unused automobiles. It has been estimated that the parking of automobiles in downtown streets costs the city $10,000,000 annually through loss of business that otherwise could be obtained from tourists and other visitors.

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Governor Comments on New Chicago Bills

Governor Emmerson of Illinois has signed the Chicago traction bills passed by both branches of the General Assembly. In going over the bills before they were signed by the Governor, attorneys discovered that House Bill 513, amending the cities and villages act, was faulty and so a Senate bill was substituted. The attorneys declared that the change in no way affected the group of bills approved.

The Governor issued a statement in part as follows:

On Dec. 6, last, Judge Wilkerson, before whom receivership proceedings are pending involving one of the surface lines companies, appointed a committee of prominent citizens to work out a definite plan of settlement upon which the city and the companies could agree. The bills now before me, with the exception of House Bills 515 and 737, are the result of the efforts of this committee.

The six agreed bills were submitted to the City Council for approval and were endorsed by practically a unanimous vote. They were agreed to by the companies and were brought to Springfield by the citizens' committee and the local transportation committee of the City Council.

The fullest opportunity was given in both branches for thorough consideration of all of these bills. They were passed in the House by upwards of 110 votes and in the Senate by 41 votes.

The measures are properly safeguarded by provisions that any ordinances drafted under them must be submitted to a vote of the people before becoming effective. The bills do not in themselves settle the traction question, and no settlement can be effected until the City Council has agreed upon the terms of settlement and the people, at a referendum, have approved the action of the Council.

For many years the ideal of those who have studied local transportation in Chicago has been unification of surface and rapid transit facilities, with subways in the congested areas, all operated on the basis of a unit fare with transfer privileges.

The citizens' committee and members of the City Council believe these bills give the city all the authority it needs to work out an adequate unification plan.

Under their terms the city has the power not only to determine the details of the plan of settlement, but also to regulate operation, rates and service, and the right of purchase by the city, should that be desired, is protected. In the arguments of those who request the vetoing of the bills no good reason has been offered for setting aside the judgment of the City Council and the two Houses of the General Assembly.

The terminable permit measure, one of those approved, applies to the entire state. Bills will be enacted July 1.

More Seven-Cent Schedules Rejected in New York

The New York Transit Commission on June 18 rejected as illegal the 7-cent fare schedules filed by the Eighth & Ninth Avenue Railways on July 16, 1928. The ground for the decision was the same as that given in rejecting the higher fare plea of the Drydock, East Broadway & Battery Company three weeks ago, namely, that the company had proceeded under the wrong section of the Public Service Commission law. The regulatory body made the point that the 5-cent fare under which the company operates in the city of New York was "contractual in nature" and could not, therefore, be altered by the commission. The opinion added that it was doubtful whether the company, even if granted a 7-cent rate, could meet the competition of the rapid transit lines and other surface lines along its routes.

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Late News Briefs

Tulsa, Okla. — After crippling transportation facilities for two days, employees of the Oklahoma Union Railway returned to their positions on June 18. The differences between the company and employees were submitted to the State Board of Arbitration and Conciliation. The strike was the second transportation tie-up in the history of Tulsa. It resulted from a request for a 3-cent hourly wage increase by members of the local union, and for a seven-day vacation each year on full time. Wages now range from 45 to 55 cents an hour. The company has not earned operating expenses at any time since the present owners took over the property in 1923.

St. Louis, Mo.—The St. Louis Electric Terminal Railway has asked the Board of Public Service to secure the vacation of a 127-ft. section of Brooklyn Street in connection with the construction of its proposed elevated and subway line which will connect the McKinley Bridge with a new passenger-and-freight terminal at Twelfth Boulevard and Washington and Lucas Avenues. Property owners have signed a waiver of damages.

Seattle, Wash. — G. B. Avery, in charge of the municipal street railway, has ruled that trainmen must stand an inspection every three months, under the critical eyes of station masters. Full length mirrors and shoe-shining stands are to be installed in each carhouse, and conductors and motormen are to be supplied with snappy new badges and new gilt cap bands to replace the cap insignias now worn.

Louisville, Ky.—Harland Bartholomew has explained to Mayor Harrison and members of the City Planning and Zoning Commission a preliminary major street plan which he has prepared as the first phase of a comprehensive plan for Louisville. Mr. Bartholomew said that Louisville has 597 miles of streets and the plan adds 9 miles to this total and makes 140 miles of the city streets major thoroughfares which will accommodate from four to eight lines of traffic. The commission arranged for a committee of its members to make revisions and suggestions before it is adopted as a layout of the principal traffic streets for the city until 1980. On this committee is Frank H. Miller, vice-president of the Louisville Railway.

St. Louis, Mo.—*Transit News*, published by the St. Louis Public Service Company, has come out for the elimination of parking in streets occupied by street cars, especially in the congested districts. The railway's research department estimates that each automobile parked in the downtown streets occupies space valued at $5,000, and that the rental and tax value of this space is $375 a year. This does not take into consideration the tremendous economic loss caused by the delay to patrons of the railway by the unwarranted congestion caused by parked automobiles.

Canton, Ohio.—The Canton Street Car & Bus Company has been incorporated by A. C. Blinn, president of the Northern Ohio Power & Light Company, J. B. Young, his secretary, and Windall L. Willkie, chief counsel for the company, to furnish Canton with transportation by street car, all bus, or a combination of the two in accordance with plans matured previously, to which reference has been made before in the ELECTRIC RAILWAY JOURNAL.

Cuyahoga Falls, Ohio.—An agreement has been reached between the City Council and the Northern Ohio Power & Light Company whereby the street cars will be taken off Front Street and routed over Second Street, both north and south bound, for a period of 30 days beginning June 10. During the same period a crosstown bus service will be established from Cleveland Boulevard on Northampton Road over Northampton, Portage, Newberry, Tallmadge, High, and back over Portage to Northampton and Cleveland. The experiment is to be tried without committing either the city or company to any definite program as to the permanent discontinuance of car service on Front Street.

Joplin, Mo. — The Missouri Public Service Commission at Jefferson City on June 21 authorized the Southwest Missouri Railroad to charge in Joplin a cash adult street car fare of 8 cents with two tokens for 15 cents and 3 cents for children. This is an extension of the adult fares authorized by the commission in April, 1928, for a period of thirteen months.

Ballston Spa, N. Y.—The Public Service Commission on June 6 directed the Kaydeross Railroad to repair its railroad. The line is electrically operated, is 12 miles in length, extending from Ballston Spa to Nill Grove where it serves the two mills of the Kaydeross Paper Company and the Cotrell Paper Company. There are two passenger trains a day.

Indianapolis, Ind. — Public bequests of approximately $160,000,000 to be available in 2129 are made in the will of the late Will A. Latta, attorney for the Indianapolis Street Railway, filed for probate here on June 13. It provides for $50,000 to be kept intact for 200 years at compound interest.

Frankfort, Ky.—The possibility of the State of Kentucky developing a State Utilities Commission appears slim. At the last session of the Legislature a special committee was named to investigate and report on the needs of state regulation of the various public utilities. The chairman says that as representatives invited to discuss the matter had failed to put in an appearance, it would seem that there was not much demand for a utility commission or any reason to recommend establishment of a commission.

Flushing, N. Y.—Edward A. Roberts, manager of the New York & Queens County Railway, convinced that the "Orange Trolley" is the quick, convenient way to New York, recently distributed a little folder containing a homily on the utility of the route, a map of the district served and last, but not least, a complimentary ticket in the form of a stub "good for one continuous passage on June 21, 22 and 23, 1929, on inbound cars to New York only."

New York, N. Y.—An independent Socialist attack on the transit policy of the present administration in New York City has been launched by Louis Waldman, former Socialist candidate for Governor, who has addressed a letter to Mayor Walker in which he asks sixteen questions intended to clear up a situation that is "full of talk about transit and new subways and no results."

Dallas, Tex.—Residents of East Dallas have asked the City Commission to require the Dallas Railway & Terminal Company to extend the Junius Heights line to Greenville Road and Llano Street in accordance with Everman Plan No. 5. Opposition was registered to the plan to continue the present shuttle bus service in lieu of the extension of the line.

New York, N. Y.—The New York Transit Commission has ordered the Brooklyn-Manhattan Transit Corporation to expend $2,500,000 for new cars. Railway officials intimate they will comply with the order. The commission is considering the matter of seeking the appointment of a receiver to take charge of all revenues of the Interborough Rapid Transit Company in excess of the $6,335,000 annual profit guaranteed by the city on the company's lease of the city-owned subways.

Chicago, Ill.—The Woods electrification bill providing that all steam railroad terminals in Chicago shall be electrified before 1933, the cost to be met by sale or lease of air rights, was killed in the Illinois Senate, as that body prepared to adjourn for the summer.

Schenectady, N. Y. — *Riders' Guide* has been started by the Schenectady Railway in the form of a four-page leaflet 6½ in. deep by 3¼ in. wide. The first issue is dated June 15. It is intended to print messages as to company policy, schedules, service, safety and any other topics that may be of an informative nature. Students of the Junior High and High Schools of Schenectady and Scotia were asked to suggest names for the new publication and the name decided upon by the committee was suggested by Miss Agnes Svolos, who received an award of $10 from the company.

COMING MEETINGS

July 1-2—National Motor Bus Division, American Automobile Association, annual meeting, Hotel Lafayette, Buffalo, N. Y.

July 10-11—Regional Conference of New England Electric Railway Executives, Copley Plaza Hotel, Boston, Mass.

July 11—New York Railroad Club, annual outing, Travers Island, N. Y.

July 17 — Central Electric Traffic Association, Miami Hotel, Dayton, Ohio.

July 24-26—Electric Railway Association of Equipment Men, Southern Properties, Lafayette Hotel, Lexington, Ky.

July 26-27—Central Electric Railway Accountants' Association, Angola, Ind.

Aug. 15-16—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.

Aug. 27—National Association of Railroad and Utilities Commissioners, Glacier National Park, Mont.

***Sept. 28 - Oct. 4* — American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium.**

Nov. 20-21—Association of Electric Railway Equipment Men, Middle Atlantic States, Richmond, Va.

Nov. 21-22—Public Utilities Association of Virginia, annual meeting, Chamberlain-Vanderbilt Hotel, Old Point Comfort, Va.

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Recent Bus Developments

Uniform Specifications Discussed

Bus specifications as drawn up by the National Automobile Chamber of Commerce, *Bus Transportation*, the Connecticut Public Utilities Commission, the Society of Automotive Engineers, and the Motor Vehicle Conference Committee were discussed at the joint meeting held on June 20 and 21 in Washington, D. C. The purpose was to try to standardize the principal dimensions and equipment of buses. Although the desirability of this was recognized, several members of the code committee felt that standardization might impede the development of the bus.

The opinion was advanced that what might be considered a desirable feature today may easily prove to be old fashioned five years hence. At such time, a state commission inspecting a bus of improved design would not accept it because it would not conform to the regulations laid down five years previously. It was thought that enough leeway should be maintained in the specifications to allow the manufacturer to incorporate his new ideas in the bus, thus giving the operator the benefit of experience gained during past years and not retarding development by regulations.

One of the changes made in the proposed rules is that a maximum length of 40 ft. be allowed, but leaving a loop hole for state commissions to reduce this maximum length if considered desirable. This overall length is to be measured from bumper to bumper. Although a prolonged discussion took place concerning the desirability of including the sleeper buses in the code, it was thought that, due to insufficient experience, it would be inadvisable to do so.

Railways Protest Queens Bus Service

Supreme Court Justice Strong in Brooklyn reserved decision on June 26 on the application by the New York & Queens County Railway and the Steinway Railway for an injunction to restrain the Long Island Transportation Company from maintaining a bus service between Astoria and Elmhurst. At one point, Justice Strong in interposing his own opinion said he thought transportation service "could be improved." Justice Dike suspended operation of the buses recently pending the outcome of the litigation. The petitioning companies, maintain trolley lines in Queens. They contend that the defendant company is engaged in unfair competition. A. T. Davison, counsel for the railways, argued that the bus company also was operating without franchise or certificate of convenience and necessity.

Another Westchester Route Sanctioned

On June 25 the County Transportation Company, Inc., was granted a certificate of public convenience and necessity by the Public Service Commission to operate a bus line in the village of Mamaroneck, Westchester County, New York. The petition for the route was a result of the abandonment of the service of the New York & Stamford Railway in various cities and towns of Westchester County. Commissioner Van Namee pointed out that the granting of the certificate completes the chain necessary to allow continuous operation over routes in Westchester County formerly operated by the trolley line. It is a further move in the series referred to in ELECTRIC RAILWAY JOURNAL NEWS for June 22, page 82.

Co-operation in "Save-a-Life" Campaign

The People's Motorbus Company and the St. Louis Public Service Company cooperated in the "Save-a-Life" campaign in Missouri during June. One of the things they did was to have all of their buses and other automotive equipment inspected by the authorized service stations. The bus companies have found that a very large percentage of all accidents between their buses and other motor cars is due to the defective brakes or steering mechanism of the other cars.

Two Cases Before Illinois Commission

Two cases, both involving bus problems, are before the Illinois Commerce Commission. In one the Chicago Railways and the Chicago Motor Coach Company are involved, and in the other the Chicago & Joliet Electric Railway, the Illinois Traction System and the Tri-State Bus Company.

Some time ago the commission authorized the Chicago Railways to operate buses over certain streets, later rescinded the order, and then authorized the Chicago Motor Coach Company to operate buses. The railway filed suit in the Supreme Court, which holds that the commission arbitrarily exercised its authority when it granted the bus company a permit. It sent the case back to the commission with instructions that the railway be given a hearing.

A hearing in the other case was set for June 27. Some time ago, after 16 companies had been involved, the commission ordered the Chicago & Joliet to operate between Chicago and Joliet, the Alton Transportation Company, a bus line owned by the Chicago & Alton, from Joliet to Carlinville; and the Illinois Traction System between Carlinville and East St. Louis. When the Alton failed to operate, the commission issued an order to the Tri-State Bus Company to operate from Chicago to East St. Louis, whereupon the two electric railways again petitioned the commission.

More Buses for Eastern Massachusetts

Buses will be substituted for cars by the Eastern Massachusetts Street Railway on the Wakefield, Stoneham-Winchester route on July 7. The change has been timed to coincide with the rebuilding of streets constituting the through route from Wakefield to Stoneham, so that the rails may be removed before the roadwork is started by the state. The Wakefield-Stoneham line was opened 37 years ago next August as the beginning of a net work that for many years made Wakefield the electric railway center of northern Greater Boston.

Trucks Curbed That Bootleg Excursions

Competition of trucks insured to carry merchandise but which on Sundays and holidays run afoul the bus lines by carrying picnic and outing parties has been effectively stopped in Massachusetts under the compulsory automobile insurance law. Owners of trucks guilty of such violations face loss of registration and operators are arrested for driving trucks that are not properly insured. The extent of the use of trucks for service of this kind is surprising.

Millbury, Mass.—Town officials and officers of the Worcester Consolidated Street Railway are endeavoring to reach an agreement on the fare to be charged by the buses which are to supplant the trolleys early in July.

Dayton, Ohio.—The Dayton & Troy Electric Railway has asked the State Supreme Court to require the Utilities Commission to revoke the certificate of the Inter-City Coach Company on the ground of alleged improper practices.

Troy, N. Y.—Consent of the Public Service Commission to abandon certain portions of its lines in Troy was asked on June 20 by the United Traction Company. Officials of the company have voted to substitute buses, a certificate for the operation of which is also asked of the commission. A hearing on the petition will be held later.

Fitchburg, Mass.—The Fitchburg & Leominster Street Railway has asked the State Department of Public Utilities to restrict the Suburban Bus Lines Company, Inc., from operating in Fitchburg and Lunenburg. It is said that of late the bus line has been picking up and letting off passengers within the limits of Fitchburg and that it is running special trips to Whalom Park, operated by the railway, in direct competition with the railway. The bus company claims it has been serving Lunenburg more adequately than the railway did before it abandoned its route. The management said it would put a stop to the handling of local business in Fitchburg by its operators in contravention of the rights of the railway there.

Dover, N. J.—A portion of the Morris County bus line, route 72, operating between Newark, Morristown, Dover, and Netcong, has been extended by Public Service Co-ordinated Transport from Netcong to Budd Lake and Hackettstown. Over the route between Newark and Dover the Morris County Traction Company formerly operated, but the service of that company was replaced by buses of the Public Service some time ago.

St. Louis, Mo.—Eight windows were broken and a parked automobile damaged when the fan-belt of a bus of the St. Louis Public Service Company broke and threw parts of the broken blades on both sides of the street on June 16. Recently a similar mishap occurred to a bus of the People's Motorbus Company. Richard W. Meade, president of the People's company, said that the two cases in St. Louis were the first of the kind to his knowledge, although buses in his charge have traveled many million miles.

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Financial and Corporate

Key System to Reorganize

Two distinct corporations may result from plans under consideration. Committee working out details

ANNOUNCEMENT has been made by A. J. Lundberg, president, Key System Transit Company, Oakland, Cal., that the company will default interest payments due on July 1, on its first mortgage, general and refunding mortgage bonds, and on notes of the Key System Securities Company. Mr. Lundberg admitted this is the initial step in a program of reorganization in which the company's capital structure will be changed and a new plan of operation followed, but stated he could not discuss details at this time.

The company has been able to pay interest by rigid operating economies, sale of non-operating properties and use of funds from its depreciation account and could have continued to meet its obligations in this manner for some time to come. However, the directors felt that serious deterioration of the property eventually would result from this process and, as the day of reckoning inevitably would arrive, decided upon action at the present time.

At a conference held on June 22 with members of the California Railroad Commission it is understood that Key System officials submitted a plan to separate into two distinct corporations, the System's East Bay street car division and its transbay ferry and interurban division. It is also understood that the commission asked for additional data on the company's plans, but pointed out that it could render no decision without a public hearing.

The transbay division has shown a 4½ per cent return on the investment, but the deficit of the street car division annually has been so high that it more than offset the profits from the ferry and interurban service. President Lundberg has stated that stockholders will not be asked to invest further capital in any branch of the company which is not able to show a return on the money invested, so it is thought probable that they will be asked to advance additional capital for the building up of the former division but will not be asked to sink any further capital in the latter.

With new money thus derived from stockholders and from the probable sale of valuable real estate which the company owns, together with advantages arising from changes in capital structure, it is pointed out that if the proposed segregation of the properties is permitted, the company taking over the transbay ferry division would be in a sound financial position. On the other hand, the condition of the street car division is so unsatisfactory that its ultimate fate is extremely doubtful. It is pointed out that on many occasions the railroad commission has urged that the Key System and Southern Pacific work out an agreement which would abolish present duplication of lines. This now may be accomplished. There are also rumors to the effect that the Southern Pacific or Western Pacific may buy the Ferry-Interurban system, and others that the Key System may abandon the street car lines.

Details for perfecting the plans for changes are in the hands of a committee of which C. O. G. Miller, president of the Pacific Lighting Corporation and chairman of the board of the Key System, is chairman.

Public Financing by Stone & Webster

Stone & Webster, Inc., will shortly add $57,500,000 of capital funds through public financing. The business will continue under the same management with added advantages of a substantial public ownership.

The present Massachusetts corporation will be dissolved and a Delaware corporation formed with the same name. The authorized capitalization of the new corporation will consist of 1,500,000 no-par shares of capital stock, of which 400,000 shares will shortly be offered at $100 a share. The present large stockholders are at the same time increasing their interest to the extent of $17,500,000, or 175,000 new shares. There will be outstanding altogether approximately 1,300,000 shares of stock. The management expects to list its shares in New York.

The board of directors will be enlarged to include W. Cameron Forbes, former governor general of the Philippines; Joseph P. Grace, chairman of W. R. Grace & Company; Herbert L. Pratt, chairman of Standard Oil Company of New York; Eliot Wadsworth, former assistant secretary of the Treasury; Albert H. Wiggin, chairman of Chase National Bank.

Wrongly Directed Municipal Ownership Efforts

Constant agitation for public ownership is a matter which receives substantial comment in the recent interim report of the committee on public service company securities of the Investment Bankers' Association approved by the board of governors at White Sulphur Springs. In the words of the report:

"There is never-ceasing propaganda for public ownership and operation and for the extension of the legal rights and jurisdiction of the municipal corporations. Many thoughtful people are lured by the idea of public ownership as a wise method of curbing disliked practices of private ownership."

The committee feels, however, that such efforts are wrongly directed, and despite examples of sporadic success, are based on misinformation and misconception of the inherent nature of the businesses attacked and of the nature of our government.

Chicago, Ill.—A committee consisting of George Woodruff, vice-chairman of the National Bank of the Republic, Joshua D'Esposito, chief engineer for the Union Station Company, and Col. A. A. Sprague, vice-chairman of the Citizens' Traction settlement committee, will be named by the city to pass on the valuation of the elevated lines under the proposed plan for unification.

City Controller Scores P.R.T.

Questions many items of expense in preliminary report on affairs of railway. Full audit promised later

CITY CONTROLLER HADLEY of Philadelphia on June 20 transmitted to City Council the preliminary report of the audit of the accounts of the Philadelphia Rapid Transit Company. The Controller demanded of Council a special investigating committee to look into the whole subject of P. R. T. expenses over the five-year period to June 30, 1928, covered by the audit. The Controller also transmitted a special report of Dr. Milo R. Maltbie, who is aiding him in the audit. The Controller promises a more definite and exhaustive report by Dr. Maltbie, but stated the audit could not be completed for at least three more months.

Fourteen leading points thus far developed by the audit demand special investigation, City Controller Hadley informed City Council, asking for a special councilmanic committee of inquiry to go into them. They have been summarized in part as follows:

1. Control of the majority of stock of the P. R. T. Company and how acquired by Mitten Management.

2. Payment of management fees of $6,551,347 to Mitten Management in addition to $19,108,538 paid to general officers of the P. R. T. Company for salaries and expenses of mmanagement as well as directors' fees amounting to $96,540.

3. Commitment of the P. R. T. Company to a 30-year lease for offices in the Mitten Building at a rental of $400,000 a year for the first ten years and $500,000 a year for the next twenty years, in addition to the payment of taxes, assessments, repairs, etc., for the entire building by the P. R. T. Company. The P. R. T. sublets to Mitten Management a portion of the building for an amount less than the cost of the P. R. T.

4. Payment of $25,000 for cancellation of lease covering a portion of the corner of the first floor of Mitten Building.

5. The purchase of the Yellow Cab Company at more than $500 a share for no par value stock.

6. The operation by the P. R. T .Company of the Quaker City Cab Company, notwithstanding the fact that the Public Service Commission has failed to approve the acquisition of the cab company.

7. The borrowing by Mitten Management of P. R. T. funds to the extent of $15,556,050, for which less than 3 per cent was paid to P. R. T. Company.

8. Payment to J. W. Braun of $621,794 and the purposes for which this money was used.

9. The question of gratuities, donations, subscriptions, etc., amounting during the auditing period to $53,125; expenses of the Co-operative Committeemen trip to Buffalo, $18,009; show at Buffalo—"Little Nellie Kelly," $13,411.

10. Loss resulting from sale of newspapers on street cars—$25,992.

11. Expenditures for legal services, including two or more individual payments of $50,000 each, which will appear in a subsequent report.

12. Damage claims settled with attorneys.

13. Services rendered by experts and fees paid for valuations made, and many other items of expenditure listed by Haskins & Sells.

14. The alleged practice of employing city officials and former city officials by the P. R. T. Company.

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Des Moines System Sold

Walter J. Cummings and associates of Chicago purchase road in Iowa city under foreclosure

A SYNDICATE headed by Walter J. Cummings, Chicago, was the only bidder for the property of the Des Moines City Railway at the public auction held on June 22, at Des Moines, Ia.

E. J. Kelly, special master, who conducted the sale, has recommended to the federal district court that Mr. Cummings' bid of $1,855,000 be approved, and it is expected that Judge Martin J. Wade will give his approval just as soon as a sufficient time has elapsed to allow creditors to file possible objections.

Associated with Mr. Cummings in the purchase were Charles H. Wilcox, president of the General Steel Company, Chicago, and Charles G. Adsit, former vice-president of the Georgia Power Company, Atlanta, Ga.

The Des Moines City Railway had been in receivership since Nov. 12, 1926, when Federal District Judge Martin J. Wade granted the application of the Harris Trust & Savings Bank, Chicago, which filed a petition on Nov. 11, setting forth that the company was in default on the principal payment on $700,000 of debenture bonds. Clyde E. Herring, Des Moines business man, and F. C. Chambers, former manager of the railway, were named receivers.

After the receivers filed a report announcing that they had on hand $118,000 to pay indebtedness of $1,759,152, Judge Wade ordered the property sold.

Prior to the sale, Mr. Cummings announced that he had purchased the debenture bonds and notes held by the Harris interests, constituting the principal indebtedness of the company, outside of first mortgage bonds totaling $5,762,000.

The 103 miles of tracks, overhead, carhouses, automatic substations and rolling stock of the railway are valued at approximately $10,000,000.

Mr. Cummings made public plans for the immediate shipment of ten late model street cars to Des Moines, and announced service betterments which include more cross-town buses, and more bus feeders for the railway system.

The car strike which threatened over the famous two-man car contract signed between the union and the company back in 1915 appeared rather remote when Mr. Cummings pointed out that he is using nothing but two-man cars on his lines around Chicago, and that the ten new cars promised to Des Moines all require two-man operation.

Mr. Cummings purchased the car system without the inclusion of the two-man car agreement which was to run till 1940, but gave no indication that he will attempt to institute one-man car service in Des Moines. He also indicated he did not intend to alter the 10-cent single fare or the weekly pass which sells for $1.25 and is good for an unlimited number of rides for seven days.

Mr. Cummings is president of the Chicago & West Towns Railway, and president of the Cummings Car & Coach Company.

4,444 Exhibits in Trade Commission's Inquiry

Field accounting work has begun on two large operating subsidiaries of two important holding companies in connection with the investigation which the Federal Trade Commission is making of public utilities in pursuance of a Senate resolution.

Summaries are almost completed on the growth of capital assets and capital liabilities, on issuance and purchase of securities and on service fees for six holding and service companies.

Field work has been started on relations between utility companies and service organizations in the offices of four management groups, while the preparation of all information available on intercorporate relationships in general, is nearing completion.

The foregoing material will be used in preparation for public hearings on the financial phase of the utilities investigation.

The total number of exhibits introduced is now 4,444.

On June 27 it was announced the inquiry had been adjourned till September.

Conspectus of Indexes for June, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	June 1929 7.76	May 1929 7.76	June 1928 7.62	June 1929 7.76	Jan. 1924 6.91
Electric Railway Materials* 1913 = 100	June 1929 145.8	May 1929 145.5	June 1928 141.4	March 1924 163.9	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	June 1929 230.8	May 1929 230.1	June 1928 229.2	June 1929 230.8	Jan. 1924 217.4
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	June 1929 199.7	May 1929 199.5	June 1928 202.7	March 1924 206.8	Sept. 1927 199.4
Eng. News-Record Construction Cost (General) 1913 = 100	June 1929 205.6	May 1929 205.2	June 1928 206.2	March 1924 224.7	Nov. 1927 202.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	May 1929 95.8	April 1929 96.8	May 1928 98.6	Nov. 1925 104.5	April 1927 93.7
Bradstreet Wholesale Commodities 1913 = 9.21	June 1929 12.46	May 1929 12.68	Jane 1928 13.19	Dec. 1925 14.41	July 1924 12.23
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	May 1929 153.3	April 1929 151.6	May 1928 153.8	Nov. 1925 167.1	May 1924 141.0
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	May 1929 159.4	April 1929 159.3	May 1928 161.5	Nov. 1925 171.8	April 1929 159.3
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	May 1929 136.9	April 1929 136.4	May 1928 119.0	Feb. 1929 140.4	July 1924 73.4
Bank Clearings Outside N. Y. City 1926 = 100	May 1929 102.5	April 1929 104.0	May 1928 108.4	Feb. 1929 110.1	May 1924 84.4
Business Failures Number	May 1929 1733	April 1929 1738	May 1928 1723	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	44.90	32.59	36.82	122.95	23.13

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Detroit, Mich. — The United States government will seek to collect $300,000 from the Detroit United Railway, the predecessor of the present Eastern Michigan Railways, in respect of profit and income taxes for 1918 and 1920.

Tacoma, Wash.—According to Commissioner Ira S. Davison, gross receipts of the municipal belt line were $10,453 in April and net profit $2,063. This pulled the line out of the "red" for the year to date, and left a balance of $341 to its credit.

Indianapolis, Ind.—Merger plans contemplate that all the interurban properties owned and leased by the Terre Haute, Indianapolis & Eastern Traction Company shall be put into a corporation to be known as the Indiana Rapid Transit Company, neither the securities nor earnings of which will be guaranteed by the Indiana Electric Corporation, which would own all common stock. It is entirely probable that the Central Indiana Power Company properties and the light and power business of the railway will be consolidated in the main corporation, while the railways will be left on their own revenue-earning ability.

Oakland, Cal. — The Key System Transit Company has applied to the Railroad Commission for permission to abandon its street car line now operating between East Fourteenth Street and the plant of the Pacific Tank & Pipe Company in East Oakland.

St. Louis, Mo.—During April the number of revenue passengers hauled by the People's Motorbus Company increased 8.45 per cent compared with April, 1928, while revenue street and bus passengers of the St. Louis Public Service Company dropped 5.24 per cent.

Springfield, Mass.—Recent reports of the Springfield Street Railway show an appreciable decline in the number of passengers carried. The report for April, 1929, shows 2,924,343 revenue passengers, as against 2,951,664 in April, 1928. Transfer passengers were 379,575, as against 379,172 in April of last year. The company recently reiterated its adherence to the policy of replacing trolleys by buses in suburban service where economic condition warrant the charge.

Denver, Colo.—Group insurance aggregating $1,250,000 recently was taken out for its employees by the Denver Tramway. No employee less than nine months with the company is eligible to the $1,000 to $1,200 coverage. The average monthly premium is 60 cents per individual, the company defraying the remaining cost. The contracts were signed by 95 per cent of the men who are eligible.

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Personal Items

C. E. Morgan With West Penn

Executive of Brooklyn City Railroad joins vast railway system radiating from Connellsville as vice-president

DYNASTIES, whether political or industrial, to be successful, must be directed by men of action. It is, of course, always interesting to inquire into the economic consequences of countries and corporations, but to the great majority of us Mussolini means more at the moment than does Italy and John D. Rockefeller means more than does Standard Oil. In contrasts of this kind in electric railroading Clinton E. Morgan means more at the moment than does the Brooklyn City Railroad. So this industry will pause at the news that Mr. Morgan, inseparately a part of the Brooklyn City Railroad since 1919,

C. E. Morgan

is to become vice-president of the West Penn Railways, Pittsburgh, Pa.

Mr. Morgan's work as doctor of the sick system of lines of the Brooklyn City Railroad has ended. He has done well with the job for which he was originally retained. He goes to Pittsburgh on the eve of the merger of the lines of the Brooklyn City with those of the surface lines of the Brooklyn-Manhattan Transit Corporation. Certainly, if he made no promises when he assumed the job in Brooklyn Mr. Morgan need make no excuses now.

Previous to October, 1919, the Brooklyn City Railroad was operated as part of the property of the Brooklyn Rapid Transit Company, the predecessor of the Brooklyn-Manhattan Transit Corporation. Mr. Morgan was placed in charge as assistant general manager, then served as general manager and latterly as vice-president and general manager. He came from the West with a long record of accomplishments and crowned his work with a record for rehabilitation and vigorous management in Brooklyn that has greatly enhanced his reputation.

Mr. Morgan began railroading as a clerk in the office of a steam railroad. For the next five years he acted as assistant to the president and other officers of the Indianapolis & Greenfield Electric Railway. In 1905 he had charge of the work of the rebuilding and operating the Indianapolis line, and was also superintendent of the Danville line of the Terre Haute, Indianapolis & Eastern Traction Company. Four years later he accepted the position of general manager of the Indianapolis, Crawfordsville & Western Traction Company. He resigned in 1912 to become connected with the Michigan Railway.

To say that Mr. Morgan has been active in the affairs of the American Electric Railway Association hardly characterizes his work properly. He has been more than active. He is a charter member of the Central Electric Railway Association and in the past has served as a member of the standardization committee on equipment in both the Central Electric Railway and the American Association. Also he was a member, and later chairman of both the schedule and time tables and the rules committees of the Transportation and Traffic Association. He also served on the block signal committee. Mr. Morgan now is the chairman of the committee on publications of the American Association and is the third vice-president of that body.

Ray P. Stevens Heads New Power Merger

Details of the merger offer by which J. P. Morgan & Company and F. L. Carlisle & Company hope to weld together a $565,000,000 power combine in upper New York State have been made public. Niagara-Hudson Power Corporation is the name of the new concern, and it has offered, by exchange of its shares, to acquire the Buffalo, Niagara & Eastern Power Corporation, the Northeastern Power Corporation and the Mohawk-Hudson Power Corporation, together with their many subsidiaries.

Floyd L. Carlisle is chairman of the board of directors; George H. Howard, president of the United Corporation, is chairman of the executive committee; Ray P. Stevens, former president of the Allied Power & Light Company, will be president.

The vice-presidents are Alfred H. Schoellkopf, vice-president and general manager of Buffalo, Niagara & Eastern, and E. L. West, also of the same concern.

H. L. Reichart Vice-President, New York State Railways

At the meeting of the directors of the New York State Railways following the recent change of control from E. L. Phillips and associates to that of the Associated Gas & Electric interests, Howard L. Reichart, secretary and treasurer of the New York State Railways, was elected a director and vice-president of the company.

Mr. Reichart has been connected with the New York State Railways since its incorporation, and was formerly associated with the late Horace D. Andrews when the latter was president of the New York State Railways and the Rochester Railway & Light Company with offices in New York City. Mr. Reichart went to Rochester when the general offices were moved there in 1918. He was appointed assistant secretary of the New York State Railways in 1913, and in April, 1925, he was elected secretary and treasurer of the company.

C. H. Dahl Heads Canadians

Assistant general manager at Winnipeg was elected president at recent Montreal meeting

C. H. DAHL, assistant general manager of the Winnipeg Electric Company, Winnipeg, Man., in charge of operation, was elected president of the Canadian Electric Railway Association at the recent meetng in Montreal. His work at Winnipeg covers the responsibility for the operation of the transportation service, the electric and the gas utilities.

The new president of the Canadians was educated in the public and the high schools of Marinette, Wis., the Normal School at Oshkosh, Wis., and the University of Wisconsin. From the last named institution he holds a B.A. degree.

Mr. Dahl taught school for seven years previous to his collegiate training. He joined the Wisconsin Railroad Commission in 1917 as case investigator, and held that position until November, 1919, when he became connected with the

C. H. Dahl

Winnipeg Electric Company as statistician. A statistician is in a position to take in the full measure of the operations of a company if he will, and this is just what Mr. Dahl did.

During his four years of almost silent work in that capacity he made himself one of the best informed men in the company's service, so that when in May, 1923, he was appointed assistant to the vice-president, Mr. Dahl, if he didn't know all about the company, knew a great deal. Incidentally, he had learned much about other Canadian utilities since statistics are the measure by which one company is compared with another in the matter of performance. In November, 1923, Mr. Dahl was appointed assistant to the operating manager, and from that post was advanced to assistant general manager in charge of operations. This was in December, 1924.

B. C. Cobb Heads Penn-Ohio Edison

B. C. Cobb has been elected president of the Penn-Ohio Edison Company to succeed R. P. Stevens, who resigned to become president of Niagara-Hudson Power Corporation. Other officers elected were T. A. Kenney, vice-president; H. G. Kessler, controller, and E. E. Nelson, secretary.

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F. A. Merrick Westinghouse President

E. M. Herr, president since 1911, elected vice-chairman. Plans vacation after long intensive service. New president was formerly vice-president and general manager

F. A. MERRICK was elected president of the Westinghouse Electric & Manufacturing Company by the directors on June 26. In announcing the election A. W. Robertson, chairman, stated that directors, while accepting the resignation of E. M. Herr, president since 1911, in order that he might go on an extended vacation, had elected Mr. Herr vice-chairman.

Mr. Merrick advances to president from the position of vice-president and general manager. He is a native of New Jersey and received his technical education at Lehigh University. Shortly after his graduation, he was employed by the Steel Motors Company, a subsidiary of the Lorain Steel Company, where he was responsible for many important electrical inventions and where he held the position of manager and chief engineer.

On the acquisition of the Steel Motors Company by the Westinghouse Company, Mr. Merrick entered the Westinghouse organization. He was immediately selected to prepare plans for a plant in Canada, and, in 1903, upon the formation of the Canadian Westinghouse Company, Ltd., was sent to the Dominion as superintendent of the company. In turn he became manager of works and later vice-president and general manager of Canadian Westinghouse Company, Ltd.

In the World War emergency, Mr. Merrick was assigned to organize the operations of the New England Westinghouse Company, to manufacture rifles for the Russian government. When the United States entered the war, further demands were made upon the plant for American war material.

From $20,000,000 Sales to $200,000,000 Under Mr. Herr

The achievements of Mr. Merrick before, during, and following the World War won for him in January, 1925, the position of vice-president and general manager of the Westinghouse Electric & Manufacturing Company, with headquarters in East Pittsburgh, Pa. In June, 1925, he was also elected a director of the company. Mr. Merrick will make his headquarters in Pittsburgh.

During Mr. Herr's management, the Westinghouse Company grew from a business with $20,000,000 sales annually to one with an annual business of approximately $200,000,000. The period of his connection with the company dates from 1905 when he resigned from the Westinghouse Air Brake Company to become first vice-president of the electric company. When the Westinghouse Electric was forced into a receivership in 1907, Mr. Herr was appointed one of the receivers and also general manager. The reorganization was successfully completed within a little more than a year and Mr. Herr resumed his former position with the company. In 1911 he was elected president.

After he was graduated from the Sheffield Scientific School at Yale University in 1884 with the degree of Ph.B. Mr. Herr entered the office of the mechanical engineer of the Chicago, Burlington & Quincy Railroad at Aurora, Ill., as a mechanical draftsman and through successive promotions became engineer of tests, superintendent of telegraphs, and finally division superintendent of that road. In 1891 he became division master mechanic of the Chicago, Milwaukee & St. Paul Railroad. Two years later he accepted the position of general superintendent of the Grant Locomotive Works in Chicago and in 1894 became general manager of the Gibbs Electric Company of Milwaukee.

F. A. Merrick

In 1898 he was asked by George Westinghouse to accept the position of general manager of the Westinghouse Air Brake Company, located at Wilmerding, Pa. Mr. Herr remained with this company until 1905 when, as before mentioned, he was elected first vice-president of the Westinghouse Electric Company.

Despite the exacting demands made upon his time as an official of the Westinghouse Company, Mr. Herr retained his deep interest in educational matters. It was he, perhaps, who helped most to develop the educational system for the employees of the Westinghouse Company. In 1920 he was elected a member of Yale Corporation and later was appointed to the Prudential Committee, which is charged with all financial matters connected with that University. He was also made a member of the Corporation's committee on educational policy, on which committee he has assisted in formulating the educational policy of the university and particularly that of the Sheffield Scientific School. If Mr. Herr has a hobby, it is etchings. Greatly interested in the graphic arts, he has one of the finest collections of Cameron prints in the United States. Mr. Herr was born at Lancaster, Pa., on May 3, 1860.

E. M. Herr

William Orem, Promoted by Salt Lake & Utah

C. H. Simpson, district freight agent of the Salt Lake & Utah Railroad, Salt Lake City, Utah, has resigned to become affiliated with the Pacific Nash Motors Company, San Francisco. William Orem, general agent, will take over the duties of Mr. Simpson, who has been with the railroad for six years. H. J. Stagg, Provo, Utah, traveling freight and passenger agent, has been appointed commercial agent with headquarters at Salt Lake City, and J. J. Sutherland, agent at Provo, has been promoted to succeed Mr. Stagg.

Commissioner McCardle Reappointed in Indiana

Reappointment of John W. McCardle and the appointment of Jere West, Crawfordsville, Ind., as members of the Indiana Public Service Comission have been announced by Governor Harry G. Leslie. Mr. West will succeed Harvey Harmon, Princeton, as a democratic member of the commission. At a reorganization meeting Mr. McCardle was elected chairman to succeed Frank T. Singleton of Martinsville. Mr. McCardle's appointment marks the beginning of his thirteenth year as a member of the commission. He was chairman from 1921 to 1926. Mr. West retired from the Circuit Court at Crawfordsville on Jan. 1.

H. Hobart Porter Heads Music Publishing House

At the postponed annual meeting of the Oliver Ditson Company, music publishers, held in Boston, the directors elected H. Hobart Porter, well known in the utility field, president, to succeed Charles H. Ditson, recently deceased. Mr. Porter announced that he would continue the basic policies inaugurated by Oliver Ditson, when he founded the business in 1835.

W. S. Robertson has resigned from the post of president and general manager of the Minnesota Power & Light Company, Duluth, Minn., to become associated with the American & Foreign Power Company, a subsidiary of the Electric Bond & Share Company. He was president and general manager of the Duluth company for six years. It is expected that Mr. Robertson will go to China to take charge of the firm's interest in the Far East.

J. Fred Hull was sworn in June 4 as a member of the Missouri Public Service Commission. He has been appointed for a six-year term to end on April 15, 1935. He succeeds J. P. Painter. Until a few days ago Mr. Hull was postmaster for Maryville. Before that he was editor of a newspaper there.

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"For the Love of Mike!"

Pittsburgh honors J. M. Loftis, who has done so much there in the interest of safety

AMERICANS tell the Chinese that their custom of putting food on an ancestor's grave is absurd because dead men cannot eat. The Chinese, in turn, ask the Americans why they put flowers on the graves of their departed since dead men cannot smell.

There can be no doubt that it is a fine thing to give bouquets to living friends. And that is exactly what the Pittsburgh trainmen did when they set aside the week of May 26-June 1, 1929, as "Safety Week" as a testimonial of their respect and admiration for J. M. Loftis, superintendent of transportation of the Pittsburgh Railways.

Quite appropriately, the slogan adopted for the campaign was, "For the Love of 'Mike,' be careful." During the campaign, which was sponsored by the company's bureau of accident prevention, all of the trainmen, as well as many employees from other departments of the company, wore lapel buttons bearing the photograph of Mr. Loftis, better known as "Mike."

J. M. Loftis

Mr. Loftis went to Pittsburgh forty years ago from Randolph County, West Virginia, at the age of 21. Since he had had about a year's experience as motorman and conductor at Wheeling, his first thought upon arriving in Pittsburgh was to connect with one of the local railways. Consequently, he applied for and secured a job with the Citizens' Traction Company, October 9, 1889, as laborer. A year later he was made night watchman and night receiver at the East Liberty Depot. After more than two years at this place, Mike asked for an outside job as gripman on the road so that he might work "on the outside." Several years later, when the Citizens' Traction Company was taken over by the Consolidated Traction Company, Mr. Loftis was made a motorman and for a period of one year operated out of the Homewood carhouse, as it was called at that time. Promotions followed in rapid succession for Mike after that.

In May, 1898, he was appointed inspector; in September, 1899, he was made division superintendent in charge of the Butler Street division; in May, 1904, he was again transferred to Homewood, this time as division superintendent; and in 1910 he was appointed superintendent of the entire system between the Allegheny and Monongahela Rivers except the Second Avenue lines.

In January, 1913, Mr. Loftis was promoted to the office of assistant to M. J. Maxwell, superintendent of transportation of the Pittsburgh Railways, and in July of the same year, following the death of Mr. Maxwell, he was appointed superintendent. From that time until the present, 16 years, Mr. Loftis has successfully carried out the duties of this office, and through the conscientious and faithful performance of his work, holds the high esteem of all who know him.

He has been a tireless and active worker for safety in the company ever since concentrated efforts in this direction were started by C. G. Rice, head of the company's claim department, twenty years ago.

C. J. Crampton Became Secretary of Dallas Commerce Chamber

C. J. Crampton, in charge of the public relations department of the Dallas Railway & Terminal Company, Dallas, Tex., has been elected executive secretary of the Dallas Chamber of Commerce. He assumed his new duties July 1. Mr. Crampton has been with the Dallas company for ten years. During this time he has done much to promote safety on the company's lines as well as to foster a closer personal relationship between the employees and the employers. In addition to being in charge of public relations he has been superintendent of the safety department of the railway, a department which he originated. He also founded *Partners,* the company weekly publication, an important organ which affords an outlet for opinions, suggestions and personal comment for the railway's employees. Mrs. Corita C. Owen, who has been secretary to Mr. Crampton, will continue as editor of *Partners.*

W. H. McCarty Heads Middle Atlantic Equipment Men

W. H. McCarty, elected president of the Middle Atlantic States Association of Railway Equipment Men recently, has been connected with the Capital Traction Company, Washington, D. C., and its predecessors since 1895. Since 1912 he has been master mechanic of the company and at present has charge of the maintenance of car, bus, and automotive equipment, in which work he has made a notable record.

Mr. McCarty went to the company at Washington unusually well-equipped in practical training since he had served a rigid apprenticeship with the American Bridge & Iron Company in the machine division. There he underwent the sturdy course of training in his profession which starts with a rat-tail file being placed in the hands of the apprentice and is concluded only after the novice has run the gamut of all the various kinds of work there is to do around the shop.

Not content, however, with this training, Mr. McCarty sought further experience and gained it as an employee of the locomotive shops of the Norfolk & Western Railroad at Roanoke, Va. Here again, this time for a period of two years, he had a hand in all the various classes of work that passed through the locomotive shops. It was from this service that he passed to the Washington & Georgetown Railroad and its successors, with which his career has carried him to eminence in the field of maintenance work and won respect for his opinion upon things mechanical not only in his own company but among his fellow craftsmen. This is well instanced, perhaps, by his notable association work as a member of the special committee No. 6 of the rolling stock division of the American Engineering Association, his many other association activities and in his very recent election to head the Middle Atlantic Association at the Wilmington meeting. Mr. McCarty is a native of Virginia.

W. H. McCarty

Dr. Philip Kremer, long connected with the street railway system in Berlin, Germany, latterly as assistant to the general manager, will on July 1 become manager of the street railway and bus system of Frankfort-on-Main. Dr. Kremer is known to many American electric railway men. He made an extended trip in this country last summer, so arranged that he attended the convention of the American Electric Railway Association in Cleveland.

Howard P. Savage, general manager of the Metropolitan Motor Coach Company (Marigold Lines) Chicago, Ill., has been appointed a colonel on the personal staff of Governor Louis L. Emmerson of Illinois. Mr. Savage is past national commander of the American Legion, and previous to becoming general manager of the Metropolitan system he was assistant general manager of the Chicago, North Shore & Milwaukee Railroad.

George I. Wright, engineer of electric traction of the Reading Railroad, with headquarters in the Reading Terminal, Philadelphia, Pa., has just returned from a six-weeks' trip to Europe. While abroad he visited nine countries, making a study of railroad electrifications in connection with the pending developments of the Reading.

William G. Marshall, since 1926 director of personnel for the Philadelphia Company and affiliated corporations, has been appointed assistant to Vice-president T. P. Gaylord of the Westinghouse Electric & Manufacturing Company. Mr. Marshall will be in charge of employees' relations, but no change is contemplated in the existing positions of director of personnel or manager of employees' service.

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Transportation Engineering Department for G. E.

H. L. Andrews Named Engineer, W. B. Potter, Consulting Engineer, and A. H. Armstrong and W. J. Davis, Jr., Associate and Consulting Engineers

REORGANIZATION of the railway engineering department of the General Electric Company and its future designation as the transportation engineering department has been announced by E. W. Allen, vice-president of engineering. H. L. Andrews is named engineer of the department; W. B. Potter is appointed consulting engineer with A. H. Armstrong and W. J. Davis, Jr., as associates and consulting engineers. Included in and as divisions of the transportation engineering department will be the railway equipment, the air brake equipment, and the industrial locomotive engineering departments at the Erie, Pa., Works, and the automotive engineering department at the Lynn, Mass., River Works.

Mr. Andrews, engineer of the new department, was graduated from the University of Missouri in 1910 with the degree of B.S. in electrical engineering. In August of that year, he entered the testing department of the Schenectady Works of the General Electric Company and was made assistant head of the floor test the following year. In May, 1912, he was transferred to the railway motor department, and, in 1916, joined the railway engineering department. A year later he was placed in charge of car equipment. Late in 1925, he was appointed assistant engineer in administrative charge of the department.

W. B. Potter is a native of Connecticut. Upon leaving school he began service as a machinist apprentice with Sawtele & Judd, Hartford, Conn. Foreseeing the future of the electrical industry, he secured employment with the Thomson-Houston Company at Lynn, Mass., in June, 1887. He became interested in electric railways through reports of Frank J. Sprague's work and decided to follow electric railroading.

In connection with a study of electric railway equipment, in 1892, Mr. Potter conceived the series-parallel controller, since used almost universally in control for electric railway motors. Mr. Potter continued in the department with the absorption of the Thomson-Houston Company by General Electric and, in 1895, was made chief engineer.

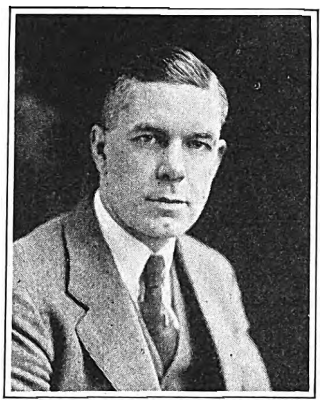
Among the projects which have engaged the attention of Mr. Potter were the Manhattan Elevated Railway, Baltimore & Ohio electrification, Paris-Orleans electrification, New York Central terminal electrification, West Jersey & Seashore Railroad and later, the Detroit Tunnel, Great Northern and Southern Pacific lines. Later, work such as that on the Butte, Anaconda & Pacific, Chicago, Milwaukee & St. Paul, and the Victorian Railways was carried out under his general supervision.

More than 130 patents have been issued to Mr. Potter for various inventions, including the series-parallel controller, the surface contact system, the three-wire system of railway operation, electro-pneumatically contact control system, and the otheograph. Other patents relate to electric switching, motors, generators, third rail, electric braking, air brakes, and various schemes of motor control.

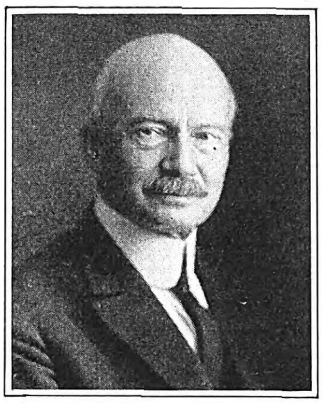
Albert Horace Armstrong was graduated from Worcester Polytechnic Institute in the engineering course in 1891 and entered the employ of the Thomson-Houston Company at Lynn in the same year. In 1897, he entered the railway engineering department and has since devoted most of his time to the study of railway problems. One of his most important earlier studies was that of train acceleration.

In addition to an extensive study of interurban and heavy traction work, Mr. Armstrong has taken part in the engineering study connected with various steam road electrifications. For many years he has held the position of assistant engineer of the railway engineering department, and chairman of the electrification committee of the company. He is the author of a section of the standard handbook on the subject of railways and also of numerous papers which have been delivered before various technical societies.

W. J. Davis, Jr., is a graduate of the Rose Polytechnic Institute. He began his work with the General Electric Company in the testing department upon graduation in 1892. After completing several of the regular tests, he was placed in charge of the calculating room of the testing department which was just then being organized. His next work was with W. B. Potter, who had then recently been made engineer of the railway department. In connection with his work on heavy electric traction, he introduced forced ventilation for railway motors and made an exhaustive pioneer study of the subject of train resistance. In February, 1921, he was transferred to railway engineering department in Schenectady.



H. L. Andrews



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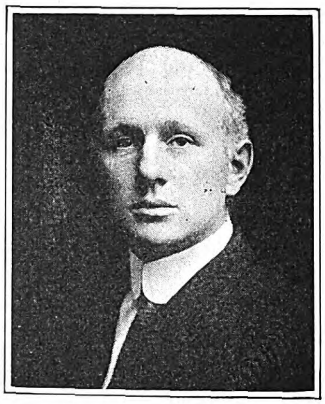
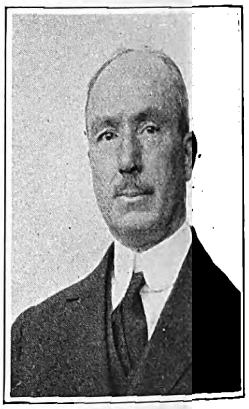


A. H. Armstrong



W. J. Davis, Jr.

New Counsel for New York Board

Denis R. O'Brien has been named by the Board of Transportation of New York City as counsel to succeed William G. Fullen, who resigned in August and was later appointed to head the Transit Commission. Mr. O'Brien has been assistant corporation counsel, in charge of the contract bureau, since 1926. He has aided the Board of Transportation in the past few months in the preparation of city contracts for subway cars, power supply and signal equipment. As head of the contract bureau of the Corporation Counsel's office he has passed upon city construction contracts and handled contract litigation.

Edward F. Kelley, secretary of the Louisville Kiwanis Club and secretary to James P. Barnes, president of the Louisville Railway, Louisville, Ky., has been named chairman of the Secretaries' Conference of International Kiwanis Clubs. It is the first time in the history of the organization that the Kentucky-Tennessee Kiwanis district has received such an appointment. The post requires Mr. Kelley to preside over approximately 1,278 secretaries of Kiwanis Clubs.

Frank S. Peters, connected with the Kansas City Public Service Company, Kansas City, Mo., in various capacities since November, 1919, has become general superintendent of the Kansas City, Merriam & Shawnee Railroad. His first position with the Public Service Company was in the treasury department as a clerk. An experienced transportation man, Mr. Peters was soon transferred to that branch of the service. From the transportation department, Mr. Peters was transferred to the maintenance department and thence to the mechanical department, where he was advanced from a clerkship to the position of assistant to R. S. Neal, assistant superintendent of maintenance.

Sir Thomas White, elected to the board of directors of the Barcelona Traction, Light & Power Company, Ltd., at the annual meeting of shareholders, replaces E. R. Peacock, former president, who has retired from the board due to pressure of other business, brought about by the death of Lord Revelstoke, senior partner.

C. F. Mitchell, vice-president and controller of the Pittsburgh Railways, Pittsburgh, Pa., has been elected a director to fill a vacancy caused by the resignation of A. W. Robertson.

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Walter H. Burke in Power Field in Northwest

Walter H. Burke has been elected president and general manager of the Minnesota Power & Light Company, Duluth, Minn. Mr. Burke went to Duluth three months ago from Houston, Tex., as assistant general manager of the local company. Since 1927 until he came to Duluth, Mr. Burke was Southwest district manager of Stone & Webster, with headquarters at Houston. He had been with the company for sixteen years when he resigned to go to Duluth.

For the first time during all his experience in the utility business Mr. Burke will not be confronted by the solution of transportation problems. This, of course, is merely a coincidence. From such problems he has never shrunk as his record of accomplishment with Stone & Webster, successful Coffin award contestant both in the light and power and the railway fields, indicates.

In addition to his post as president of the Minnesota Power & Light Company it is expected that Mr. Burke will be elected executive vice-president of the Superior Water, Light & Power Company in Wisconsin. Both of these companies are included in the system of the American Power & Light Company, under Electric Bond & Share Company supervision.

Mr. Burke was graduated from the University of Maine in 1906 as an electrical engineer, and after several student courses with large power concerns he joined the Stone & Webster firm, going first to Dallas and thence to Milwaukee. In 1914 he was assigned as assistant to the vice-president of the Stone & Webster at the executive offices in Boston, remaining there until 1923. He then served successively as director of the utility operations in Keokuk, Iowa, Houghton, Mich., and Fort Worth, Tex., after which he was appointed as Southwest manager at Houston, in charge of the properties in several states and Mexico. He was born in Portland, Me., in 1884.

J. H. McGraw Doctor of Commercial Science

The degree of Doctor of Commercial Science was bestowed upon James H. McGraw, chairman of the board of the McGraw-Hill Publishing Company, publisher of the ELECTRIC RAILWAY JOURNAL, by the New York University on June 12. Dr. George Alexander, president of the council of the university, in presenting Mr. McGraw, said:

"James Herbert McGraw, teacher, publisher of many technical periodicals, broad-minded and far-seeing man of business, is presented for the honorary degree of Doctor of Commercial Science."

William H. Nichols, acting chancellor of the university, in conferring the degree upon Mr. McGraw, said:

"Educator transformed into publisher, you have never ceased to be an educator. Your notable career accentuates that tendency in commercial life through which, however private its form, its operations have a public character and become an important element in public education.

"Wherefore, I welcome you to the degree of Doctor of Commercial Science, with all the rights and privileges thereunto appertaining, in evidence whereof you will receive this diploma, and be invested with the insignia appropriate to this degree."

Capt. Mark A. Smith, an engineering specialist in aerial and motor coach transportation, has joined the staff of Ford, Bacon & Davis, Inc. Captain Smith has been identified with the motor coach industry almost from its beginning. He was one of the first to approach the problems of design, production and distribution from the engineering standpoint. He has served as advisory transportation counsel to various state governments and has held many offices and has headed many committees in the Society of Automotive Engineers.

Miss Ella D. Troughton has been appointed assistant treasurer of the New York State Railways. Miss Troughton is only twenty-six years old. She went with the New York State Railways in 1921 from West High School in Rochester where she was an honor student in the business course. In the post of secretary to the secretary and treasurer, her natural ability soon evidenced itself and she was placed in charge of the office force in the secretary's office. Besides being appointed assistant treasurer of the New York State Railways, Miss Troughton has also been appointed assistant treasurer of the United Traction Company and the Schenectady Railway.

R. K. Brown, formerly superintendent and chief engineer, Salt Lake & Utah Railroad, is now superintendent of construction for the Utah Building Commission, recently created by the state legislature.

OBITUARY

Will H. Latta

Will H. Latta, attorney for the Indianapolis Street Railway, Indianapolis, Ind., was killed on June 12, when the auto in which he was driving alone was struck by a southbound Monon train near Carmel at a side road crossing.

Mr. Latta was to have been married on June 17 to Miss Margaret Sander. Fort Wayne, at the Little Church Around the Corner in New York, and had booked passage for a honeymoon trip to Europe on June 19. The Rev. H. C. Stoup, uncle of Miss Sander, and pastor of the church, was to have performed the ceremony.

Mr. Latta had made his home at the Claypool Hotel, Indianapolis, for several years. He was born on a farm near Ligonier. After being graduated from DePauw University, he married Miss Carrie Hunt, Coatesville, a student in the university. Mrs. Latta died in February, 1927. Following his graduation, Mr. Latta taught several years in the university, later entering the law office of Augustus Mason in Indianapolis. About 29 years ago he became associated with the legal staff of the railway. He had served as a member of the board of trustees of DePauw University.

Frederick R. Slater

Frederick R. Slater, vice-president in charge of public relations of the Queens Borough Gas & Electric Company, Far Rockaway, N. Y., died on May 4. At one time Mr. Slater served the Manhattan (Elevated) Railway, New York, as assistant engineer. This was during conversion of the lines from steam to electric operation. Later he became a member of the engineering staff constructing the New York subway and was made principal assistant engineer of the Interborough Rapid Transit Company. For about six years he was with the firm of Latey & Slater, consulting engineers in the design and installation of electric railway equipment. He was born in Washington, D. C., in 1872.

Charles Finigan

Charles Finigan, superintendent of the Westchester Electric Railroad, Mount Vernon and New Rochelle, N. Y., and the Westchester Street Transportation Company, Inc., died recently.

He began his railroad career in 1902 under his father, William Finigan, who was superintendent of the New York City Interurban Railroad, Mount Vernon. Shortly after his father's death, this company was operated by the Union Railway and later by the Westchester Electric Railroad. Mr. Finigan's first work was in the car shops; he also served as foreman in the overhead line department and as operator and starter in the transportation department. He was appointed superintendent of the Westchester Electric Railroad on Dec. 1, 1919, and of the Westchester Street Transportation Company, Inc., on Aug. 29, 1926, when that company became a part of the Third Avenue System.

James P. Boyden

James P. Boyden, since 1905 superintendent of wires for the Boston Elevated Railway, is dead. He entered the employ of the West End Street Railway as a rodman. A short time later he resigned and entered the office of Alixes H. French, civil engineer at Brookline then engaged in engineering work for the town as well as private practice. Subsequently he reentered the employ of the West End Street Railway, later leased to the Boston Elevated. While in the employ of the Elevated, Mr. Boyden has been in direct touch with every foot of underground conduit constructed on the system, and as superintendent of wires was in direct charge of the transmission and distribution system of the company. He was born in Walpole, Mass., 61 years ago. He was educated in the public schools there and at the local high school.

Henry M. Lane

Henry Marcus Lane, at one time head of the Lane & Bodley Company, Cincinnati, lost his life on May 15, in the Cleveland Clinic Hospital disaster. Among the achievements for which Mr. Lane was noted were the design and construction at Cincinnati, in 1885, of the Walnut Hills cable railroad, the first in Ohio, and the Vine Street cable railroad in that city in 1887. He also was noted as a designer of large Corliss engines, used in cable railway installations and in early electric generating stations. He also was consulting engineer for cable railroads in several other cities. Mr. Lane was 75 years old. He was graduated from the Massachusetts Institute of Technology in 1873.

John E. Eustis, a member of the Public Service Commission for the First District of New York, from 1907 to 1914, died on June 22. At the close of the Civil War he resumed his education, being graduated from Wesleyan University in 1874 with the degree of Bachelor of Science. In 1877 he received his law degree from the Dwight Law School, entering the legal profession as a member of the firm of Olin, Rives & Montgomery.

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Industry Market and Trade News

Three Properties Order Standardized Cars

Recognition of the efforts of the car builders to produce standardized units is indicated by orders recently placed by three representative companies with the Osgood-Bradley Car Company, Worcester, Mass., for a total of 27 cars. Five cars will be delivered in August to the Altoona & Logan Valley Electric Railway, Altoona, Pa., while the Scranton Railway, Scranton, Pa., has ordered ten cars, and the Union Street Railway, New Bedford, Mass., has ordered twelve. The new cars, all of which are practically identical in design, differing only in certain minor features of trim and decorative effect, are of a type developed by the car builder's engineers with the view to combining pleasing appearance, balanced proportions, and easy riding qualities with rugged construction, light weight and features that would make for low operating and maintenance costs. A car of this type, built as a sample and distinguished by its designers with the trade name of "electromobile," was shown at the Cleveland convention last year, and was described in detail in ELECTRIC RAILWAY JOURNAL, issue of June 23, 1928.

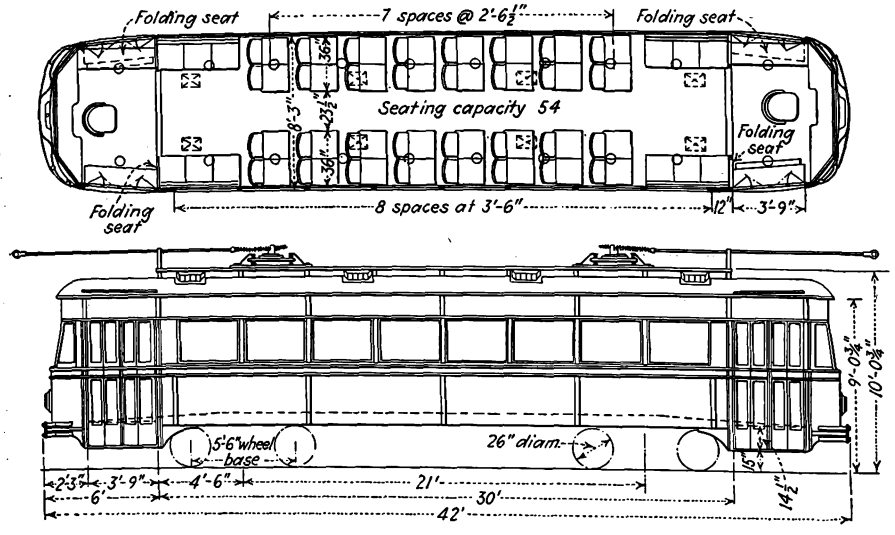
The cars are built for double-end operation but with controls arranged for one-man operation if so desired. In general appearance they follow conventional lines with straight sides, rounded ends, and low-arch roof, but with the motorman's window of the sloping, automotive type. Standard structural shapes have been used in the framing, and, while an effort has been made to keep the weight at a minimum consistent with adequate strength and ruggedness, together with a liberal margin for safety, no attempt has been made to achieve extreme light weight. It is estimated, however, that each car will not exceed 34,000 lb. in weight, completely equipped. Perhaps the most unusual departure from the conventional is the elimination of the customary foundation brake rigging and the use of automotive type of brake diaphragms at each wheel, an arrangement which is expected to produce better equalization, simplified brake rigging, and a reduction in weight. Otherwise the trucks, which are Osgood-Bradley type 45-46, present no unusual features.

All operating apparatus, including controller handle, brake valve handle, reset switch handle, sign box handle, windshield wiper and light switches are within easy reach of the seated operator. Equipment cabinets and switch and control devices are built into the vestibules and concealed, although readily accessible through doors and panels. An arrangement of signal lamps indicates to the operator whether doors are open or shut, and door control is interlocked with motor control, so that the car cannot be started until all doors are closed.

Special attention is given in the new cars to passenger comfort. The floor in the car body is finished with a composition, aisle width is 22 in., and wide vision windows of plate glass are provided, as well as adequate heating and ventilating devices. Sixteen reversible cross seats, eight on each side of the aisle, are of the full upholstered type of composition leather, with deep spring cushions and individual form-fitting backs. Stationary foot rests are provided and grab handles are built into the seat framing next to the aisles. A longitudinal seat is built into each corner, and the capacity can be further increased, so as to provide seats for a total of 54 passengers, by the use of folding seats for three passengers each, which are provided on each side of each vestibule.

Detail specifications of the five cars of this type supplied to the Altoona & Logan Valley Electric Railway are shown in the accompanying table.

Name of Railway	Altoona & Logan Valley Electric Railway
City and state	Altoona, Pa.
Number of units	5
Type of unit	One-man, motor, passenger, city, double-end, double-truck
Number of seats	54
Builder of carbody	Osgood-Bradley Car Company
City and state	Worcester, Mass.
Date of order	March, 1929
Date of delivery	August, 1929
Weight	34,000 lb.
Bolster centers	21 ft.
Length over all	42 ft. 6 in.
Length over body posts	30 ft.
Truck wheelbase	5 ft. 6 in.
Width over all	8 ft.
Height, rail to trolley base	11 ft. 6½ in.
Window post spacing	42 in.
Body	All steel
Roof	Arch
Doors	End
Air brakes	Westinghouse Traction Brake Company
Armature bearings	Plain
Axles	Heat-treated
Car signal system	Faraday
Compressors	D.H.-16
Conduit	Metal
Control	Safety Car Type K75
Destination signs	Hunter 226 RB
Door mechanism	National Pneumatic
Doors	Folding
Finish	Enamel
Floor covering	Duralastic
Gears and pinions	Tool steel
Glass (non-shatterable)	Front
Hand brakes	Peacock staffless
Hand straps	Elcon railing
Heaters	Consolidated Car Heating Company
Headlights	Crouse-Hinds, Golden Glow
Headlining	Agasote
Interior trim	Statuary finish
Journal bearings	Hyatt
Journal boxes	Hyatt
Lamp fixtures	Electric Service Supply
Motors	Westinghouse 510A, outside hung
Painting scheme	Orange, Pratt & Lambert
Roof material	Canvas covered
Safety car devices	St. Louis Safety Devices
Sash fixtures	O. M. Edwards Company
Seats	Heywood-Wakefield
Seat spacing	30½ in.
Seating material	"Cletan" leather
Slack adjusters	Osgood-Bradley
Steps	Stationary
Step treads	Kass
Trolley catchers	Earl
Trolley base	OB, form 4
Trolley wheels	Electric Materials Company
Trucks	Osgood-Bradley 45-46
Ventilators	Garland C-1 Junior
Wheels, steel	26 in. diameter
Wheelguards or fenders	H. B.
Special devices	C. S. spring bumpers



Floor plan and elevation of new car for Altoona & Logan Valley Electric Railway

Track Improvements in Progress

With the reconstruction of approximately 3,000 ft. of double track on Summer Ave. the Springfield Street Railway, Springfield, Mass., has just completed its biggest track job of the year. All-steel ties and 6 in. 100 lb. T-rail were used on this job, the total cost of which was about $43,000.

To meet the demands of a $500,000 roadway program now under way, the Memphis Street Railway, Memphis, Tenn., has purchased one differential motor car and trailer and one differential electric locomotive crane car. This equipment is to be manufactured by the Differential Steel Car Company.

More than 3,700 ft. of double track is being laid on Lincoln Way, Massillon, Ohio, by the Northern Ohio Power & Light Corporation. Specifications call for use of 100 lb. rail in concrete. The cost will exceed $100,000.

The Scranton Railway Company, Scranton, Pa., will expend more than $100,000 in a building and improvement program this year in the city and its suburbs. The work, which is mainly of a maintenance nature, calls for track and pavement reconstruction, new special work and the replacing of considerable 80 lb. rail with 100 lb. rail.

Illinois Terminal Railroad System will install some 20 miles of new 90 lb. rail at various points along its route.

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Canadian Railways Buying Many New Cars

ORDERS for more than 260 new cars have recently been placed by electric railways in Canada, or are likely to be placed in the near future. One hundred and six street cars of the most modern type are being constructed by the Canadian Car & Foundry Company for the Montreal Tramways. The Toronto Transportation Commission has recommended to the board of control the purchase of 55 motor cars and 55 trailers. The Ottawa Car Manufacturing Company, Ltd., is building 21 cars for the Quebec Railway, Light & Power Company, seven for the Regina Municipal Railway, and five for the Saskatoon Municipal Railway, while the British Columbia Electric Railway of Vancouver, B. C., has announced that fifteen cars will be purchased as soon as certain franchise difficulties are adjusted.

Deliveries under the Montreal order are already under way and it is expected that practically all of the cars will be completed by the end of July. A few of the cars under the contract will be the one-man type, in order to provide additional equipment for lines on which cars of this type are now authorized, but the greater part of the order will be of the two-man type such as are now used on the most heavily traveled routes in that city. An unusual feature is the manner in which the new cars are to be heat insulated. Between roofs and ceilings and in wall panels hair felt is employed, while between the two wooden floors thick strips of cork are inserted. In addition to improving the heating facilities, this will lessen vibration and reduce noise. Thermostatic control of heating will be provided, to maintain an even temperature and obviate the possibility of seats becoming overheated.

Details regarding the new Toronto cars are not available at this time as the order has not been placed, but it is estimated that the total cost, including motors, will be about $1,750,000. Of the cars ordered by the Quebec Railway, Light & Power Company, six are of the interurban type of semi-steel construction, weighing complete about 85,000 lb., and fifteen are for city service, being of the single-end, two-man type, seating 35 passengers. The Regina and Saskatoon cars are also for city service, the former being of the one-man, single-end type, while the latter are of the one-man, double-end type. Like the Montreal cars they are to be heat insulated, with construction throughout incorporating many of the latest features making for passenger comfort and easy riding qualities. Details regarding the Regina, Quebec and Saskatoon cars, all of which are being built by the Ottawa Car Manufacturing Company, of Ottawa, Ont., are set forth in the accompanying tables.

SPECIFICATIONS FOR CARS RECENTLY ORDERED BY CANADIAN PROPERTIES

Name of Railway	Regina Municipal Railway	Saskatoon Municipal Railway	Quebec Ry., Lt. & Power Co.	Quebec Ry., Lt. & Power Co.
City and state	Regina, Sask.	Saskatoon, Sask.	Quebec, Que.	Quebec, Que.
Number of units	7	5	15	6
Type of unit	One-man	One-man	Two-man	Two-man
	Motor	Motor	Motor	Motor
	Passenger	Passenger	Passenger	Passenger
	City	City	City	Interurban
	Single-end	Double-end	Single-end	Single-end
	Double-truck	Double-truck	Double-truck	Double-truck
Number of seats	40	41	35	37
Builder of car body	Ottawa Car Manufacturing Co.	Ottawa Car Manufacturing Co.	Ottawa Car Mfg. Co.	Ottawa Car Mfg. Co.
Date of order	Feb. 1929	June, 1929	Feb. 1929	May, 1929
Date of delivery	July, 1929	Nov., 1929	Aug., 1929	Jan., 1930
Weight, car body	17,400	14,365	19,050	45,000
Trucks	10,000	9,895	10,440	18,000
Equipment	6,600	6,240	9,220	22,000
Total	34,000	30,500	38,710	85,000
Bolster centers	17 ft. 7 in.	18 ft.	17 ft. 7 in.	40 ft.
Length over all	41 ft. 2 in.	39 ft. 3 in.	41 ft. 2 in.	65 ft.
Length over body posts	26 ft. 4½ in.	25 ft. 8 in.	26 ft. 4½ in.	53 ft. 1 in.
Truck wheelbase	5 ft. 4 in.	4 ft. 10 in.	5 ft. 4 in.	7 ft.
Width over all	8 ft. 3 in.	7 ft. 9½ in.	7 ft. 11½ in.	10 ft.
Height, rail to trolley base	10 ft. 10½ in.	10 ft. 11⅛ in.	11 ft.	12 ft. 8 in.
Window post spacing	30 in.	30 in.	30 in.	32 in.
Body	Semi-steel	Semi-steel	Semi-steel	Semi-steel
Roof	Arch	Arch	Arch	Arch
Doors	End, folding	End, folding	End, folding	End
Air brakes	General Electric Co.	General Electric Co.	Westghse 10x12 in. types "S"	Westinghouse
Armature bearings	Plain	Plain	Plain	Plain
Axles	Forged steel, 4 in. diameter	A.E.R.E.A standard	A.E.R.E.A standard	Forged steel, 6½ in. dia.
Car signal system	Consolidated	Consolidated Type 233-Y	Consolidated Type 233-D	Consolidated
Compressors	General Electric CP-27-B	General Electric CP-27-B	Westinghouse Type DH-16	Westinghouse
Conduit	Metal	Galvanized steel	Galvanized steel	Metal
Control	K-35 HH with LB-2 handle	K-35	Westinghouse K-35-HH	Westg. 15-B-2 master control.
Couplers				Van Dorn No. 2374 M.C.B.
Curtain fixtures	National Lock Washer	National Lock Washer Co.		National Lock Washer Co.
Curtain material	Pantasote No. 86-K2	Pantasote		Pantasote No. 2577
Destination signs	Ottawa Car Mfg. Co.	Ottawa Car Mfg. Co.	Keystone	Keystone
Door mechanism	National Pneumatic Co.	National Pneumatic Co.	National Pneumatic Co.	
Doors				
Energy saving device	Economy Electric Devices Co.	National Pneumatic Co.	National Pneumatic Co.	
Fare boxes	Cleveland No. 5	Cleveland No. 5	Cleveland No. 5	
Finish	Duco	Duco	Duco	Duco
Floor covering	Wood slats, Kass treads	Wood treads	Wood slats, Kass safety treads	
Gears and pinions	Steel 74:13	Tool steel	Tool steel	Nuttall
Glass	D.S.S. and Protex	D.S.E. and Protex	D.S.A.A. and Protex	D.S.S. and Protex
Hand brakes	Peacock	Peacock staffless	Peacock staffless	Peacock
Hand straps			O.C.M. Co's stand. grabrails	None
Heat insulating material	Plastic cork	¼-in. cork	Cork insulation, ¼-in.	Plastic cork
Heaters	General Electric Co.	Consolidated and Peter Smith	G. E. Calrod, 400 w., 500 v.	General Electric Company
Headlights	Golden Glow R. M.-96	Golden Glow Type R. M. L.-96	Keystone Type DG	Golden Glow
Headlining	Haskelite	Haskelite, 3/16 in.	Haskelite, 3/16 in.	Agasote
Interior trim	Aluminum	3/16 in. Haskelite and birch	Birch	Bronze
Journal bearings	5 cars plain, 2 cars roller, S.K.F.	S.K.F. roller	A.R.A. standard	Plain
Journal boxes	Cast iron		3¾x7-in.	Malleable
Lamp fixtures	Electric Service Supply Co., Dome	Electric Service Supply Co.	Electric Service Supply Co.	Elec. Service Sup. Co., Dome
Motors	Four G.E. 264A, inside hung	Four G.E. 264, inside hung	Four Westghse. 40 hp. in. hg.	Westghse 125 hp., ins'd hung
Painting scheme	Red and cream	Olive green and cream	Red and cream	Maroon
Registers				None
Roof material	Basswood, canvas covered	Haskelite covered with duck	7/16-in. basswood covered with No. 10 duck	Basswood and canvas
Safety car devices	National Pneumatic Co.	National Pneumatic Co.	National Pneumatic Co.	
Sash fixtures	Robert Mitchell Co., Ltd.	Robert Mitchell Co., Ltd.	Robert Mitchell Co., Ltd., brass sash	
Seats	Ottawa Car Mfg. Co.	Hale & Kilburn No. 300	O.C.M. Co. standard	Brass
Seat spacing	30 in.	30 in.	30 in.	O.C.M. Co.
Seating material	Rattan	Rattan	Spanish leather	32 in.
Slack adjusters	General Electric E-1	American Automatic, Form E-1	American Auto., Form E-1	Pantasote No. 707
Steps	Folding	Folding	Folding	Westinghouse
Step treads	Honey-comb anti-slip	Kerlow "Honeycomb"	Kerlow "Honeycomb"	Stationary
Trolley	Ohio Brass Co. No. 8112-1	Ohio Brass Co. No. 13141	Ohio Brass Co. No. 13119	Kass
Trolley base	Ohio Brass Co. No. 4	U. S. 20-A		Ohio Brass Co.
Trolley wheels	Kalamazoo 4½ in.	Ohio Brass Co.	Ohio Brass Co. No. 15238-15239	U. S. 20-A
Trucks	Canadian Car & Foundry Co.	National Steel Car Corp.	Canadian Car & Fdry. Co.	Ohio Brass Co.
Ventilators	Nichols-Lintern	Nichols-Lintern 6x8-in.	Nichols-Lintern 6x8-in.	Baldwin Locomotive Works
Wheels, type	Carnegie rolled steel, 26 in.	Rolled steel, 26-in. diameter	Rolled steel, 27-in. diameter	Nichols-Lintern
Wheelguards or fenders	Ottawa Car Mfg. Co.	Ottawa Car Mfg. Co. life guard	Ottawa Car Mfg. Co. life g'rd	U. S. Steel r'ld steel, 33-in. dia

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Electric Railways Add to Bus Fleets

Electric railway properties in various sections of the country continued to add to their bus fleets during the month, the majority of buses purchased being of the large capacity type and for city service. The Boston Elevated Railway has ordered nine 40-passenger buses from the Twin Coach Corporation, of which several have been delivered within the past week. When deliveries are completed the company will have 35 Twin Coaches in service, in addition to a number of other large capacity buses of the Versare and ACF types. All of the recent order are of the straight mechanical type.

Twenty-nine buses each with a seating capacity of 40 passengers have been purchased within the last thirty days by the Northern Ohio Power & Light Company, Akron, Ohio, from the Twin Coach Corporation. Twenty-five of the new buses, including six of the express type, will go into service on the Akron city lines, two express type buses will be placed in service between Dover and New Philadelphia to take the place of the local car service formerly operated between these cities, but which was recently discontinued, and two express buses will be kept in reserve. The cost of the new coaches exceeds $300,000, and when the order is completed the company will have 82 of these 40-passenger buses in operation, in addition to over 200 buses of other types and lesser capacity.

Twin Coach Corporation has delivered three buses of the parlor car type to the Southern Pacific Motor Transport Company for service out of Portland, Ore., four urban type buses to the Los Angeles Motor Coach Company, two urban type buses to the Tennessee Electric Power Company, at Chattanooga, and four of the urban type to the Detroit Motor Bus Company. The Detroit Company now has 24 buses of this type in its fleet.

The Wisconsin Power & Light Company, Janesville, Wis., has purchased seven 23-passenger Yellow Coaches for service on the Janesville city lines. The buses cost about $6,000 apiece.

The Pacific Northwest Traction Company, Seattle, Wash., has purchased two White buses of the 30-passenger type and four ACF buses of slightly larger capacity, all for intercity service. The body design of the new buses incorporates the raised observation compartment in an improved form, a feature originated on this property.

During the later part of May the first of the new super-service buses being built by the Public Service Co-ordinated Transport was turned out of the Newark shops. The new type of bus accommodates 32 passengers in seats of green leather with arm rests and extra high backs and headrest. Other equipment includes balloon tires, specially designed springs with an extra long wheelbase, and a heating and ventilating system of the blower type controlled from the instrument panel. Ninety-four bodies of this type will be constructed in the Newark shops for mounting on chassis supplied by the General Motors Truck Corporation. The buses will be used for long hauls in interstate and suburban service.

Citizens Transit Company, a subsidiary of Citizens' Traction Company, Oil City, Pa., has taken delivery of one ACF urban type coach.

The Southern Michigan Transportation Company, controlled by the Michigan Electric Railway, Jackson, Mich., has purchased five metropolitan type coaches and three parlor coaches from the ACF Motors Company.

Logan Valley Bus Company, subsidiary of the Altoona & Logan Valley Electric Railway, has received one ACF 23-passenger urban coach.

The Fonda, Johnstown and Gloversville Railroad, of Gloversville, N. Y., has accepted delivery of four Mack model AB four cylinder 25-passenger city type buses.

The Connecticut Company, New Haven, Conn., has accepted delivery of two Mack model AB 29-passenger city type buses.

The Denver Tramway Company, Denver, Col., has received two White model 54 six cylinder buses and one model 53 bus.

The Alabama Power Company has purchased a White Model 50B bus for service in Birmingham, Ala.

Eight 21-passenger Fitzjohn pay-enter grand coach bodies mounted on Reo GB 179 in. wheelbase chassis have been delivered to the Montreal Tramways, Montreal, Can.

Wheelguards to Replace Fenders on Seattle Cars

George B. Avery, superintendent of public utilities, Seattle, Wash., has obtained approval of the Board of Public Works for a plan to replace the present street car fenders with wheelguards. Six feet of space will be saved on every two cars in the crowded downtown business district at the peak of the day's rush hour, according to Mr. Avery.

Laconia Car Company, Laconia, N. H., through its directors, has decided to close the company's car building department and liquidate the assets incident to that part of its business. The closing of this department brings to an end a New England industry that has been in business for nearly 100 years.

American-LaFrance & Foamite Corporation, Utica, N. Y., has installed the fire fighting apparatus in the new municipal auditorium at Atlantic City.

Peter Smith Heater & Manufacturing Company, Detroit, Mich., has changed its name to Peter Smith Stamping Company, with the heating branch of the business operated under the name of Peter Smith Heater Company, a separate corporation.

General Electric Company, Schenectady, N. Y., has published bulletin GEA-991 descriptive of insulating material for railway and industrial-haulage apparatus.

Wagner Electric Corporation, St. Louis, Mo., has issued bulletin No. 162 on Wagner transformer oil, containing complete specifications as prepared for their own organization, but recently released for transformer buyers and users. The bulletin discusses the purposes of transformer oil, its properties, methods of testing, and precautions to take when handling and storing.

Perey Manufacturing Company, Inc., 101 Park Avenue, New York, has issued a folder describing the value of Perey turnstiles in preventing pilfering and "gate crashing" and in toning up the morale of an operating organization through removing the temptation to defraud.

International Steel Tie Company, Cleveland, Ohio, has published in pamphlet form the results of the recent Nielsen survey covering the use of steel twin ties on the property of the Kansas City Public Service Company.

Westinghouse Electric & Manufacturing Company has released circular No. 1834 entitled "Synchronous Visual Supervisory Control," describing the present types of Westinghouse supervisory control units, giving their application, advantages, and system of operation. The circular is illustrated with typical control equipment.

ELECTRIC RAILWAY MATERIAL PRICES—JUNE 29, 1929

Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.
Lead, cents per lb.	7.00
Nickel, cents per lb., ingot	35.
Zinc, cents per lb.	6.725
Tin, Straits, cents per lb.	44.583
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	45.00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.10
Somerset mine run, f.o.b. mines, net tons	1.80
Pittsburgh mine run, Pittsburgh, net tons	1.70
Franklin, Ill., screenings, Chicago	1.70
Central, Ill., screenings, Chicago	1.35
Kansas crushed mine run, Kansas City	2.25

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, 5/16 in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.95
Ties, white oak, Chicago, 6 in.x8 in.x8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.70
Sheet iron (24 gage), cents per lb.	2.90
Sheet iron, galvanized (24 gage), cents per lb.	3.65
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	3.15

Waste—New York

Waste, wool, cents per lb.	13.
Waste, cotton (100 lb. bale), cents per lb.:	
White	12.5
Colored	9.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	11.1
White lead in oil (100 lb. keg), cents per lb.	13.2
Turpentine (bbl. lots), per gal.	$0.56
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.85
Weatherproof wire base, cents per lb.	20.875

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	$2.78
Paving brick 3½x8½x4, N. Y., per 1,000 in. carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.25
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, ¾-in., cu.yd., delivered	3.25
Sand, cu.yd., delivered	2.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	13.75
Light copper, cents per lb.	12.00
Heavy yellow brass, cents per lb.	8.25
Zinc, old scrap, cents per lb.	3.25
Lead, cents per lb. (heavy)	5.00
Steel car axles, Chicago, net ton	$16.75
Cast iron car wheels, Chicago, gross ton	14.75
Rails (short), Chicago, gross ton	18.75
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.75

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

CHARLES GORDON, *Editor*

Volume 73 New York, August, 1929 *Number 17*

Reviving the Will to Win

WHEN the will to win permeates an organization from top to bottom, victory is already half won. This truth has been recognized by military leaders from the time of Alexander the Great on down to the days of Pershing and Foch. Examples are not lacking to show that this axiom applies with equal force in the affairs of every day life.

A few years ago the spectacular achievements of electrical engineering were attracting much attention and many opportunities for improvement in the design of steam locomotives were being overlooked. Because of the wonderful progress of electricity, the morale of the mechanical engineers was relatively low. They were disheartened but they were not beaten. With grim determination they pushed the design of superheaters, automatic stokers, boosters and other devices that greatly increased the efficiency of the steam locomotive. Today steam and electricity are competing on a new basis. Continued progress will be made in electrification, but the day has apparently not arrived when the steam locomotive will be generally superseded by electricity on our trunk line railroads. Had not the steam locomotive designer challenged the advent of electricity with improvements previously undreamed of, the iron horse of the poets would today be definitely on the way out. It is greatly to the credit of these designers that the challenge of competition found them just starting to fight.

A close parallel to this can be found in the local transportation industry. Widespread public attention has been attracted by the spectacular development of the bus, while the street car has come to be regarded as a back number. Although bus service has actually replaced car service on only a very small part of the track mileage of the country, the contrast in appearance between old run-down cars and new up-to-date buses has created the impression that the day of the electric railway is passing. The attitude of the public has been contagious and many electric railway men themselves became discouraged—to say nothing of the builders of cars. Apparently sight was lost of the fact that attractive modern vehicles, comfortable, speedy and quiet can be built to run upon rails as well as upon rubber tires.

Of course, this is easier said than done. Difficulties are real and numerous in the way of improving the performance of street cars to the extent to which they must be improved if they are to survive. But these difficulties are not insurmountable. Evidence of a reviving confidence in the future of the electric railway is quite apparent. So also is the evidence that the field for the motor bus is far broader than that anticipated for it during its early days, and that replacement of unprofitable rail mileage is a secondary rather than a primary field for the automotive vehicle. When the problems facing the industry are attacked in a spirit of confidence, apparent difficulties may be expected to give way before courage and determination. Here again, the will to win is half the battle.

Legislation Needed to Check Cut-Rate Taxicabs

THOUGH taxicabs offer a type of transportation service closely approximating that of a private automobile, the extensive promotion of flat and cut-rate taxicab operations in the past two years has lowered the standard of this industry, much to the regret of the legitimate cab companies, which are striving to maintain this vehicle in its proper place. Wherever cut-rate taxis have started up, price wars have followed, resulting in some instances in an increased volume of taxi riding but with losses to all established transportation agencies giving local service. The experiences have proved that semi-private vehicles cannot be operated permanently at rates of fare comparable to those charged by mass transportation vehicles, and that the whole set-up is economically unsound. But in spite of the many failures under cut rates and the agitation against this kind of operation these operators have continued to expand until at the present time they exist in approximately sixteen large cities and 122 smaller cities throughout the country.

Legitimate taxicab companies have been the principal sufferers from this evil, but the electric railways also have been affected, in some cases rather seriously. In line with their objective of carrying a large number of riders at a small fare the cut-rate cabs have really turned "jitney," paralleling the street car lines and picking up their passengers. The cab rates in some cities actually are lower, when four people ride, than are those of the street car. Naturally the cut-rate cabs collect much revenue that properly belongs to the railways.

It is the opinion of H. A. Innes-Brown, editor of *Taxi Weekly,* who spoke on this subject at the recent C.E.R.A. meeting and whose paper is abstracted elsewhere in this issue, that the only solution to the problem is to secure protective legislation. Moreover, to be really protective this legislation should be sought by the street car companies as well as the legitimate taxicab companies. Local council ordinances ruled out the jitneys in most cities but only after the jitneys had seriously harmed the railways. Similar legislation, as suggested by Mr. Brown, is just as necessary at the present time to check this second jitney peril.

It is always unfortunate when transportation agencies leave their own proper field in search of business that really does not belong to them. The net result usually is a lowering of their standard of service and a reduction in revenue for the other agencies with no increase in their own net income. Cities in which cut-rate cab companies are now operating will suffer from impaired service

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from both the legitimate taxicab companies and the electric railways in the long run if they do not take steps to end this disastrous attempt to sell transportation for less than it costs.

Complete Analysis Proves Value of Equipment Replacement

PERHAPS the most complete record ever compiled of the results obtainable through the replacement of obsolete, heavy rolling stock by light equipment of more modern design, is published elsewhere in this issue in an article by F. W. Bacon, vice-president International Utilities Company. The results are of particular interest and significance because they represent a complete historical record giving a comparison of income and expense for old and new equipment on a combined interurban and city system, on which a complete replacement of all existing rolling stock was made.

Nor are these the only considerations that commend these tabulations to the earnest attention of the entire industry. Second only in importance to the completeness of the record, is the fact that this whole analysis deals with exactly the type of property that has been the subject of the most serious question in discussions regarding the future of electric railway operations. The city lines of the Kentucky Traction & Terminal Company are located in a community which even in the "booster" figures of the Chamber of Commerce is credited with a population of only 60,000. The interurban lines are of the type which radiate from this comparatively small city, into surrounding rural territory.

Moreover, the economies usually available in a change from two-man to one-man operation do not enter into the results on this small city property, for the change to one-man operation had been made a number of years before new equipment was purchased, and all figures, both for the five-year period with old equipment and for the five years with the new cars, are based upon one-man operation. Finally, it is worthy of special note that the old cars which were replaced were not the heavy double-truck units so commonly in use, but were single-truck cars weighing only 26,350 lb. In the light of these significant facts, therefore, Mr. Bacon's article seems to justify careful study by every operating executive who is giving attention to the possibility of equipment improvements.

Earning Power as a Basis of Security

SIGHT should not be lost of the nice financial point made in the decision rendered recently by Supreme Court Justice Rodenbach, in which he authorized the New York State Railways to abandon the Rochester and Sodus Bay line and parts of lines in Syracuse, Utica and Sherrill. The question involved was the substitution of property under the terms of a mortgage given to secure an issue of bonds. For the bondholders, the Security Trust Company of Rochester questioned the right of the railway to discontinue the lines. It wanted to be sure that the letter of the mortgage under which it acted in behalf of the bondholders would be met under the changes proposed.

The mortgage agreement did not directly mention abandonment of any part of the system, but Justice Rodenbach pointed out that there could be no question that discontinuance of useless and unprofitable lines was to be expected. In his opinion, the use of the property would be clogged to an unnecessary extent by forcing maintenance of the lines it was intended to abandon. In this particular case he felt the bondholders were safeguarded since the public authorities had recognized the changed conditions and had readjusted fares to meet the change.

Even more important than that was the opinion of the court to the effect that holders of bonds secured by mortgage on physical property were required to co-operate in the readjustment to the new conditions. This was not intended as a rebuke to the trustee. It was the kind of an expression of opinion the trustees desired, restricted as they had been under the terms of the indenture securing the bonds. Of course, there will be salvage from the sale of the abandoned railway lines. From this source officials of the New York State Railways hope to realize $70,000, and they have signified their willingness to turn this amount over to the trustees, together with stock in seven allied bus lines which the railway will control.

As pointed out briefly in ELECTRIC RAILWAY JOURNAL NEWS for June 22, this case serves to emphasize again the fact that it is not so much the actual property back of their bonds to which the bondholders may look, but rather to the earning capacity of that property. It was an interesting issue upon which the court passed—interesting from both the practical and the academic points of view.

Developing Men as Well as Machinery

MEN and machinery! These two things terseiy sum up the whole of the transportation industry and of its problems as well. What thought and effort have been devoted to the machinery! What fortunes have been spent on research and improvement, more research and more improvement! Today street cars run almost unbelievable distances without a failure, dwarfing the records of the much-advertised endurance fliers and commercial automobiles. Substations run automatically, almost without the touch of a human hand. Track has been improved time after time and become better and better, as the result of the expenditure of millions of dollars in research.

But human research has lagged. Employees have offered themselves, or the personnel department has gone outside the gates and hired them, never expecting to find the perfect man to match the perfect machine. In a measure this is right, for of course the perfect man does not exist. But after the man is hired, even if he is the best we can get, he is also as good as he can be made?

In isolated spots careful selection of employees along the well-established principles of psychology has brought a better grade of men, better suited to take up transportation work. Nearly all companies have realized the necessity of a brief period of training to adjust the raw material to the new and unfamiliar tasks. But almost always the training has stopped at this point and has failed to carry on educational and developmental work to broaden the employee, intensify his interest in his job, and fit him into the scheme of the industry so rationally that he knows he is part and parcel of it. Many have followed the maxim: "To educate a nigger is to spoil a good mule driver," and that to initiate a motorman or conductor into the problems of the company he works for is to unsettle him, make him dissatisfied and make him feel too good for his job.

Not all men react alike to education and training.

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But with proper selection at the time of hiring, no fear need be entertained as to the effect of future instruction and education. The employees need to know the business because they are the salesmen of the service. So far as 99 per cent of the customers are concerned, these men are the only representatives that they ever know or even see. Like it or not, they discuss the affairs of the company together. Why not have them well informed, accurately informed, painstakingly informed, so that they may present our business to our customers as we would do it ourselves were we to meet them?

After all, the success of this industry is particularly dependent on the performance of its men. One side supplies the capital or the management, or perhaps both; the other makes the direct contact with the public. One side supplies the machinery and the vision; the other gives the man power without which they would be useless. Men and machinery. Machinery and men. And the one must be developed as well as the other.

Drivers of Hard Bargains May Suffer Most

IT SEEMS incredible that ideas should persist in the matter of franchise grants that have been unsound for more than a quarter of a century. But such ideas do persist among the representatives of the public chosen to office. This is particularly true in cities of moderate size, in several of which grants are now under negotiation. It is not so much the radical who would drive a hard bargain, but rather the small business man, the very man who ought to know better.

Instead of looking at the situation as a business proposition, deciding the amount and character of service best designed to meet the requirements of the community and then making terms that will enable the company to give that service, the process too often is reversed. There is little in the proceedings of the modern business concept that both parties should gain from a contract. The principle that there is a mutuality of interest between the negotiators in a franchise hearing, rather than the idea of barter and trade, needs constant reiteration. There is no such thing as a low franchise bid. The trials and tribulations of the past with railway receiverships prove that no organization can continue indefinitely to render service at a loss. Service tends unmistakably to seek the level of the liberality or lack of liberality of the franchise itself.

Change Needed in Concept of Utility Regulation

RECENT developments in the power industry have focused public attention to an unusual extent upon the subject of utility regulation. Much of the discussion which has been heard sounds like an echo from the dark ages, when the object of regulation was restrictive and punitive, rather than constructive. Many of the self-appointed guardians of the public welfare seem to feel that because private interests are making attractive profit the public is being gouged. Henry Ford, in a recent interview in the *Electrical World,* disputes that assumption. He insists upon the modern conception of business fair dealing, that the reward for initiative and enterprise is a secondary consideration, provided that both parties profit from the transaction.

With the local transportation industry, the problem is different but not less important. Power is a vital and necessary service, but so also is transportation. Although the public has much at stake, its attention is more difficult to attract because the problem is one of relieving the industry in difficulty in contrast with that of controlling one which is expanding rapidly. Nevertheless it is apparent that the public is the greatest sufferer through the inability of community transportation facilities—under the conditions imposed—to keep pace with growing community requirements.

Proceedings before regulatory commissions with respect to local transportation are limited largely to the age-old ground of valuation, and the right to earn a fair return. But in many instances the primary question is not one of right to earn but of ability to earn. Local transportation encounters today a new factor which demands a radical change in the whole concept of regulation. That is competition. And it is obvious that any business is hopelessly handicapped in meeting competition unless it is permitted that necessary flexibility with respect to rates which is essential in meeting the inroads of unregulated competitors. In any such vital facility as community transportation, the public interest lies in regularity, reliability, safety and character of service. The public interest also demands that the facilities available be permitted to keep pace with growing community requirements. Without a sound financial basis, no enterprise can accomplish these objectives. It seems high time, therefore, that while the public is considering the deficiencies of present regulatory policy, the need for a changed concept to permit greater flexibility in the management of local transportation be given the attention which its importance warrants.

More Speed for the Locals

FEATURED in advertising, manned by selected employees, and favored by the dispatcher, the interurban limiteds are the pride of the road. So that they can get through in the fastest possible time, work trains, freight trains, and passenger locals must give way and take to the sidings. The cars used on the limited runs often have been specially designed for this purpose. They are provided with easy riding trucks, powerful motors, wide windows, upholstered seats and other refinements directed toward passenger comfort and convenience. All of which is as it should be and in line with present-day tendencies. This kind of service has done much to uphold the prestige of the interurbans and to offset the inroads of automobile and bus competition.

But would it not be well also to give attention to the matter of speeding up the local trains and bringing these cars up to the standard that is provided for the limiteds? Those who ride the locals constitute a numerous element of the patronage at all seasons of the year. As a class they are people of influence in their respective communities whose good will it is desirable to cultivate. Most assuredly they would react favorably to improved service either in the way of greater comfort or greater speed. While it may not be possible to provide parlor cars, it will nearly always be possible to speed up a local schedule. By speeding a little here and cutting a siding there; by taking advantage of every possible opportunity to gain a moment's time—in the main by clear-cut instructions to the motormen to "hit the ball," and by tightening up the schedule accordingly, the trains can be sent over the road in faster time, and the passengers impressed by the fact that they are receiving the faster service for which there is so general a demand.

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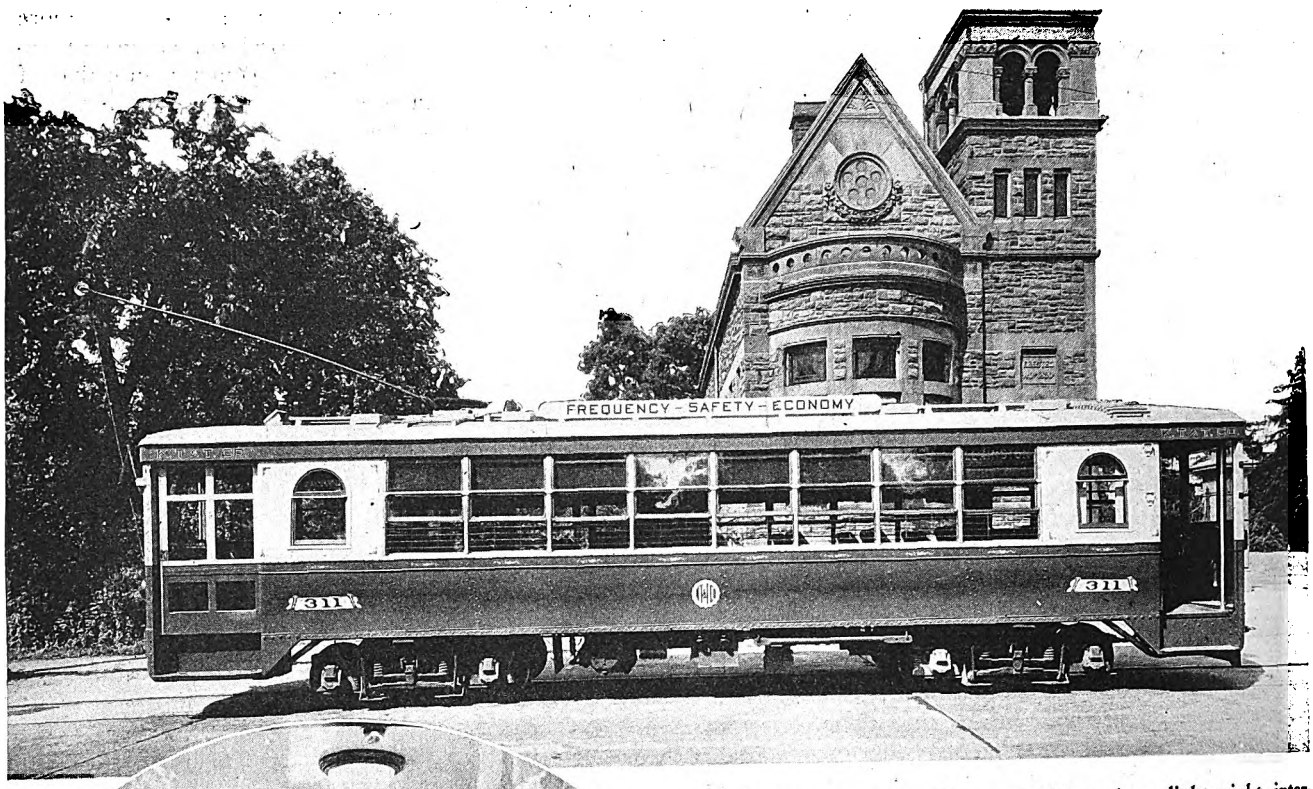
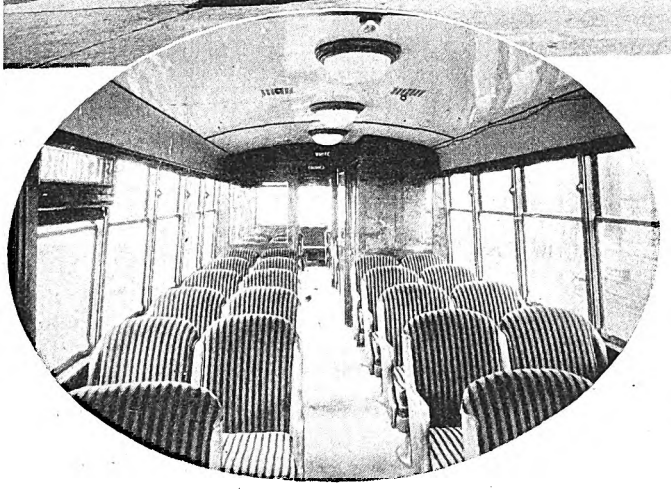


Despite severe automobile competition these lightweight interurban cars of the Kentucky Traction & Terminal Company paid for themselves in three years



Passenger comfort combined with attractive simplicity feature the interior of the lightweight one-man operated interurban

Complete Car

New cars on 70-mile interurban in rural territory return investment in three years and in five years on 17-mile city property in community of 60,000. Detailed summary of operating results over ten-year period presents unusually complete analysis of new car economics

By

F. W. BACON

Vice-President International Utilities Company

DURING a continuous period of eighteen years, the Kentucky Traction & Terminal Company, which I represent, has owned and controlled the public utility properties comprising power and light, local transportation and ice, serving exclusively the city of Lexington, Ky., and surrounding territory. Consequently, we have had a very major interest in the development of the city and its immediately tributary territory. The transportation property comprises some 70 miles of interurban system (divided into four lines radiating out from Lexington) and 17 miles of city trackage. Prior to 1922 there was in operation on the interurban a standard type of car weighing approximately 35 to 40 tons, of the design in common use at that time, and operated with two men. In the city the cars were a common type of single-truck equipment. They weighed 13½ tons and had been operated with one man for a number of years before they were replaced.

On a property of this size, facing the rapid growth in automobile competition, it was obvious that the possibilities for the development of transportation business were limited. The maximum length of ride on the city lines is not more than 1 mile, and under these conditions the effect of direct automobile competition and, in addition, their tendency to pick up passengers waiting for street cars, is particularly severe. Nevertheless, this company was faced with its responsibility for maintaining efficient, modern, comfortable and attractive transportation service in the community whose good will it has continued to enjoy for many years and with whose destiny its other utility properties, as well as its transportation system, are intimately associated. Here, then, was a problem of keeping faith with the community and at the same time keeping operating costs and fixed charges on the transportation

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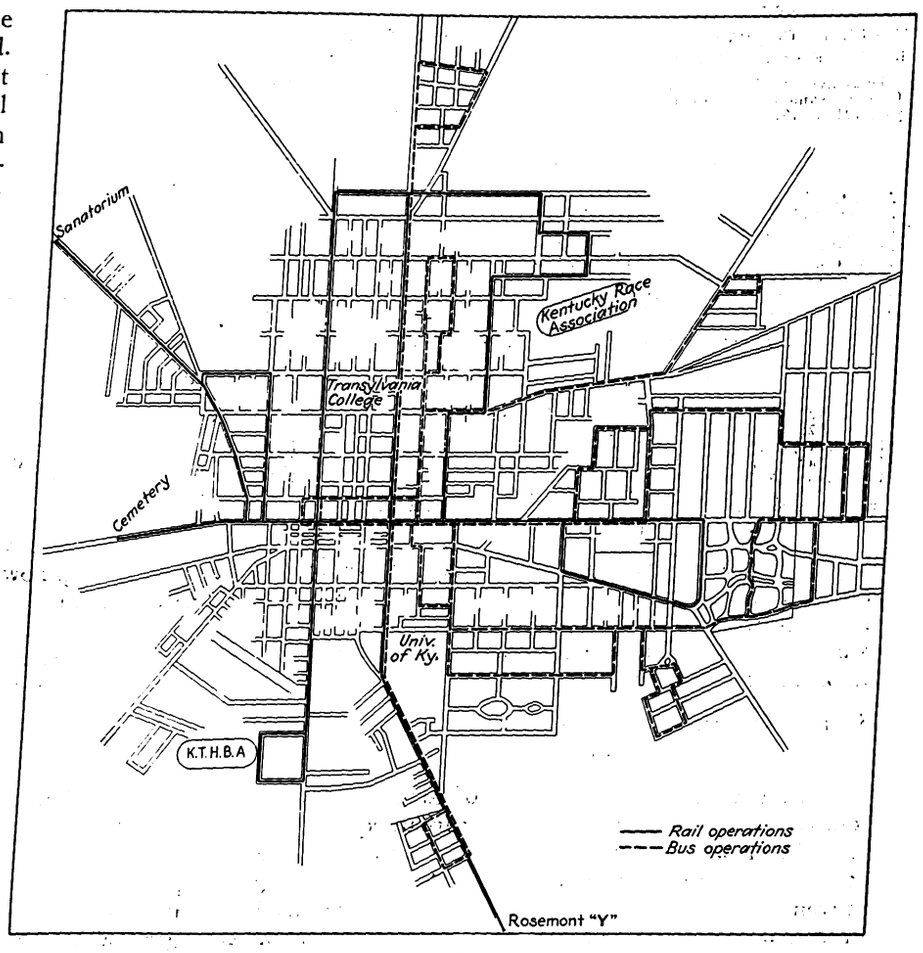
lines within the limits of the volume of business that could be expected.

We were convinced that frequent and convenient headway is essential in any transportation service which may be expected to win a fair response from the public. We recognized, likewise, that with the old equipment available, it was impossible to provide the character of transportation service which we felt the public had a right to expect; or to hold operating costs at a point which would permit the property to continue to maintain reliable transportation service in the community. Consequently, we decided to replace all of the existing equipment on the entire property—both interurban and city lines. The replacement was made on the interurban in 1922. The cars selected were of a light-weight double-truck type to be operated by one man. Twelve of these were purchased, and all of the old equipment was either sold or scrapped. In the following year the cars on the city lines were all replaced with 27



Although the maximum length of ride in Lexington is only 1 mile, new lightweight cars have produced a substantial increase in patronage and revenue and have returned their cost in five years despite jitney and bus competition. Buses of the Kentucky Coach Company now carry more than 1,800,000 passengers per year. The buses parallel two important rail lines

Replacement in Lexington

Returns Investment in Five Years

light-weight, single-truck one-man cars of a special design, in which careful attention was given to features of passenger comfort and attractiveness. The total investment was $306,999.

Since this property now furnishes a rather complete example of an entire replacement of equipment on both an interurban system and a small city operation, for which results are available over a sufficient period of time to afford a fair basis for drawing conclusions, it should be of interest to the industry to set up a comparison of operating results over a period of years before and after the acquisition of the new equipment, so far as it is possible to set up such a comparison and to attach significance to the figures. Obviously, the question of greatest interest is whether or not the investment in new equipment was justified. We are quite convinced that it was. In fact, if we had attempted to continue operation of the interurban lines with the old equipment, this part of the property would have long since been abandoned. Had that been made necessary, the million passengers now handled annually by these lines would have been forced to use other forms of transportation at a probable increased cost of transportation service. We feel that had this become necessary it would have been against the general interests of Lexington and its surrounding territory, in which, as the operators of power and ice utilities, we have a considerable stake. On the

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TABLE I— COMPARATIVE CHECK ON ALL FOUR INTERURBAN LINES OF AUTOMOBILE AND BUS OPERATION DAILY AVERAGE

Daily average of automobiles, buses and passengers as shown by check of five (5) days, same hours, same men making the check and at the same points each year 1912 to 1928.

	Automobiles	Per Cent Increase	Passengers	Per Cent Inc. or Dec.	Average Passengers per Automobile	Licenses Issued Lexington
August, 1912....	291	....	935	....	3.21	.....
August, 1921....	2,321	697.5	5,614	500.4	2.41	4,717
June, 1924.....	2,817	21.3	6,125	9.1	2.17	9,485
May, 1925.....	3,841	36.3	8,698	42.0	2.26	10,577
May, 1926.....	3,847	0.1	7,960	*8.4*	2.07	11,534
September, 1926	4,519	17.4	10,476	31.6	2.31	.....
September, 1927	5,464	20.9	12,596	20.2	2.30	12,350
September, 1928	5,649	3.3	12,477	*0.9*	2.20	13,472

BUSES AND BUS PASSENGERS DAILY AVERAGE, ALL DIVISIONS

	Buses	Per Cent Inc. or Dec.	Passengers	Per Cent Inc. or Dec.	Average Passengers Per Bus
May, 1925.....	61	....	432	....	7.1
May, 1926.....	78	27.8	621	43.7	9.7
September, 1926....	80	2.5	610	*1.7*	7.6
September, 1927....	79	*1.2*	658	7.8	8.3
September, 1928....	78	*1.2*	655	*1.4*	8.3

city lines the results have been such that we feel that the service has been put upon a basis on which it can be perpetuated for the community, despite the limited earning power of a street railway system in a city of approximately 60,000 population.

CAR INVESTMENT LIQUIDATED ON BOTH INTERURBAN AND CITY LINES

On the most conservative basis of comparison with the old cars, the investment in the interurban equipment was liquidated within three years. This has been accomplished despite an average annual reduction in gross revenue of approximately 5 per cent. On the city lines the new car investment was liquidated within approximately a five-year period. I want to make it quite clear that the transportation property of this company as a whole is not a money-making enterprise even in its present form. It is with considerable difficulty that we are able to make the property self-sustaining, due to its limited scope of operations. When you look at our earning statement today, including intercompany charges and depreciation, etc., a casual observation would lead to the conclusion that it is a decided liability. This, however, is not the case; efficient and economical transportation service is a necessity to this community, vital to its development and welfare, and although the railway does not contribute directly to the earning power of the combined operations after paying its interest and its proportion of the general overhead we regard the transportation system as a real asset to the combined properties. While the investment in new cars has not contributed any collectible return, it has, through putting the property on a self-sustaining basis and through its general effect upon the public's attitude, contributed in a very real way to the interests of the company.

Taking up now the specific analysis of the effect of the new equipment on the interurban lines, the immediate effect of comfortable light-weight cars and improved service increased the gross revenue during the first year following the replacement. A competing bus service, however (since acquired by this company), and steady, increased use of private motor vehicles, has had the effect of causing a decrease in gross averaging about 5 per cent a year. Therefore, it is of particular interest to note that on the interurban lines the liquidation of the investment in new cars over a period of three years has been accomplished entirely through operating economies, and the investment has proved to have been justified despite a gradual loss in gross business.

To give a fair idea of the extent of the competition

TABLE II—INTERURBAN DIVISION INCOME STATEMENT THREE YEARS NEW CAR OPERATION VERSUS THREE YEARS OLD CAR OPERATION

	Total Three Years Actual New Car Operation July 1, 1922, to June 30, 1925			Total Three Years Actual Old Car Operation July 1, 1919, to June 30, 1922			Increase or Decrease, New Operation Over Old Operation			Assuming Old Equipment Had Been Continued in Service 1922-1925 at Former Cost per Car-Mile			
	Amount	Per Cent of Gross Earnings	Per Car-Mile in Cents	Amount	Per Cent of Gross Earnings	Per Car-Mile in Cents	Amount	Per Cent	Per Car-Mile in Cents	Amount	Cost per Car-Mile	Increase or Decrease Over New Car Operation	Per Cent
Passenger revenue.....	$907,888.38	100.0	0.350	$978,087.79	100.0	0.507	*$70,199.41*	*7.2*	*0.157*	$907,888.38	0.350	.....	.....
Operating expenses:													
Ways and structures.....	174,334.58	19.2	.067	159,689.33	16.4	.083	14,645.25	9.2	*.016*	215,305.40	.083	$40,970.82	19.7
Equipment.....	43,372.09	4.8	.017	55,236.35	5.6	.029	*11,864.26*	*21.5*	*.012*	75,227.19	.029	31,855.10	42.3
Power.....	128,704.60	14.2	.050	160,581.64	16.4	.083	*31,877.04*	*19.8*	*.033*	215,305.40	.083	86,600.80	40.2
Conducting transporation..	188,670.03	20.7	.072	176,048.61	18.0	.091	12,621.42	7.2	*.019*	236,057.73	.091	47,387.70	20.1
Traffic.....	9,197.37	1.0	.003	4,735.72	.5	.002	4,461.65	94.2	.001	5,188.08	.002	*4,009.29*	*77.2*
General and miscellaneous.	76,896.60	8.5	.030	90,843.30	9.3	.047	*13,946.70*	*15.4*	*.017*	*76,896.60	.030	.....	....
Total operating expenses	$621,175.27	68.4	.239	$647,134.95	66.2	.335	*$25,959.68*	*4.0*	*.096*	$823,980.40	.318	$202,805.13	24.6
Net operating revenue.....	286,713.11	31.6	.111	330,952.84	33.8	.172	*44,239.73*	*13.4*	*.061*	83,907.98	.032	*202,805.13*	*241.7*
Taxes—local.....	61,751.00	6.8	.024	54,175.89	5.5	.028	7,575.11	14.0	.004	54,175.89	.021	*7,575.11*	*13.9*
Gross income.....	$224,962.11	24.8	.087	$276,776.95	28.3	.144	*$51,814.84*	*18.7*	*.057*	$29,732.09	.011	*$195,230.02*	*656.6*
Interest charges on new equipment at 7½ per cent	28,734.63	3.2	.011	.....	.....	.....	28,734.63	100.0	.011	.....	.....	*28,734.63*	*100.0*
Gross income after interest charges on new equipment	$196,227.48	21.6	.076	$276,776.95	28.3	.144	*$80,549.47*	*29.1*	*.068*	$29,732.09	.011	*$166,495.39*	*559.9*
*Car-miles basis not used.													
Cost of cars.....	$127,709.52			.....			.....	....					
Passengers, car-miles.....	2,594,041			1,929,377			664,664	34.4					
Revenue passengers carried	3,696,772			3,657,852			38,920	1.1					
Revenue per passenger in cents.....		24.5			26.7		*2.2*	*8.2*					
Number of track-miles.....		67.67			67.67		....	.....					
Average yearly savings account of new equipment.....												$55,498.46	
Average yearly return on investment before interest charges.....													50.9%
Average yearly return on investment after interest charges.....													43.5%

Twelve new interurban cars were installed during the period from Feb. 8, 1922, to March 5, 1922.
Change from two to one man operation of cars was made between Feb. 11 and 24, 1922.
Weight of old interurban cars 75,600 lb.
Weight of new interurban cars 25,100 lb.
Fares: Effective June 10, 1918, cash rate increased from 2½ cents to 3 cents per mile. and mileage rate increased from 2 cents to 3 cents per mile.
Effective Aug. 21, 1920, cash and mileage rates increased from 3 cents to 3⅓ cents per mile.
Effective Dec. 1, 1921, cash rates were reduced from 3⅓ cents to 3½ cents per mile, and tickets rates reduced from 3⅓ cents to 3 cents per mile.
There is an additional saving of $30,000.00 yearly in the operation of the new interurban cars due to the reduction in the power house kilowatt demand being released for commercial purposes.

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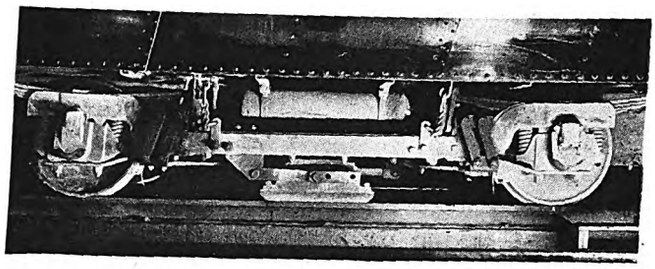
encountered, there is presented herewith in Table I the results of periodic checks of highway traffic made since 1912. Each check was made for a period of five consecutive days from 6 a.m. to 6 p.m., and shows the number of motor vehicles and the passenger movement per day on roads between points served by our interurban lines. The checks were made at the same points each year, during the same hours and by the same men. It will be noted that in 1927 and 1928 there was an average of approximately 12,500 passengers carried daily by automobiles between points served by the four interurban lines. The average number of passengers per car varied between 2.2 and 2.3. Although there was a slight increase in the number of automobiles between 1927 and 1928, there was a slight decrease in the number of passengers riding in them. There has likewise been a slight decrease in bus passengers, and there are indications that for the time being, at least, the conditions have become static.

Table II presents a detailed summary of operating statements on the interurban before and after the substitution of new equipment. There is also presented in this table, for comparison, a summary of what the statement would have been during the period for the new equipment, had the old equipment been continued in operation. It is assumed for purposes of comparison that the same service had been given with old equipment as was given with the new, and that the gross revenue would have been the same as it has been for the new equipment. Obviously, an analysis of the financial results with new equipment on this basis, in an effort to determine the justification for the investment in new cars, is indeed very conservative. There is every reason to believe that



The unique air-magnetic track brake developed on this property has made possible increased speed with safety and has effected large reductions in accident cost. The illustration shows the equipment mounted on the single truck of the city cars

the gross revenue would not have been the same had the old cars been continued in service. In fact, we are quite convinced that it would have been much lower, and that with the higher attendant operating costs, these interurban lines would have long since been abandoned. Table II shows a comparison of the three-year period immediately preceding the installation of new cars, with the three years immediately following. These figures do not show the economy resulting from the light-weight equipment in the form of reduced power station demand, which released generating capacity for the sale of commercial power amounting to $30,000 per annum.

Gross Increased On City Lines

In Table III there is presented a comparison of operating statements for the city lines over a five-year period with old and new equipment. Prior to the installation of new cars it had been found impossible to increase the

TABLE III—LEXINGTON CITY DIVISION INCOME STATEMENT FIVE YEARS NEW CAR OPERATION VERSUS FIVE YEARS OLD CAR OPERATION

	Total Five Years Actual New Car Operation Jan. 1, 1924, to Dec. 31, 1928			Total Five Years Actual Old Car Operation July 1, 1918, to June 30, 1923			Increase or Decrease, New Operation Over Old Operation			Assuming Old Equipment Had Been Continued in Service 1924-1928 at Former Cost per Car-Mile			
	Amount	Per Cent of Gross Earnings	Per Car-Mile in Cents	Amount	Per Cent of Gross Earnings	Per Car-Mile in Cents	Amount	Per Cent	Per Car-Mile in Cents	Amount	Cost per Car-Mile	Increase or Decrease Over New Car Operation	Per Cent
Passenger revenue	$1,434,341.24	100.0	0.276	$1,218,056.41	100.0	0.304	$216,284.83	17.8	*0.028*	$1,434,341.24	0.276	.....	.....
Operating expenses:													
Ways and structures	146,200.46	10.2	.028	181,166.91	14.9	.045	*34,966.45*	*19.3*	*.017*	233,949.92	.045	$87,749.46	37.5
Equipment	81,416.89	5.7	.016	73,846.43	6.1	.018	7,570.46	10.3	*.002*	93,579.96	.018	12,163.07	13.0
Power	80,684.65	5.6	.016	103,515.52	8.5	.026	*22,830.87*	*22.1*	*.010*	135,171.06	.026	54,486.41	40.3
Conducting transportation	375,614.82	26.2	.072	336,514.58	27.6	.085	39,100.24	11.6	*.013*	441,905.40	.085	66,290.58	15.0
Traffic	20,152.40	1.4	.004	9,530.71	.8	.002	10,621.69	111.4	.002	10,397.77	.002	*9,754.63*	*93.8*
General and miscellaneous	118,865.81	8.3	.022	129,039.16	10.5	.033	*10,173.35*	*7.9*	*.011*	*118,865.81	.022	.....	.....
Total operating expenses	$822,935.03	57.4	.158	$833,613.31	68.4	.209	*$10,678.28*	*1.3*	*.051*	$1,033,869.92	.198	$210,934.89	20.4
Net operating revenue	$611,406.21	42.6	.118	$384,443.10	31.6	.095	$226,963.11	59.0	.023	$400,471.32	.078	*$210,934.89*	*52.7*
Taxes—local	96,029.35	6.7	.018	87,417.11	7.2	.022	8,612.24	9.8	*.004*	87,417.11	.017	*8,612.24*	*9.8*
Gross income	$515,376.86	35.9	.100	$297,025.99	24.4	.073	$218,350.87	73.5	.027	$313,054.21	.061	*$202,322.65*	*64.6*
Interest charges new equipment at 7½ per cent	67,232.85	4.7	.013	.....	.....	.....	67,232.85	100.0	.013	.....	.....	*67,232.85*	*100.00*
Gross income after interest charges on new equipment	$448,144.01	31.2	.087	$297,025.99	24.4	.073	$151,118.02	50.9	.014	$313,054.21	.061	*$135,089.80*	*43.2*
*Car-mile basis not used.													
Cost of cars	$179,289.72			.....			.....						
Passenger car-miles	5,198,887			3,996,731			1,202,156	30.1					
Revenue passengers carried	21,318,283			19,276,730			2,041,510	10.6					
Revenue per passenger in cents	6.7			6.3			.4	6.3					
Number of track-miles	16.02			16.02			.....	.....					
Average yearly savings account of new equipment												27,017.96	
Average yearly return on investment before interest charges												22.6%	
Average yearly return on investment after interest charges												15.1%	

Twenty-seven new city cars installed during the period June 24, 1923, to Sept. 2, 1923.
Weight of old city cars, 26,350 lb.
Weight of new city cars, 16,000 lb.
Fares: Effective Nov. 18, 1917, cash fare increased from 5 cents to 6 cents; Metal tokens from 4⅛ cents to 5⅝ cents.
Effective June 14, 1920, cash fare increased from 6 cents to 7 cents; Metal tokens from 5⅝ cents to 6¼ cents.
Effective Dec. 21, 1927, cash fare increased from 7 cents to 8 cents; Metal tokens from 6¼ cents to 7⅛ cents.

Lexington Board of Commerce Population Statistics

1923—50,000	1926—56,801
1924—48,641	1927—57,312
1925—55,000	1928—59,808

There was no reduction in station demand account of installation of the new city light weight cars, due to air and magnetic brakes, increased speed and other electrically operated safety devices.
All operations, both with old and new equipment were one man.

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revenue; in fact, the property was steadily losing ground in the face of growing automobile competition. It should be noted particularly that there has been an increase of 30.1 per cent in passenger car-miles operated for the five-year period with new equipment, compared to the preceding five years with the old cars. This brought an increase of 17.8 per cent in gross revenue, and an increase of 10.6 per cent in the number of revenue passengers carried. All of this is based upon a ten-year comparison—five years with old equipment and five years with the new cars. Operating expenses decreased only 1.3 per cent. The costs per car-mile, however, were

TABLE IV—KENTUCKY COACH COMPANY INCOME STATEMENT FROM JUNE 1, 1925, TO DEC. 31, 1928

	Seven Months Dec. 31, 1925		Twelve Months Dec. 31, 1926		Twelve Months Dec. 31, 1927		Twelve Months Dec. 31, 1928		Total Three Years and Seven Months	
	Amount	Per Bus-Mile	Amount	Per Bus-Mile	Amount	Per Bus-Mile	Amount	Per Bus-Mile	Amount	Per Bus-Mile
Passenger revenue	$19,157.03	0.145	$93,415.42	0.159	$123,824.43	0.163	$139,155.90	0.181	$375,552.78	0.167
Operating expenses:										
Maintenance of plant and equipment	9,547.46	.072	40,061.93	.068	53,340.89	.071	47,854.08	.063	150,804.36	.067
Operating garage expenses	5,841.43	.044	28,808.57	.049	32,019.98	.042	31,775.13	.041	98,445.11	.044
Conducting transportation	6,138.52	.047	24,321.58	.041	31,814.87	.042	34,423.80	.045	96,698.77	.043
Traffic promotion	640.89	.005	866.32	.001	891.15	.001	1,055.29	.001	3,453.65	.002
General and miscellaneous	4,291.74	.033	7,970.18	.014	10,251.52	.013	13,791.83	.018	36,305.27	.016
Total operating expenses	$26,460.04	.201	$102,028.58	.173	$128,318.41	.169	$128,900.13	.168	$385,707.16	.172
Net operating revenue	*$7,303.01*	*.056*	*$8,613.16*	*.014*	*$4,493.98*	*.006*	$10,255.77	.013	*$10,154.38*	*.005*
Taxes—local	1,157.53	.008	2,191.06	.004	5,426.11	.006	6,396.50	.008	15,171.20	.007
Gross income	*$8,460.54*	*.064*	*$10,804.22*	*.018*	*$9,920.09*	*.012*	$3,859.27	.005	*$25,325.58*	*.012*
Interest charges on investment at 7 per cent	1,053.36	.008	6,285.88	.011	9,555.64	.013	11,593.96	.015	28,488.84	.012
Gross income after interest charges	*$9,513.90*	*.072*	*$17,090.10*	*.029*	*$19,475.73*	*.025*	*$7,734.69*	*.010*	*$53,814.42*	*.024*
Return on investment before interest charges, per cent	*32.8*		*12.0*		*7.3*		2.3		*6.1*	
Cost of investment	25,796.45		89,798.41		136,509.18		165,628.05		417,732.09	
Passenger bus-miles	131,730		588,605		761,406		766,817		2,248,558	
Revenue passengers carried	293,113		1,426,214		1,869,922		1,805,807		5,395,056	
Revenue per passenger	6.6		6.6		6.6		7.7		7.0	

Fare is the same as charged on street railway and transfers are accepted by the rail system.

Before the inception of the Kentucky Coach Company there were thirteen independent buses operating in the City of Lexington in competition with the city cars, and present bus operation parallels part of city car operations.

TABLE V—TRACK AND ROADWAY MAINTENANCE COST AND STATISTICAL DATA
ALL DIVISIONS

Year	1921	1922*	1923**	1924	1925	1926	1927	1928
Superintendence	$5,264.92	$4,918.67	$6,377.90	$7,136.80	$5,851.56	$6,792.62	$7,004.38	$6,935.06
Ballast	1,094.32	849.21	1,434.32	1,558.10	173.92	421.91	243.08	614.25
Ties	25,619.88	24,264.11	8,288.90	16,443.65	12,861.64	9,061.69	13,029.33	11,135.52
Rails and rail fastenings	2,279.28	2,617.19	3,148.60	691.54	819.91	985.30	1,425.35	271.76
Special work	2,250.24	5,853.64	443.61	3,556.34	1,056.54	947.84	2,667.19	859.42
Track and roadway labor	27,066.89	25,005.85	27,857.16	26,528.41	23,742.38	19,286.88	24,968.34	20,346.39
Paving	5,703.11	4,851.01	10,286.72	10,093.71	9,457.13	2,483.93	3,163.59	3,464.35
Miscellaneous expenses, including sanding, removing snow, etc	6,620.52	8,159.82	6,305.63	7,605.46	6,943.34	6,471.02	4,754.72	3,658.09
Bridges, trestles, culverts, crossings, etc	2,581.79	2,959.87	7,436.54	8,760.47	3,928.80	4,301.10	3,613.01	2,269.48
Total	$78,480.95	$79,479.36	$71,519.38	$82,364.48	$64,835.22	$50,752.29	$60,868.99	$49,554.32
Per cent of gross revenue	11.9	14.3	11.9	13.6	11.1	8.5	10.3	8.6
Car-miles operated	1,619,090	1,750,197	1,922,051	1,930,137	2,025,674	2,214,062	2,251,170	2,228,612
Maintenance cost per car-mile operated	$0.049	$0.045	$0.037	$0.042	$0.032	$0.023	$0.027	$0.023
Number of miles of track	93.79	91.33	83.69	89.35	89.35	89.33	89.33	89.33
Total cost per mile of track maintained	$836.77	$870.24	$854.57	$921.81	$725.63	$568.14	$681.40	$554.73
Total car and passenter ton-miles of tare	38,178,884	33,142,318	25,824,807	20,766,743	21,318,600	23,406,211	23,746,784	23,484,862
Number of ties used	28,466	20,562	6,973	13,261	9,893	6,663	10,022	8,593
Cost per tie	$0.90	$1.18	$1.18	$1.24	$1.30	$1.36	$1.30	$1.30
Cost of ties based on present market value of $1.30	$37,005.80	$26,730.60	$9,064.90	$17,239.30	$12,861.64	$9,061.69	$13,029.33	$11,171.03
Miles of paved single track	18.70	18.70	18.70	18.70	18.70	18.70	18.70	18.70

*First year light-weight interurban equipment. **First year light-weight city equipment.

TABLE VI—SIX YEAR COMPARATIVE ACCIDENT STATEMENT COVERING COLLISION ACCIDENTS, PEDESTRIAN, VEHICLE AND STOCK

Interurban	1923 Straight Air	1924 Straight Air	1925 Straight Air	Average 1924-1925 Straight Air	1926 Seven Months Straight Five Months Air Magnetic	1927 Air Magnetic	1928 Air Magnetic	Average 1927-1928 Air Magnetic	Per Cent Increase or Decrease Average Years 1924-1925 Compared With 1927-1928
Miles operated	846,950	853,242	945,181	899,211	1,061,929	1,090,183	994,018	1,042,100	15.8
Number of accidents	66	71	90	80	94	58	67	62	*22.5*
Amount of money spent for claims	$9,577.01	$7,131.43	$5,208.12	$6,169.77	$3,960.61	$2,272.40	$2,711.64	$2,492.02	*59.6*
Average cost per accident	145.10	100.44	57.86	79.15	42.13	39.10	40.47	39.78	*49.7*
Miles per accident	12,832	12,017	10,502	11,259	11,297	18,796	14,836	16,906	50.1
Speed, miles per hour	18.8	19.3	19.6	19.4	20.2	20.2	20.2	20.2	4.1

Combined Cities	Seven Months Hand Brake Five Months Straight Air	Straight Air	Straight Air	Average 1924–1925 Straight Air	1926 Eleven Months Straight Air One Month Air Magnetic	Air Magnetic	Air Magnetic	Average 1927–1928 Air Magnetic	Per Cent Increase or Decrease
Miles operated	1,076,668	1,085,317	1,134,446	1,109,881	1,174,017	1,171,457	1,113,571	1,142,514	29.4
Number of accidents	365	306	262	284	291	264	231	247	*13.0*
Amount of money spent for claims	$3,468.88	$3,424.10	$7,293.84	$5,358.97	$4,049.63	$963.74	$1,727.80	$1,332.27	*75.1*
Average cost per accident	9.50	11.18	27.83	19.50	13.91	3.54	7.48	5.51	*71.7*
Miles per accident	2,949	3,546	4,330	3,938	4,034	4,391	4,825	4,608	17.1
Speed, miles per hour	7.7	8.2	8.0	8.1	8.6	8.8	9.0	8.9	9.8
Automobile registration	.....	9,485	10,577	10,031	11,534	12,350	13,472	12,911	28.6

Actual money saved on collision accidents 1927–1928, two full years operation with magnetic brakes, as against 1924-1925 without magnetic brakes $15,408.91

Estimated number of applications per annum based on check made September and October, 1927, which indicate an average of 1½ applications per car per day based on 30-car operation 14,604

Estimated number of accidents prevented by use of the magnetic brake as reported by operators for { 1927 ..... 125; 1928 ..... 197 } 109

Actual decrease in front-end accidents in two years' comparison 431

Estimated reduction total .....

The total maximum cost of any one accident in the past five years was $1,250.

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reduced from an average of 20.9 cents for the old equipment, to 15.8 cents average over the five-year period with new cars, or a net reduction of 24.4 per cent. All operations in this comparison, both before and after the installation of new cars, were one-man. The net result of the investment in new cars has been (after deducting interest at the rate of 7½ per cent on the new cars) to increase the gross income 50.9 per cent over the five-year period, while at the same time permitting service to be increased 30.1 per cent. The net annual return on the investment in new cars was 22.6 per cent. It seems quite obvious, therefore, that the investment in new equipment was amply justified.

But even the summary given in Table III does not tell the whole story of the showing made by the new equipment. During the five-year period of operation with new cars, severe jitney competition developed in Lexington. This was accompanied and followed by 5-cent, at random, bus competition, paralleling the rail lines in the city and running to points beyond. In 1925 this was cleaned up through the installation by our company of a modern bus system, which now operates approximately 766,000 miles per year and carries more than 1,800,000 passengers. Much of this operation is in the direct territory of the railway, while some of the routes reach into areas beyond the rail lines. The important fact, in considering the question of the results accomplished with new cars on the railway, is that although the bus system has built up new business of its own, a considerable portion of its traffic is directly competitive with the railway lines. A summary of the bus operations is presented in Table IV.

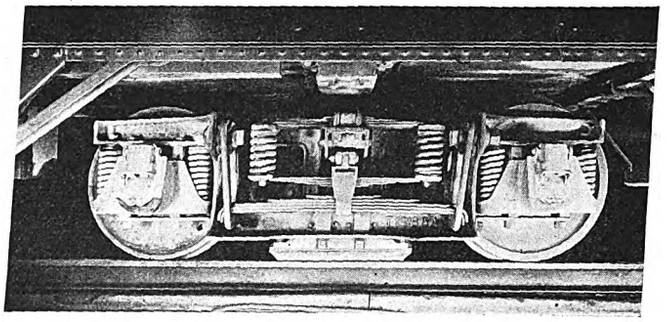
Track Life Extended and Maintenance Reduced

Still another phase of the experience on this property seems worthy of particular note. In all studies of the possible economies to be expected through the purchase of modern light-weight equipment, the factor of track life and track maintenance are major items upon which it is extremely difficult to make even approximate estimates. Our experience, therefore, extending as it does over a period of more than five years with a complete replacement of cars, helps to throw additional light on the possibilities for track economies through the operation of light-weight equipment. In our particular situation, covering all the depreciable values in the track and roadway department, we estimate that the substitution of lighter cars has extended the life of this structure 50 per cent. We value this property—rail fastening, special work, bridged ties and paving (all the actual depreciable property in the track and roadway department)—at $1,083,000. Based on these values we estimate that the reduction in depreciation amounts to $18,058 per year, which would be properly creditable to the return on the investment in new cars.

Table V gives a summary of the total track and roadway maintenance on this property for the past eight years, and also certain statistical facts with respect to the track department. The figures include all divisions, both interurban and city lines. They are set up to show the year 1921, the last year in which operation was entirely with old equipment. In 1922 the interurban cars were changed, and in 1923 new cars were operated on the city lines as well. For the remaining five years, 1924 to 1928 inclusive, all operations were with new equipment. The statement indicates a reduction of approximately $20,000 per year in the total expenses of this department. Of this amount, our organization estimates that the direct economy which may properly be credited to the light-weight equipment is slightly more than $15,000 per year, or approximately 5 per cent on our total car investment of $306,999.

Track Saving Alone Justifies Investment

Adding together the amount creditable because of increased life of track through decreased wear and tear with light-weight equipment, and the direct reduction in maintenance cost, the total saving is approximately $33,000 per year, or 10.7 per cent on the cost of the new cars. On the basis of a permanent property, therefore, the investment in new cars is justified by the figures for track economies alone. The facts of outstanding interest in Table V are not only the reduction in total cost, but in the track cost per car-mile operated, which is about half the former figure. The ton-mile information given is approximate only, but on the basis shown represents about a 40 per cent decrease despite considerably increased car mileage. The costs for maintenance per mile of track during the latter periods shown in Table V —with increased age of the structure—in comparison with earlier years, seem of particular interest and significance.



New trucks built by the Cincinnati Car Company, are designed so that the air-magnetic track brake is carried between the wheels

One feature of the equipment on both interurban and city cars on this property is of enough special interest to seem worthy of particular mention. This is the success achieved in the reduction of accidents and accident costs after more than two complete years of experience with a special auxiliary magnetic track brake which was applied to all of our new cars during the year 1926. The development of the equipment followed continuous and persistent though vain efforts to reduce the number of accidents and the accident liability on the property. We finally came to the conclusion that there was need for some more positive means of stopping cars in an emergency than that afforded by the conventional air brake. After considerable study, and in collaboration with the engineers of the Cincinnati Car Company and the General Electric Company, there was perfected a special type of air-magnetic track brake which gives the motorman of a car marginal braking capacity, in the event of emergency, 30 per cent to 35 per cent above that of his air brakes alone, regardless of rail conditions.

Full details of this equipment were given in an article in the July 17, 1926, number of Electric Railway Journal. Our pupose in this development was primarily that of reducing accidents—fulfilling to the limit of our ability a moral obligation to the public and to our passengers. In addition to this humanitarian objective was the desire to reduce the cost and losses which invariably result from accidents regardless of where the actual

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TABLE VII—COST OF INSTALLATION, MAINTENANCE, OPERATION AND DEPRECIATION AIR-MAGNETIC BRAKES

Installed 53 equipments May 17, 1926, completed Dec. 26, 1926

Investment cost installed	$26,602.43
7 per cent on capital investment (two years 1927-1928)	3,724.34
4 per cent depreciation on magnetic brakes (two years 1927-1928)	2,128.20
Increase maintenance cost of air and magnetic brake equipment for years 1927-1928 over straight air-brake equipment year 1926	376.42
Total	$6,228.96
Total savings on collision accidents (years 1927-1928 over years 1924-1925)	15,408.91
Total maintenance depreciation and interest	6,228.96
Total savings after interest and depreciation charges	$9,179.95
Actual return on magnetic brake investment without crediting saving for 431 accidents that may have been prevented, per cent	48.5

responsibility lies. After two years of experience with all cars equipped with this device, there is presented in Table VI a five-year record of accident statistics and costs for the property.

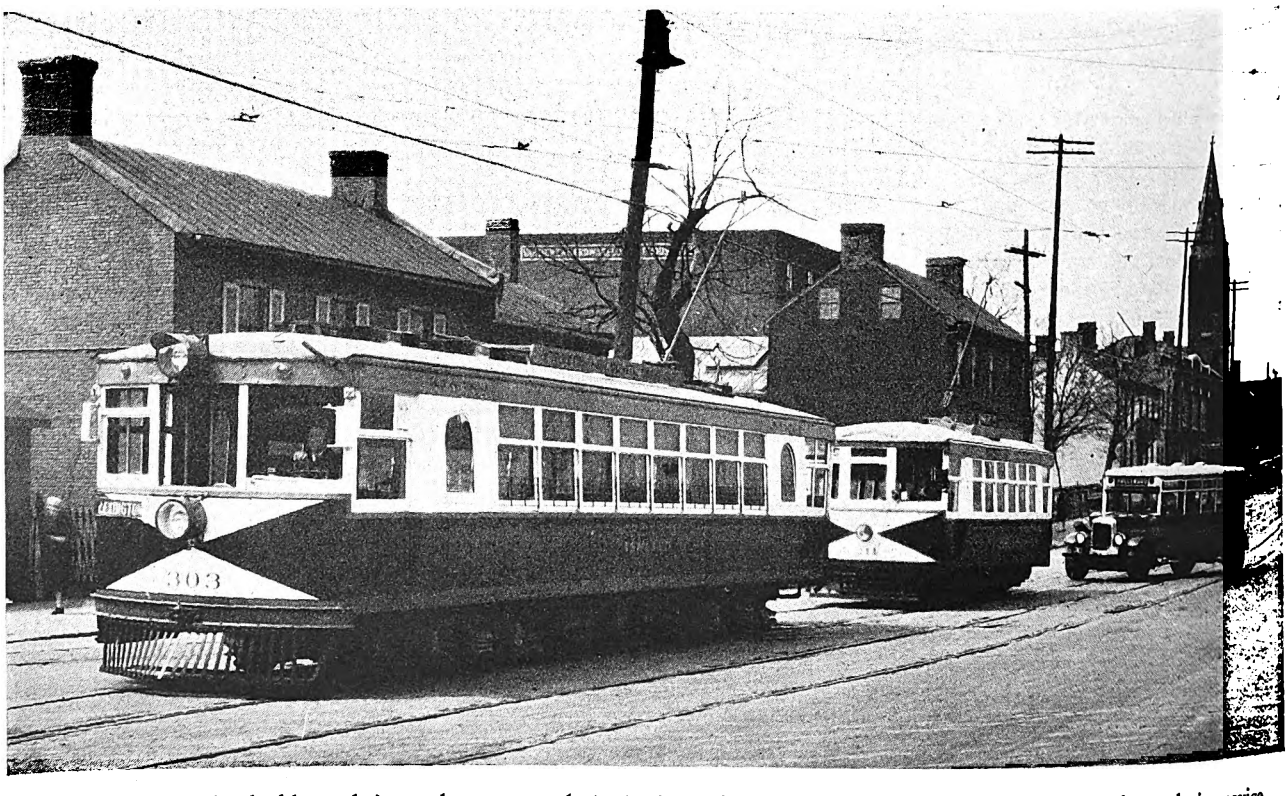
Table VI shows large reductions in the number of front-end accidents following the installation of the track brakes in 1926. It shows, in addition, reduction of accident costs on both the interurban and city lines. These results were achieved despite increases of 15.8 per cent in car mileage operated on the interurban and 29.4 per cent on the city property. At the same time there was an increase of 28.6 per cent in the number of motor vehicle licenses issued in this immediate territory. The record shows an actual reduction of 109 accidents from collision with pedestrians or vehicles. In addition, motormen's reports indicate 322 collision accidents prevented through the use of the magnetic track brakes in emergency.

A summary of the actual financial results of the installation of this special brake equipment is given in Table VII. Briefly, the total cost represented an investment of $26,602. After deducting all charges we figure that this installation has actually earned a return of 48½ per cent in the direct reduction of accident cost, without attempting to assign any monetary value to the prevention of 431 collisions or potential collisions. No allowance is made in these figures for the saving in catastrophe insurance. Entirely on the basis of the performance of this brake equipment, the insurance companies have made a reduction in the rate for catastrophe insurance applicable to this property from $2 to $1.40 per $1,000 of revenue.

Because this equipment was designed and installed on our cars after they had been in service for several years, it was necessary to carry the brake on an outrigger on the double-truck cars. On a new car installation today, the brake can be included in the original design of the trucks, making a more satisfactory installation and reducing the cost considerably. Nevertheless, with only minor changes and improvements, the design as originally worked out for the Lexington property has proved entirely successful mechanically and has not materially increased maintenance costs. Total air-brake maintenance in 1926 was $2,538. With the auxiliary track brakes installed and in operation during 1927, the cost of all brake maintenance was $2,680. In 1928, total brake maintenance costs were $2,773, the increase of $235 being almost entirely accounted for by a damage cost of $153 resulting from a motor vehicle running into the side of a car.

An important maintenance feature resulting from the use of the track brakes is the almost total elimination of flat wheels and the increase of mileage obtained from wheels on both interurban and city equipment.

As used on this property, the track brake is used wholly as an auxiliary brake. Judging from a check which we made in 1927, it is estimated that the average number of applications per year will run between 14,000 and 15,000. In our practice there is no restriction on the use of the magnetic brake.



Twelve light-weight double-truck interurban cars and 27 single truck city cars replaced all of the equipment formerly in service. This represented an investment of $306,999. In addition, a modern bus service was developed to replace former jitneys

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Short Signal Cycles

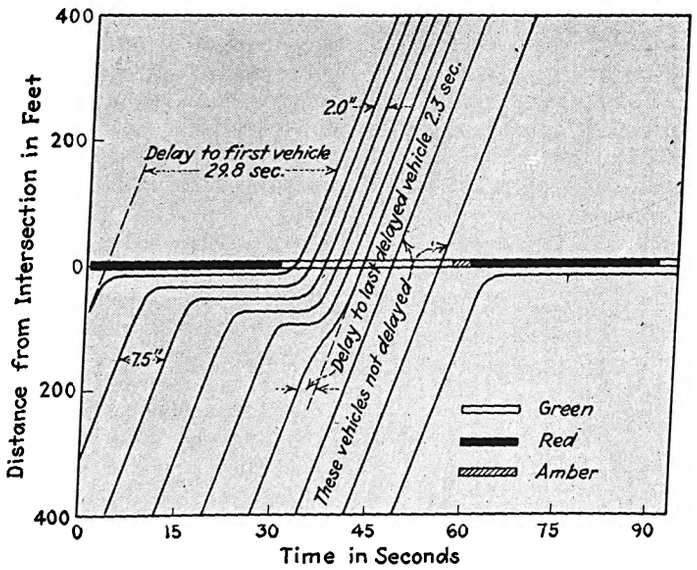
SPEED UP TRAFFIC

By

HAWLEY S. SIMPSON

Traffic Engineer, Essex County, N. J.

EXPERIENCE with automatic signals has demonstrated many inherent inefficiencies, and much attention is now being directed to the economics of traffic movement at the intersection, which constitutes the critical point of any street system. Through this area passes twice the traffic per lane which approaches on the intersecting streets, and it thus becomes absolutely essential that the most efficient movement of traffic at such points be obtained if traffic stagnation is to be forestalled. One of the greatest, yet most common, extravagances in modern road construction is to invest large sums in super-wide highways, while allowing traffic to be throttled in a "bottleneck" at every important intersection. In general it has been found that the shortest interval which will permit pedestrian traffic to cross with ease is the most efficient interval.



Vehicular movement at street intersection equipped with automatic signals, showing effect of signals in reducing intervals between vehicles—assumed conditions 480 vehicles per hour moving at 20 m.p.h.; signal cycle, red 30 seconds, amber 3 seconds and green 27 seconds

To obtain the maximum efficiency of traffic movement every heavy traffic intersection should be studied with the view to determining whether traffic signals should or should not be used, or whether the grades should be separated. If traffic signals are considered, it can in general be stated that but two factors should be analyzed and two questions answered, namely:

1. Will the installation reduce the accident toll?

2. Will the installation reduce the volume of vehicular delays below that experienced without traffic signal control?

The first question would receive a negative answer from many engineers in instances where traffic volume is not heavy. Accident records of intersections where the hazard increased materially following traffic signal installation, often show the hazard returning to pre-signal level after the signal's removal. An analysis by the writer of accidents at 52 intersections in twelve municipalities in New Jersey showed an accident reduction of about 35 per cent following automatic signal installation when traffic through the intersection exceeded an average of 1,000 vehicles per hour from 8 a.m. to 6 p.m. But when traffic was below an average of 800 vehicles per hour the analysis indicated that automatic signals were not effective in reducing the number of accidents.

Mathematical analyses made recently of automatic traffic signals installed and operated at intersections of light traffic volume have shown unwarranted vehicular delays. Therefore, before a signal installation is decided upon, a careful study of the probable effect of a traffic signal on both the accident situation and the traffic flow should be made. When this is done, and it is determined that signals are economically warranted, the further question arises as to what would be the most efficient cycle.

Vehicular movement can be expedited to a marked degree by the proper selection of time cycles of automatic traffic signals. It has been found that the most efficient time interval is the shortest interval that will allow pedestrian traffic to cross the street with ease.

In progressive signal systems, the length of the cycle is quite rigidly indicated by the distance between the signalized intersection and the vehicle speeds to be maintained. At isolated intersections and in synchronous systems the length of cycle may range between wide limits. Cycles now used vary from a minimum of about 40 seconds to a maximum of 180 seconds.

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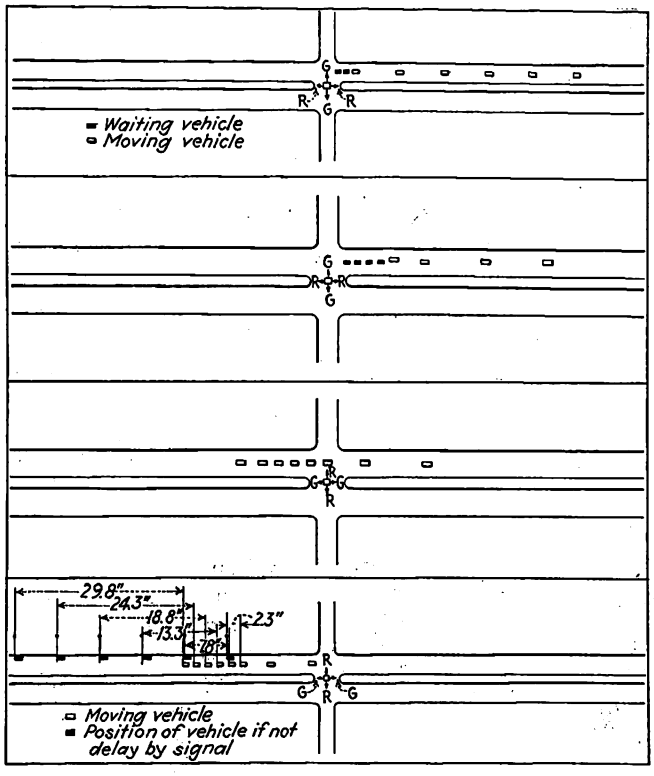

Spacing of vehicles before and after passing through signaled intersection, showing delays caused by operation of signals

In order to determine the relative efficiency of various length cycles, the writer has developed formulas from which the accompanying graphs are drawn, and which may be used to determine the theoretical average minimum delay at an isolated signalized intersection under any condition of traffic volume or cycle. Briefly stated, the formulas sum up the delays to each individual vehicle, thus arriving at the total intersection delay. More specifically, the delay to the first vehicle arriving on the stop signal equals the red period, plus a portion of the preceding amber period, plus an acceleration loss, minus a variable to account for the average condition of arrival at the intersection. The delay to succeeding vehicles will always equal the delay of the preceding vehicle minus the difference in time spacing between arriving and leaving vehicles, or 7.5 seconds and 2.0 seconds, respectively, as shown on the chart on page 765. The delay to all vehicles will equal the sum of the delays to the first and last delayed vehicle multiplied by one-half the number of delayed vehicles.

These facts may be readily understood by an examination of this chart, which shows the detailed delays to each vehicle in one lane on one street with an average movement of 480 vehicles per hour. Under the conditions assumed, eight vehicles will pass in each lane in one signal cycle. Of these eight, five will come to a full stop and one will be required to slow down, the delays ranging from 29.8 seconds to 2.3 seconds and totaling 96.3 seconds. Only two vehicles will not be delayed. A series of charts on this page shows the same conditions with vehicles on only one side of the main thoroughfare. The first shows the position of the eight vehicles 15 seconds after the beginning of the display of the red signal, two of the vehicles already having stopped, one slowing down and five approaching. The second shows their position at the end of the red period and the beginning of the green period, four vehicles stopped, one practically stopped and three approaching. These vehicles immediately begin to move and at the end of 15 seconds of the green period all vehicles are in motion, as shown on the third chart, but in the meantime the fifth car has had to stop and the sixth slow down due to the necessity for the first four to accelerate and space themselves at a safe distance.

The fourth chart shows the position of the eight cars, all moving, at the end of the green period. There is also shown the position which the first six cars would have had if there had been no signal at the intersection. The delay to each is shown in seconds, the sum equalling 96.3 seconds.

Incidentally, this figure also demonstrates one of the reasons why signals increase the efficiency of the street system when traffic is heavy. The six delayed vehicles occupied 1,320 ft. of street space when approaching the intersection at 20 miles per hour and required 45 seconds to pass any point. The grouping effect of the signal resulted in the cars being more closely spaced on leaving the intersection, occupying only about 352 lineal ft. of street space, and requiring only 12 seconds to pass a point; an increase in efficiency which warrants the delays imposed when the volume of cross traffic demands it.

A comparison of the relative volumes of delays per hour produced by various length cycles with varying traffic volumes is presented in the chart on page 767. The statistics are computed for only one lane in one direction under the special condition noted in the title of the chart. The total delays for one hour at an intersection may be computed by scaling the delays to each lane from the diagram, provided the cycle is divided evenly between red and green. The same relative increase in delays when long cycles are used will occur regardless of the proportions into which the cycle is divided.

In order to determine the probable accuracy of the formulas and assumptions, field surveys were analyzed by W. B. Powell, consulting engineer, Buffalo, at three signalized intersections. The computed delays using the above mentioned formulas varied from the observed delays by less than two and one-half per cent. Mr. Powell concluded that traffic volume did not warrant traffic signal operation which fact is amply supported by the statistics, while a detailed study of the cycles used gave the following additional conclusions:

1. The cycles were badly proportioned between red and green.
2. The lengths of cycle were somewhat excessive (70, 75 and 80 seconds).
3. The amber period for such light traffic should have been three seconds, rather than five seconds.

If the same length cycles had been proportioned so that the green periods were proportional to the traffic—but no period less than 20 seconds—the delays would have been reduced to 75 per cent of that observed. If a 60 second cycle had been used allowing 40 seconds green on the main street, 20 seconds on the cross street and a three second amber, the delays would have been further reduced to 61 per cent of the actual delay, but the delay to main street traffic would have been somewhat higher in proportion and such a change might not have been justified. This is a very practical illustration of the economic losses due to the unnecessary use of signals in combination with careless or unstudied regulation of the timing.

The conclusion from this study is the evident efficiency of the use of the shorter cycles. The reasons are

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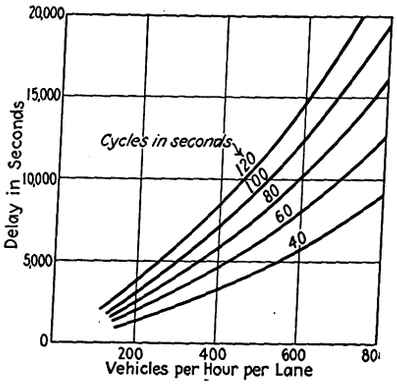
apparent by study of the charts. When vehicles are stopped and waiting at the intersection and are ready to proceed at the capacity spacing, it becomes uneconomical to use the cross street for vehicles moving at greater spacings. This conclusion might be carried to the extreme, and cycles of a few seconds selected as most efficient, but such reasoning must be tempered with judgment, and consideration given to the rights of pedestrians. The green period must be sufficiently long to permit a group of pedestrians to cross the highway without vehicular interference. An average speed of pedestrian travel may be taken as 5 ft. per second, fixing 12 seconds as the time required to cross a 60-ft. pavement. There must be allowed some clearance to permit more than one pedestrian to make the crossing and to allow for vehicular interference from turns. This allowance may be assumed as 8 seconds, fixing the minimum practical length of the green period at 20 seconds.



Total delays per hour with various lengths of signal cycle — assumed conditions; red is half the total length of cycle and amber is 3 seconds

Another and by no means unimportant argument favoring the shorter cycles is introduced by consideration of another element of the pedestrian problem. With very long cycles, as in New York City, the pedestrian cannot be expected or even forced to wait at the curb, as was recently tried, until the green light appears, but will attempt to thread his way through heavy moving traffic, with an attendant increase in accident hazard, and a reduction in the efficiency of the intersection brought about by the unregulated conflict between pedestrians and vehicles simultaneously attempting to move at right angles to each other. Shorter cycles have been found to be productive of greater pedestrian observance of traffic signals with the attendant benefits.

In conclusion, it is apparent that the use of automatic signals cannot but produce delays totaling many vehicle hours per day, in some cases absolutely without necessity, but where studies prove the economic advisability of the use of signals, analyses should be made to determine the shortest and the most efficient cycle that will be practicable.

Third Regional Meeting Held at Boston

BASIC problems facing the electric railway industry were discussed at the third regional conference held at Boston, Mass., on July 10 under the auspices of the Advisory Council. About 40 electric railway executives from the New England territory attended the meeting. This was the third regional conference of this type, the first having been held in San Francisco in February and the second in St. Louis in April.

At the outset of the meeting J. N. Shannahan, chairman of the Advisory Council, announced the selection of Charles Gordon, editor of ELECTRIC RAILWAY JOURNAL, to be managing director of the American Electric Railway Association to fill the vacancy created by the resignation of Lucius S. Storrs. The chairman then called upon Mr. Gordon to give his views on the problems confronting the industry. According to Mr. Gordon there is no panacea for the troubles of the electric railways. He pointed out the need for arousing the interest of business men in the problems of local transportation by stressing the relation between transportation and business development and property values. In conclusion Mr. Gordon expressed his abiding faith in the industry and predicted substantial future development.

During the discussion it was emphasized that every effort should be made to arouse business men to realize they have a vital interest in the successful operation of their local transportation systems. The public does not understand the situation because too many railway managements have been inarticulate. Fundamentally the public is even more interested in the soundness of its transportation than the security holders themselves, according to Mr. Shannahan. When the public is properly informed its attitude may be counted upon to be fair. As a result of the work of the management at Omaha, an extremely unfavorable situation has been completely changed during the past two years and the company restored to favor with the public. His experience there convinced him that other similar situations can be successfully worked out if approached in the right way.

Edward Dana, general manager of the Boston Elevated Railway, said that while the total annual traffic on the system shows a slight decline, the weekday traffic has increased. This presents a serious problem, but does not indicate any decreasing need for public transportation service. He emphasized the need for rapid transit extension. C. V. Wood, president of the railways in Springfield and Worcester, pointed out that transportation must be made more salable by being made attractive. Speed is the most important factor. In 1863 the average speed of the Worcester Street Railway was approximately 8 m.p.h. It is not much better today. Special attention should be given to increasing the speed of operation.

To improve its position materially an electric railway must select a definite objective, according to George Clifford, division manager of Stone & Webster. He cited examples among the Stone & Webster properties to show results when this principle is followed. The human element is important. Employees should be educated to know their business and to make favorable contacts with the public. Prof. A. S. Richey also stressed the importance of securing co-operation from platform men.

Considerable discussion centered around the subject of taxicab operation. Elton S. Wilde, president of the Union Street Railway, New Bedford, expressed the opinion that regulation of taxicabs is highly desirable.

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When this is done it may become expedient for the electric railways to enter this field. Henry Page, general manager of the Worcester Consolidated Street Railway, discussed the taxi situation in Worcester and emphasized the need of regulation, as did several other speakers.

W. B. Spencer, executive assistant United Electric Railways, Providence, suggested that this industry would do well to undertake an extensive advertising campaign to popularize its product. A. J. Boardman, general manager Eastern Massachusetts Street Railway, discussed the need for greater co-ordinated effort among the companies. Fred Gordon, general manager Cumberland County Power & Light Company; O. M. Lord, vice-president York Utilities Company, and A. D. Kendrigan, general manager Manchester Street Railway, all discussed problems confronting their companies.

National Motor Bus Division Reorganized

REORGANIZATION of the National Motor Bus Division was the outstanding result of the third annual meeting held at Buffalo on July 1 and 2. A. M. Hill, chairman, recommended that the work for the ensuing year should be primarily aimed at development of accurate and useful information on the tax situation affecting the industry throughout the country. Upon his suggestion, a special committee was appointed which was given responsibility for co-operating with other agencies working on the same problem. It was recommended also to have all state regulatory bus laws codified in index reference volumes. This was prompted by the fact that many members of the division are operating across state lines or connecting with other interstate operations. This creates a real need for up-to-date information on the status of state regulations.

The opinion was advanced that highway transportation should be regulated on its own merits, without regard to its effect on other forms, because trouble on the highway is increasing and the effect of bus traffic on the railroad is slight and is steadily growing less. It was stated that it was fortunate that the interstate bus bill failed of passage at the last session of Congress, because the power to regulate interstate commerce rests only with Congress and should not be delegated to the state, as was provided in the bill.

In a report submitted by the legislative committee it was said that while interstate legislation had been the outstanding problem, state regulations had also received a great deal of attention. State bus associations, state legislatures and regulatory authorities have received assistance in the preparation of laws and regulations. It is believed that this work will help establish uniformity in state regulatory practice.

Trailer buses are receiving more attention than in the past. They will double passenger capacity with but slight increase in the maintenance requirements, it was said. The possibilities of light-weight metals in reducing heavy weight are illustrated in a new seat developed for airplane service by the Aluminum Company of America. This is 40 in. wide and weighs only 24 lb., complete with upholstery. It was stated that the design might have to be made stronger and, therefore, heavier for bus application, but even then it was thought that the weight could be reduced approximately 50 per cent.

San Francisco Chosen for 1930 Convention

THAT the 49th annual convention of the American Electric Railway Association will be held at San Francisco, Cal., was decided at a meeting of the executive committee on July 12. The desirability of holding a convention on the Pacific Coast has been under discussion for several years, and it was felt that it would be particularly appropriate to hold it there next year. The exact date of the 49th convention was not fixed by the committee, but it was decided that it should be held some time in June. This departure from the usual practice of holding the convention during the early fall was made in order to permit delegates attending the railway convention to attend also the annual convention of the National Electric Light Association, which will be held at San Francisco in June. Whether the A.E.R.A. convention will be held immediately before or immediately after that of the N.E.L.A. was not decided.

In accordance with the custom that has been followed for some years past, the meeting of the executive committee was held on board the steam yacht *Florida*, belonging to Barron Collier. In the absence of the president and the first vice-president of the association, J. H. Hanna, second vice-president, presided. J. N. Shannahan, chairman of the Advisory Council, announced the selection of Charles Gordon, editor of ELECTRIC RAILWAY JOURNAL, as managing director of the association. The appointment was formally made and approved by the committee. Mr. Gordon expressed his appreciation and spoke of the wonderful opportunity of leadership in an industry with an investment of $6,000,000,000.

At the outset of the meeting, J. W. Welsh, general secretary, announced that he had been offered a position with the Cleveland Railway which he desired to accept. The suggestion had first been made a long time ago, he explained, but he had felt that he could not consider it at the time when the association was without a managing director. Since the selection of a new managing director by the Advisory Council, he felt free to accept the offer of the Cleveland Railway and submitted his resignation to take effect Sept. 1. Mr. Welsh's resignation was accepted with regret by the executive committee, and a special committee was appointed to prepare a statement of appreciation for the services he has rendered the association during his tenure of office.

Routine reports were presented by numerous committees. An interesting discussion occurred concerning the appointment of a committee on fare research. It was the consensus of opinion that such a committee could render the industry an important service.

For officers during the coming year the nominating committee made recommendations as follows: President, Paul Shoup, Pacific Electric Railway; first vice-president, J. H. Hanna, Capital Traction Company; second vice-president, C. E. Morgan, West Penn Railways; third vice-president, G. A. Richardson, Chicago Surface Lines; fourth vice-president, J. H. Alexander, Cleveland Railway; treasurer, Barron Collier.

To fill the vacancies in the executive committee effective to the end of the association year, the nominating committee recommended W. H. Wood, president Virginia Electric & Power Company, to fill the unexpired term of J. H. Alexander, and Thomas Conway, Jr., president Cincinnati, Hamilton & Dayton Railway, to fill the term of D. W. Snyder.

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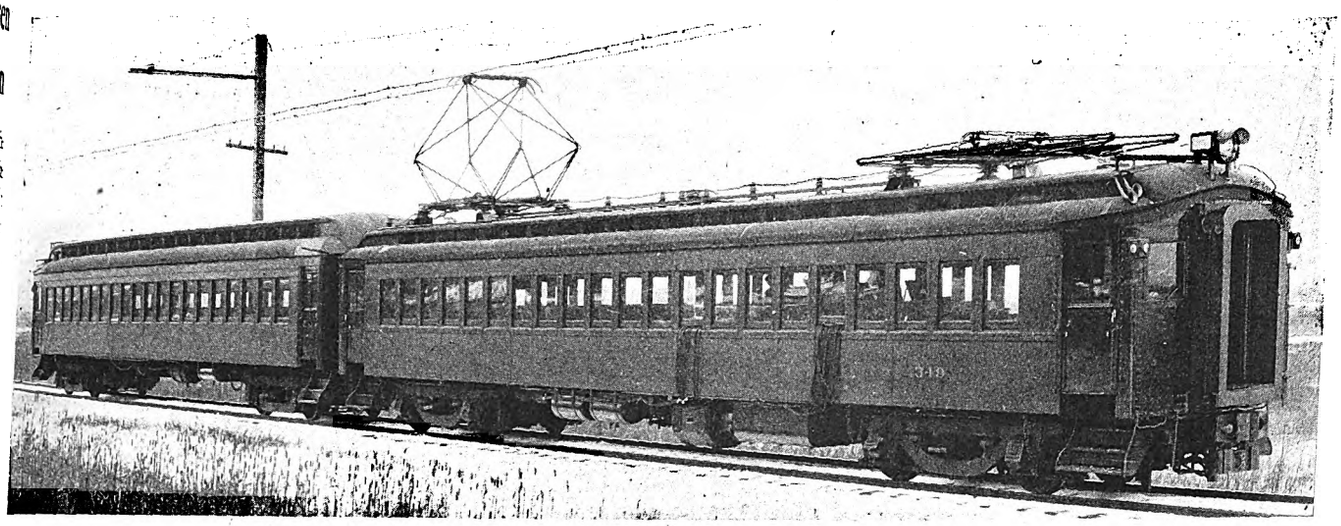

A sample two-car unit for the Lackawanna electrification on the test track

Lackawanna Electrification

Plans Completed

General plans for this 160-mile suburban electrification are complete and contracts are being let for the equipment and construction. Multiple-unit trains will give suburban service on the Morristown line from Hoboken to Dover and on the branches to Montclair and Gladstone

PLANS for the electrification of the Lackawanna Railroad between the Hoboken, N. J., terminal and Dover via Morristown, as well as the branches to Gladstone and Montclair, now are virtually complete. The main line from Hoboken has three tracks as far as Millburn and two tracks from there to Dover. The Montclair branch has two tracks all the way from the Roseville Avenue junction, while the Gladstone branch from Summit to Gladstone is a single-track line. The entire project involves 70 miles of route and 160 miles of single track, including main track, yards and sidings. While many details remain to be worked out, bids for the major parts of the work, such as the overhead construction, the cars and the substations, will soon be taken and contracts will be let in the very near future.

The engineering work is being done by Jackson & Moreland, engineers of Boston, Mass., under the direction of G. J. Ray, chief engineer D. L. & W. Railroad.

The immediate electrification will be confined to the suburban trains within the zone mentioned above. These will be operated with multiple-unit cars, arranged in permanent groups of two, a motor and a trailer, which can be coupled to form trains of two, four, six, eight, ten, or twelve cars. Certain heavy freight trains will also be handled between Secaucus and Hoboken freight yards by electric power.

All of the 141 motor cars required for the service will be purchased new. They will be 71 ft. long over bumpers. The trailers with which they will be coupled to form the two-car units are at present in steam service in the suburban district. Sixty, including ten combination cars, are of the so-called low-roof type. They are practically identical in general design and appearance with the motor cars to be ordered. The remainder are of the high-roof type, and include 71 coaches, five combination smoker-baggage cars and five club cars. These cars are all of modern, all-steel construction. The motor cars will weigh 148,000 lb. complete with electrical equipment, and the trailers 113,000 lb., making the weight of a complete unit 261,000 lb., excluding passengers. Each motor car seats 84, and the trailer coaches seat 78 or 82, making a total of 162 or 166 for the unit.

Each unit will be semi-permanently joined with MCB type couplers. All operating electrical equipment will be carried on the motor car, and current for the lights and heaters on the trailers will be carried through jumpers between the ends of the cars. Connections between units will carry the control circuits only, and will be made through jumpers. Each two-car unit will have a motorman's control station at each outside end only. Connection with the contact system will be made through two pantographs which are mounted on the motor car.

Each motor car will be equipped with four motors having a one-hour rating of 230 hp. at 1,500 volts. Pairs of motors will be connected permanently in series, and the pairs will be handled with series-parallel control. A feature of the equipment is that the motors will

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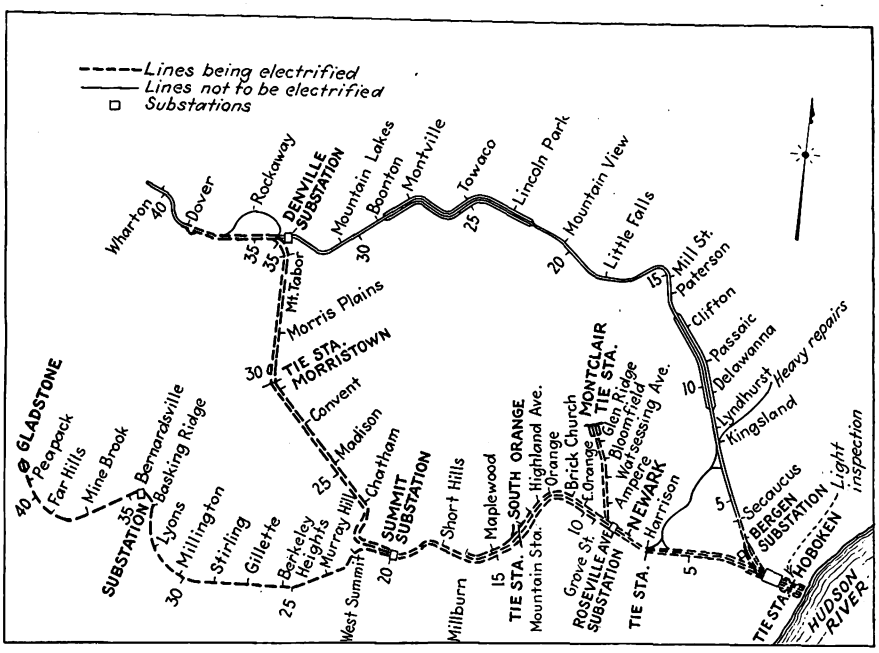
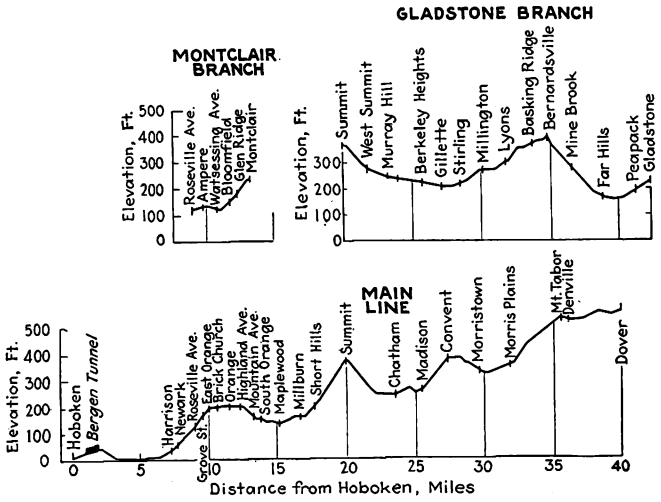


This map shows the Lackawanna electrification. Figures are miles from Hoboken. Power will be transformed to 3,000 volts d.c. in five rectifier substations



The profile is irregular, there being a rise of more than 500 ft. from the Hoboken terminal to Dover on the main line

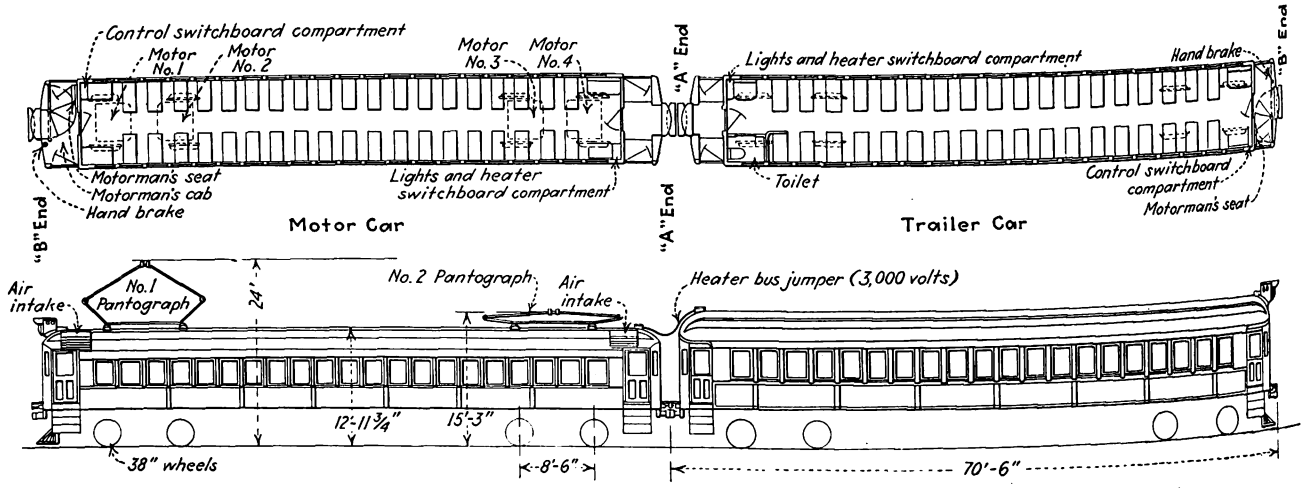
be self-ventilated, the cooling air being taken from the roof of the car at either end, and led to the motors through suitable ducts.

The motor control will be of the multiple-unit, electro-pneumatic type, the magnet valves being actuated with storage battery current. Acceleration will be automatic, although an optional hand control of acceleration is possible. The automatic acceleration has been designed for a rate of 1.5 m.p.h.p.s. with a six-car train. Braking will be at the rate of 1.75 m.p.h.p.s.

Current for the control and for the car lighting will be taken from an auxiliary circuit supplied by a generator forming part of the dynamotor, with a storage battery in parallel, the battery also being charged from this generator. The dynamotor has two 1,500-volt windings with commutators in series. It supplies power from a tap at the mid-point for the 1,500-volt air compressor. The separate generator armature on the same shaft supplies 40 to 50 volts for the control, lighting and battery charging circuits.

The heating for all the cars will be by 3,000-volt current taken from the line. There will be 40 heaters in each car, each with two elements. These heater elements will be divided into two circuits, each circuit being connected across the 3,000 volts. The heat control will be thermostatic, the two circuits being connected and disconnected automatically as needed to maintain the desired temperature by means of auxiliary contactors.

The contact lines will be of the catenary type. For the two and three-track sections the wires will be supported on steel bridges. The vertical members will be steel beams of H section, carrying single cross-members. A few four-track sections will be supported with lattice girder bridges. On the Gladstone branch, which is single track, the overhead will be supported from brackets attached to wood poles. Typical construction is shown in the drawings reproduced. The normal spacing of the catenary structures is 300 ft., but this is varied to some extent to meet conditions, as at stations and on curves. Each of the bridges will be supported by concrete footings. These are being placed at the present time. On the meadows, where the ground is little if any above



Trains will be made up of units, each consisting of a motor car and a trailer semi-permanently coupled. The complete unit weighs 261,000 lb. and seats 162 or 166 passengers

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TABLE I—LOCATION AND RATING OF SUBSTATIONS, LACKAWANNA RAILROAD ELECTRIFICATION

Substation	Rectifiers: Number of Units	Rectifiers: Capacity of Each, Kilowatts	Number of Transformers	Source of Supply: Volts	Source of Supply: Cycles	Source of Supply: Company
Bergen	3	3,000	3	13,200	60	Public Service Electric & Gas Company
Newark	4	3,000	4	26,400	60	Public Service Electric & Gas Company
Summit	2	3,000 (2 tanks)	2	66,000	60	Jersey Central Power & Light Company
Denville	2	3,000 (2 tanks)	2	33,000	60	New Jersey Power & Light Company
Bernardsville	2	2,000	2	33,000	60	New Jersey Power & Light Company

tidewater, it has been found necessary to sink piles in order to get a suitable foundation for the concrete footings.

The contact line on the main portion of the system will consist of two contact wires. These and the main and auxiliary messenger cables will be in parallel, with a total equivalent section of copper of 800,000 circ.mil. There will be two No. 0000 trolley wires throughout on the main line.

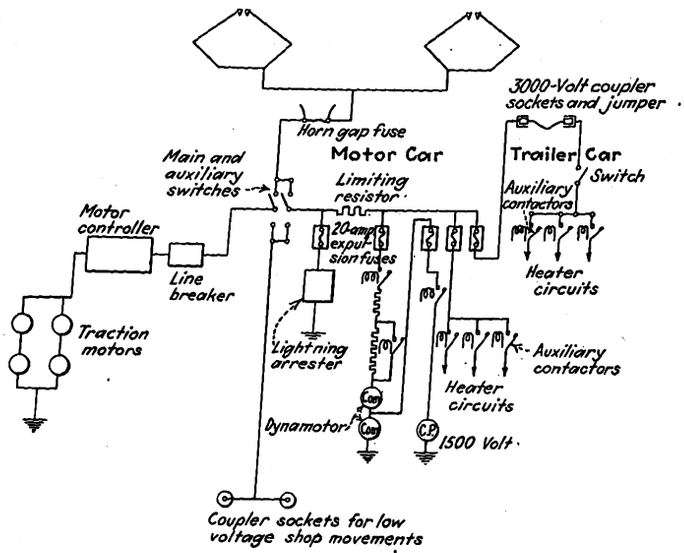
Normally the overhead system will all be tied in together through the substations and tie stations, but automatic switches will be provided that will isolate any section in which trouble occurs.

Power for operation of the system will come from three sources. The Public Service Electric & Gas Company will supply the substations at the west end of the Bergen Tunnel, near the Hoboken terminal, and at Newark, the Jersey Central Power & Light Company the one at Summit, and the New Jersey Power & Light Company the stations at Denville and Bernardsville. Tie stations will connect the overhead conductors for the several tracks together at Hoboken, Harrison, South Orange, Montclair Morristown and Dover.

The power will be converted from 60 cycles alternating current to 3,000 volts direct current in five substations. The locations are shown on the map and the ratings and equipment are given in Table I. Mercury arc rectifiers will be used throughout for conversion. Each rectifier tank will deliver power at 3,000 volts. Three sizes are specified, 3,000-kw. single-tank units being used in the Bergen and Newark substations, 3,000-kw. (two-tank) units in the Summit and Denville substations, and 2,000-kw. units in the Bernardsville station. The Bernardsville station will be equipped for automatic operation.

The main line from Hoboken to Dover has many heavy grades, as may be seen from the condensed profile. There is a rise of more than 500 ft. from Hoboken to the junction with the Boonton branch at Denville. This has necessitated relatively heavy motive power for steam service, particularly on the long run to Dover. With electric power it will be possible to make certain reductions in the running time.

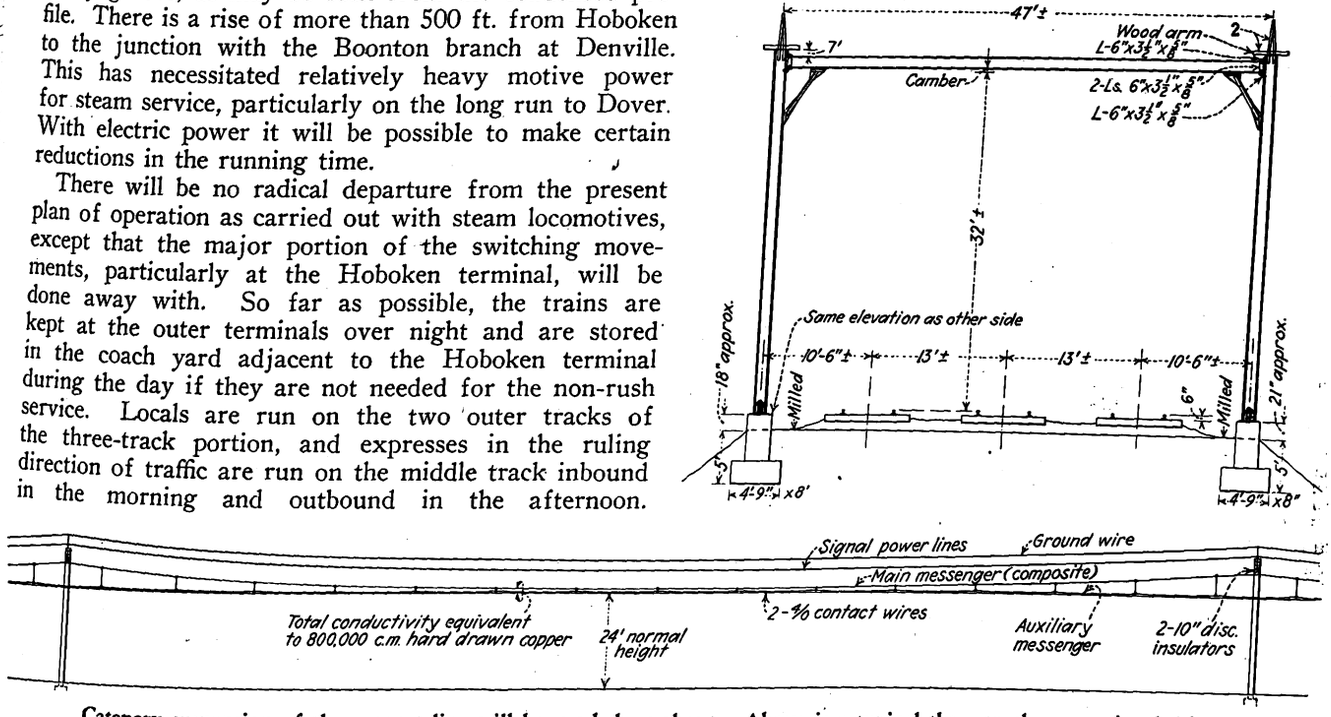
There will be no radical departure from the present plan of operation as carried out with steam locomotives, except that the major portion of the switching movements, particularly at the Hoboken terminal, will be done away with. So far as possible, the trains are kept at the outer terminals over night and are stored in the coach yard adjacent to the Hoboken terminal during the day if they are not needed for the non-rush service. Locals are run on the two outer tracks of the three-track portion, and expresses in the ruling direction of traffic are run on the middle track inbound in the morning and outbound in the afternoon.



Connections of the major electrical equipment are shown in the schematic car wiring diagram

A shed for light inspection will be provided at the Hoboken terminal. Heavy repairs will be made at Kingsland, about 7 miles across the meadows on the Boonton division. This is the main repair shop for the eastern portion of the railroad, so that the added facilities will be kept to a minimum.

Electrification of the Boonton division is not contemplated at present. The greater portion of the business on this line is freight. By far the larger part of the commuting business, as well as most of the through trains, go out over the division which is being electrified. The through trains will be hauled by steam locomotives for the present.



Catenary suspension of the contact line will be used throughout. Above is a typical three-track supporting bridge.

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Gross and Net Earnings Are Holding Up

REPORTS of operation of 27 electric railways in the United States and Canada now available show that the revenues are holding steady on the properties included. Out of 23 reports for which comparable monthly figures are given, fifteen companies show greater gross receipts for 1929 than for the corresponding month in 1928. Fifteen of the companies show a reduction in operating expenses for the current year, and eighteen show an increase in gross income after taxes. The disposition of gross income is given for only seventeen of the companies in comparison with last year. Eleven of these show a greater amount available for dividends or surplus.

The best showing is made by the Canadian properties. All the six listed show more revenue this year than last, and every one of them shows greater net. This relatively better showing of the Canadian properties has been commented on previously in this paper. Evidently the causes for it are still in evidence.

The report of the Boston Elevated Railway for the twelve months ended June 30, which is included along with the monthly statement for May, shows a reduction in gross and net revenue, even though operating expenses were lower than for any year since that ending June 30, 1923. The decline in gross, according to a statement from Edward Dana, is continuing and increasing depression in summer riding, and the increase in automobile riding, particularly during the open winter last year. It is pointed out that in spite of the decline in total passenger revenues there has been a substantial increase in weekday traffic for the eight months of the year from October to May, inclusive. Rental charges on rapid transit lines increased by $291,116 this year as compared to last year.

Table I—Monthly Reports of Electric Railway Companies

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Market Street Railway, San Francisco, Cal.					
June, 1929	779,474	658,763*a*	.....	120,711*b*	61,314*f*
June, 1928	804,151	683,428*a*	.....	120,723*b*	58,356*f*
12 mo.end.June, 1929	9,585,383	8,205,287*a*	.....	1,380,096*b*	649,693*f*
12 mo.end.June, 1928	9,858,135	8,342,756*a*	.....	1,515,379*b*	749,252*f*
Capital Traction Company, Washington, D. C.					
May, 1929	389,304	263,059	32,076	94,727	64,814
May, 1928	386,038	265,386	26,071	95,985	67,728
5 mo.end.May, 1929	.....	.....	.....	.....	281,200
5 mo.end.May, 1928	.....	.....	.....	.....	309,999
Jacksonville Traction Co., Jacksonville, Fla.					
May, 1929	98,918	77,774	9,215	11,349*b*	.....
May, 1928	104,433	81,625	9,286	12,863*b*	.....
12 mo.end.May, 1929	1,177,796	951,547	106,664	113,245*b*	47,682
12 mo.end.May, 1928	1,268,975	1,038,812	107,796	115,072*b*	50,741
Chicago Surface Lines, Chicago, Ill.					
June, 1929	5,118,799	4,015,900*a*	.....	1,102,899	848,376*e*
June, 1928	5,090,269	3,989,114*a*	.....	1,101,155	846,078*e*
United Railways & Electric Co., Baltimore, Md.					
June, 1929	1,368,136	940,037	133,435	313,638	33,710
June, 1928	1,354,102	930,009	128,708	310,342	30,009
6 mo.end.June, 1929	8,390,353	5,766,486	819,139	1,893,889	195,687
6 mo.end.June, 1928	8,224,067	5,574,873	789,127	1,933,340	229,674
Boston Elevated Railway, Boston, Mass.					
May, 1929	2,978,446	1,990,084	147,965	844,765	148,725
May, 1928	3,013,663	2,095,826	158,055	768,815	93,651
12 mo.end.June, 1929	34,223,172	24,473,329	1,695,086	8,144,390	*180,153*
12 mo.end.June, 1928	34,909,542	24,083,391	1,793,128	8,133,413	82,812
Eastern Massachusetts Street Railway, Boston, Mass.					
May, 1929	720,540	460,195	31,258	246,558	80,661
May, 1928	731,743	514,013	18,556	215,760	76,045
5 mo.end.May, 1929	3,752,014	2,265,644	168,923	1,407,170	468,551
5 mo.end.May, 1928	3,919,918	2,392,562	152,425	1,469,929	491,005
Detroit Municipal Railway, Detroit, Mich.					
June, 1929	2,193,665	1,704,344	62,422	437,112	296,797
June, 1928	1,998,277	1,567,295	66,965	380,000	232,240
12 mo.end.June, 1929	26,329,072	20,888,667	754,745	4,872,689	3,130,286
12 mo.end.June, 1928	23,587,107	18,286,177	784,161	4,758,648	2,860,498
Twin City Rapid Transit Company, Minneapolis, Minn.					
3 mo.end.June, 1929	3,249,703	2,420,058	.....	.....	223,887
3 mo.end.June, 1928	3,167,779	2,438,194	.....	.....	149,111
6 mo.end.June, 1929	7,013,530	5,086,338	.....	.....	686,923
6 mo.end.June, 1928	6,876,251	5,104,546	.....	.....	573,672
Kansas City Public Service Co., Kansas City, Mo.					
June, 1929	713,507	545,324	41,675	126,506	41,959
6 mo.end.June, 1929	4,518,265	3,387,791	250,050	880,423	405,261
Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.					
May, 1929	84,831	57,674	7,840	23,075	*9,974*
May, 1928	90,121	61,469	7,840	33,908	1,993
5 mo.end.May, 1929	430,635	308,611	39,200	95,531	*64,268*
5 mo.end.May, 1928	469,683	325,102	39,200	129,086	*28,984*
Brooklyn-Manhattan Transit System, New York, N. Y.					
June, 1929	4,167,999	2,741,014	213,036	1,346,674	603,523
June, 1928	4,055,296	2,603,516	216,075	1,322,521	660,890
12 mo.end.June, 1929	48,586,548	31,256,533	3,304,036	15,073,622	6,518,372
12 mo.end.June, 1928	47,466,603	30,572,658	3,367,443	13,565,561	6,599,211
Hudson & Manhattan Railroad, New York, N. Y.					
June, 1929	1,006,646	508,250	.....	498,396*b*	162,265
June, 1928	1,018,838	529,074	.....	489,764*b*	154,549
6 mo.end.June, 1929	6,286,633	3,161,902	.....	3,124,731*b*	1,108,429
6 mo.end.June, 1928	6,269,864	3,195,448	.....	3,074,416*b*	1,061,171
New York, Westchester & Boston Railway, New York, N. Y.					
May, 1929	223,109	121,623	23,974	78,409	*137,370*
May, 1928	207,340	132,681	17,813	58,467	*139,363*
5 mo.end.May, 1929	990,151	627,037	105,629	261,116	*297,605*
5 mo.end.May, 1928	936,536	619,369	95,319	229,005	*764,506*
Third Avenue Railway System, New York, N. Y.					
May, 1929	1,387,522	1,039,778	88,035	278,698	31,551
May, 1928	1,353,303	1,021,687	95,949	252,799	46,194
11 mo.end.May, 1929	14,276,172	10,969,717	987,798	2,525,944	*281,618*
11 mo.end.May, 1928	14,217,866	10,908,843	1,018,143	2,476,399	*70,870*
Cincinnati Street Railway, Cincinnati, Ohio					
June, 1929	733,164	499,356	59,847	176,052	2,707
Philadelphia & Western Railway, Norristown, Pa.					
June, 1929	68,096	39,153	.....	28,943*d*	13,024
June, 1928	71,222	42,595	.....	28,627*d*	12,702
Philadelphia Rapid Transit Company, Philadelphia, Pa.					
3 mo.end.June, 1929	14,255,943	10,748,208*a*	.....	3,836,208	10,575*c*
6 mo.end.June, 1929	28,441,135	21,546,476*a*	.....	7,536,182	*109,798c*
Dallas Railway & Terminal Company, Dallas, Tex.					
June, 1929	268,829	190,556	.....	72,795	9,240
June, 1928	258,427	192,191	.....	63,555	0
12 mo.end.June, 1929	.....	.....	.....	883,653	120,987
12 mo.end.June, 1928	.....	.....	.....	783,228	20,948
Galveston-Houston Electric Railway, Houston, Tex.					
May, 1929	49,181	29,271	2,565	17,343*b*	.....
May, 1928	54,585	32,251	2,584	19,749*b*	.....
12 mo.end.May, 1929	617,174	347,172	31,665	238,336*b*	32,508
12 mo.end.May, 1928	684,590	399,129	30,415	255,044*b*	12,771
Houston Electric Company, Houston, Tex.					
May, 1929	287,354	173,236	25,530	88,588*b*	.....
May, 1929	282,228	175,409	25,445	81,372*b*	.....
12 mo.end.May, 1929	3,383,455	2,086,639	287,781	346,192*b*	600,635
12 mo.end.May, 1929	3,225,893	1,988,387	286,568	354,295*b*	555,901
Calgary Municipal Railway, Calgary, Alta.					
May, 1929	82,407	54,008	.....	22,134	*1,697*
May, 1928	73,324	45,476	.....	21,634	2,947
5 mo.end.May, 1929	432,217	244,549	.....	156,341	35,971
5 mo.end.May, 1928	386,587	228,550	.....	126,973	32,342
Edmonton Radial Railway, Edmonton, Alta.					
May, 1929	65,923	44,079	.....	19,344	996
May, 1928	61,359	44,718	.....	15,641	*3,102*
5 mo.end.May, 1929	372,146	224,449	.....	107,696	15,956
5 mo.end.May, 1928	348,146	222,418	.....	98,727	5,011
British Columbia Electric Railway, Vancouver, B. C.					
April, 1929	1,201,207	789,071	.....	412,136*b*	.....
April, 1928	1,081,401	710,175	.....	371,226*b*	.....
10 mo.end.Apr. 1929	11,671,509	7,778,484	.....	3,893,025*b*	.....
10 mo.end.Apr. 1928	10,960,445	7,463,104	.....	3,497,341*b*	.....
Cape Breton Electric Company, Sydney, N. S.					
April, 1929	59,033	41,604*a*	.....	17,428	.....
April, 1928	56,057	43,505*a*	.....	15,552	.....
12 mo.end.Apr., 1929	675,713	521,699*a*	.....	154,013*b*	85,193
12 mo.end.Apr., 1928	660,758	521,559*a*	.....	139,198*b*	70,764
Regina Municipal Railway, Regina, Sask.					
May, 1929	31,902	21,584	.....	8,402	*1,123*
May, 1928	25,647	18,884	.....	5,095	*3,222*
Saskatoon Municipal Railway, Saskatoon, Sask.					
April, 1929	30,352	20,740	1,198	8,413	55
April, 1928	24,903	16,616	996	7,290	116
4 mo.end.Apr., 1929	150,534	90,487	5,940	54,104	20,513
4 mo.end.Apr., 1928	127,185	78,018	5,087	44,079	15,225

a Includes taxes. *b* Net operating revenue. *c* Surplus (deficit) after dividends. *d* Before taxes. *e* Balance for return on investment. *f* Before depreciation and federal taxes.

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Conference Method Effective for TRAINING EMPLOYEES

Experience of numerous electric railways shows this kind of educational work to be of great value. Methods vary somewhat on different properties, but the basic principle has been applied successfully in transportation, track, overhead line and shop departments

BELIEVING that the efficiency of the human element in electric railway operation is a factor equally as important as the efficiency of the physical equipment, many companies have recently been devoting special attention to educational work among their employees. In these activities the conference method of training has been playing an increasingly important rôle. Among the companies which have successfully used this method are the Milwaukee Electric Railway & Light Company, the Boston Elevated Railway, the Cleveland Railway, The Kansas City Public Service Company, the Northern Ohio Power & Light Company, the Chicago, North Shore & Milwaukee Railroad, the Louisville Railway and the Capital Traction Company. The underlying principle of the conference method of training is that all those present at the meeting enter into the discussion. In this it differs radically from the older and more familiar method of instruction wherein the instructor does practically all of the talking.

Experience shows that a conference can be conducted successfully only with a comparatively small group of persons who have had a similar background. Under these circumstances all take part in the discussion and contribute something from their own personal experience. Such a group can analyze their jobs so as to better appreciate their responsibilities and discover the best way to develop a smooth-working organization.

The conference method has a wide range of adaptability. It has been used most extensively in the transportation department of the electric railways, but good results have been also obtained in other departments. Among the transportation subjects discussed in conferences are accident prevention and safety work, courtesy, fare collection, relations with the public, methods of training motormen, conductors and bus operators, and proper use of equipment. The general subject of the problems and responsibilities of a foreman or supervisor has been discussed on several properties. At Boston, Louisville, Milwaukee and Kansas City the conference method of training has been extended to foremen in the track, power, rolling stock and shop departments.

The size of the group gathered together for conference training varies somewhat on the different properties, but is necessarily rather small. This method of education is adapted primarily to the training of foremen and supervisors, although it has been extended under special circumstances to include trainmen and bus operators. In general, the attendance of the conference group ranges from about 10 to 25 members.

Undoubtedly the success of the conference method of training depends to a large extent upon the selection of the conference leader. He should be a man of proper personal qualifications and should never be one who is in a supervisory relation to the persons who are conference members. It is absolutely necessary that he know the technique of conference teaching, that he have an objective and know how to reach it. At present there are relatively few qualified conference leaders, but the number is increasing steadily with the growing interest in this type of employee training.

The conference method of training has been adopted enthusiastically by the Cleveland Railway as one phase of its educational program. This company has used the group conference idea for training men to avoid accidents, particularly those trainmen whose number of accidents have been above the average. The groups have been limited to twelve and the conference has been conducted by the supervisor of accident prevention, who has had each group discuss an actual accident in which one member was involved. The men have decided who was responsible, what could have been done to prevent the accident and what general standards of operation should be adopted. In the opinion of C. D. Smith, superintendent of the personnel department, the results obtained have been most gratifying.

During the past two years the conference method has been used on the Chicago, North Shore & Milwaukee Railroad in the conduct of two distinctly separate training activities. These are: First, the improvement of standards of personal service on the part of those employees whose duties bring them into contact with the customers, and, second, the development of improved standards of foremanship among those charged with supervising the work of others. The meetings have been in charge of a trained conference leader who gives his whole time to the organization and discussion of the conference group. Every effort is made to get a full and unrestricted expression of opinion from the em-

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ployees making up the group. Care is exercised that they are given the impression that their knowledge and experience are regarded as having value and that the responsibility for the proper solution of the problem under consideration rests with them. Although it is difficult to measure the results of this training method, the management believes that it has been productive of good results.

At Boston the development of the conference method of training has been an outgrowth of earlier methods which were more in the nature of lectures. In the fall of 1924, group meetings were organized in the four principle operating departments of the company, transportation, track shops and power, as well as a group of women employees. It was early realized, however, that these group meetings did not take full advantage of conference possibilities. More recently the practice has been adopted of holding meetings of the true conference type for men of supervisory rank. According to E. A. Kelly, assistant to the superintendent of transportation, the conference plan has been a marked success. It has caused the men to think for themselves and draw conclusions from their own knowledge of the job. They compare individual experiences and in this way are made to feel that their opinions and suggestions are of value and are given consideration by the officials. The conference gives the employee a renewed interest in his work and makes him feel that he is of importance in the organization. Moreover, much real information and many valuable suggestions have come from the men as the result of these conferences.

The Kansas City Public Service Company at present has four foremen clubs, one each in the equipment, way and structures, electrical distribution and bus garage departments. Each club has its own organization, but nevertheless co-operates with the other clubs. To some extent the activities of these clubs follow the conference method. Their objects are threefold: First, to keep the members in touch with the best modern thought and practice on industrial management and related subjects; second, to provide an opportunity for the exchange of ideas and the discussion of departmental problems; third, to promote social intercourse among the foremen. A man is eligible to membership provided the nature of his work is such that he has foremanship responsibilities regardless of whether he has the direction of only two or three men or a greater number. Also eligible are those closely connected with this work, such as engineers, etc. Each unit meets regularly once every two weeks, from September to May inclusive. The meetings are held on company time. Concerning the results obtained, F. G. Buffe, vice-president in charge of operation, states: "We have found that this is by far the best way to create interest in the work and in the affairs of the company, to improve production and service, to reduce costs and to bring about the friendly co-operation and general good will which are so essential to the successful operation of the property."

The conference method of training was adopted by the Northern Ohio Power & Light Company a little more than a year ago. On this property the attendance is not confined to the supervisory officials, but includes the car and bus operators. According to L. G. Tighe, assistant general manager, the men feel a keener interest in their work when they have an opportunity to discuss their problems and to bring out their own ideas in open and informal meetings. The management feels that the men are ordinarily in closer contact with operations than are the officials and supervisors, and are in a position to develop ideas which will greatly benefit service. It is the belief of the company that the adoption of the conference method by all operating companies will increase the efficiency of the men and reflect favorably on the company, both financially and in the development of good will.

On the property of the Capital Traction Company the conference method as a definite educational procedure was first introduced in July, 1928. Since last fall three series of conferences have been held with: (1) A group made up of division superintendents and assistants, who discussed in particular the hiring and training of car and bus men; (2) A group of shop and roadway foremen, who considered such subjects as foreman's cut orders, building morale, personal relations between foreman and other departments. They take a new interest in their men and handle them better. The appreciation of the value of these conferences is evidenced by the fact that each group has suggested additional present day problems which they wish to handle by this method.

To test the value of the conference training method, the Louisville Railway inaugurated the plan soon after the 1926 A.E.R.A. convention. Conferences are held the second Thursday of each month from 7 to 9 o'clock in the evening. Approximately 40 foremen from the transportation, track, shop, power and line departments attend these meetings. Among the many interesting subjects discussed during the 2½ years that these conferences have been in session are: Carelessness on the job; the importance of reporting all accidents and injuries; an energetic, live foreman will be a good example to his men; how the various departments can be of service to each other; how best to impress on the men the fact that they represent the company before the community; service; safety; how to gain the good will of the public; economy; how can the trainman help the mechanical department? how can all departments help the trainman? how can a man of indifferent nature be made into a good workman? a foreman's responsibility; resuscitation and first aid; fundamentals of personal efficiency; etc.

The company believes that by far the most important benefit derived from these conferences is the genuine spirit of co-operation between departments, which has resulted from the understanding of each other's problems. The necessity for cars to be kept moving on an even headway is no longer considered the problem of the transportation department alone, but, on the contrary, each foreman realizes that it is the problem of every man in the organization. G. B. Powell, superintendent of transportation, believes the foreman's conference has been of great value in the education and development of the key man, the foreman, and the company is looking forward to obtaining new ideas and expecting to develop the conferences into even greater usefulness in the future.

"Advertising to Cure Prejudice"

An extremely interesting story of one railway's unusual publicity campaign—to appear in a future issue.

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What Happens When Steel Gets Tired

By

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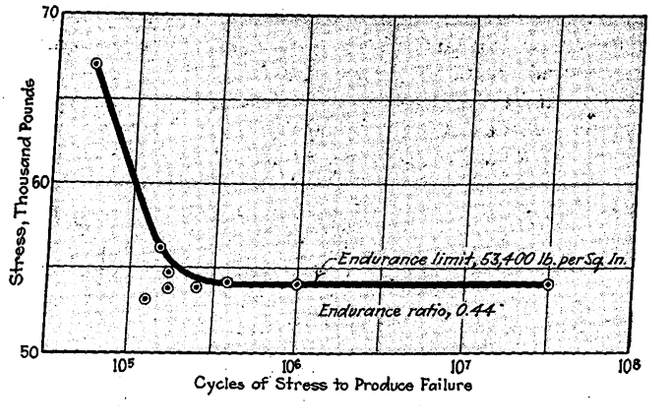

Typical S-N diagram for rail steel. Up to 100,000 cycles the strength of the material decreases rather rapidly

Fatigue of metals is an important factor in failures of track and car construction. This article discusses the causes of the phenomenon and precautions that must be taken in design to minimize the danger. Crystallization is no longer considered the explanation.

IN THESE DAYS when new records of automobile and airplane endurance are being made before the ink used in recording the previous records is scarcely dry, writers in the daily press are fond of remarking about the "tirelessness" of metals and machines. But does metal ever become "fatigued"? If so, what is likely to happen when it is "tired"?

In electric railway operation the materials from which equipment and structures are constructed are often subjected to varying stresses. Car wheels and axles, springs, truck beams, equalizer bars, brake rigging, gears, bolts and studs are all typical elements of equipment which may fail because they become tired. In the track, the rails, spikes, concrete and ties are subject to varying stresses. Trolley wires, span wires, poles and other elements of the overhead system may fail because of fatigue.

What Is Fatigue?

That when animal muscle becomes fatigued it loses strength, is every-day knowledge. Because of the apparent analogy scientists have given the name fatigue to the loss in molecular strength which some metals and other materials suffer under stresses often repeated. That the application of force first in one direction and then in another is more likely to produce failure in a stick or bar than the application of a greater force in one direction only is a principle that was probably known even among the most primitive of men. However, the first recorded work in the way of analyzing the effects of repeated stress seems to be that of a German, Albert, who made some tests on mine hoist chains a hundred years ago.

Wohler, between 1859 and 1870, made a number of investigations which resulted in the formulation of the first really definite notions as to the result of repeated stresses. He found that whereas 800 applications of a stress of 52,800 lb. per square inch would rupture wrought iron, with a stress of 35,000 lb. per square inch 10,140,000 applications were required to produce rupture. From time to time other investigators made contributions to the subject and the theory of the phenomena as held 30 years ago is indicated by the following quotation from a standard text book of that time:

> Rapid oscillations (of stress) cause a change in the molecular structure which impairs the elasticity of the material when such loads are often applied. It is sometimes found that the appearance of a fracture of a bar which has been subject to shocks is of crystalline nature, whereas the same material, if ruptured under a gradually increasing stress would exhibit a tough fibrous structure. Moving loads which produce stresses above the elastic limit cause the wrought iron and steel to become stiff and brittle and hence it is that the working unit stresses should be taken very low.

This theory of fatigue failure came to have wide acceptance. So prevalent is it today that the fracture of a rail, axle, automobile steering knuckle, engine crankshaft or other machine part subject to repeated stresses usually is ascribed to the deadly work of crystallization.

Within the last ten years a great deal of research has been done on fatigue failure, stimulated no doubt by the necessities for new data for use in the design of automobiles, airplanes, steam turbines and other high-speed machinery.

Crystallization Theory Now Rejected

The disclosures of the metallurgical microscope and other developments in the art and science of metallography have led to a complete refutation of the crystallization theory. Under the microscope, wrought iron, steel and other metals are seen to be of granular structure instead of being of smooth and uniform texture. Instead of stresses being uniformly distributed throughout the material, as we are accustomed to think of them, there are actually many irregularities in the stress distribution. The microscope shows that at high-stress concentration points some of the grains of the metal split and slip because there is a non-uniform distribution of stress

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Under repeated stresses the bond between the parts of the split grains eventually breaks down and minute cracks result. The metal fails by fatigue when these cracks have grown progressively until the remaining sound metal is insufficient to carry the load and a sudden break results. In the fracture the earlier cracked surface is usually somewhat smooth—made so by the crack alternately opening and closing—while the fresh break is rough and crystalline in appearance.

The ability of a material to withstand fatigue may be expressed in either of two ways: (1) The stress at which a material stands up under a definite number of cycles of force application; (2) the endurance limit or fatigue limit, that is, the maximum stress which the material can withstand with an infinite number of repetitions of the stress producing force. Another term much in use is the endurance ratio, which is the ratio of the endurance limit to the ultimate tensile strength of the material.

How Fatigue Data Are Secured

The usual procedure in fatigue testing is to select a number of small specimens of the material to be tested. These specimens are tested one by one in a special form of testing machine which subjects the specimen under test to rapidly repeated stresses, the stress for each specimen being of different magnitude.

For wrought irons and steels, from 500,000 to 5,000,000 cycles of stress may be required to determine the endurance limit, while for cast iron and cast steel over 10,000,000 cycles usually are required. The results of these tests are plotted in so-called S-N (stress—number of cycles) diagram. The accompanying graph is a typical one for steel rails (see Technologic Paper No. 363, United States Bureau of Standards, "Endurance and Other Properties of Rail Steel"). It will be noted that up to 100,000 cycles the strength of the material decreases rather rapidly, while above 500,000 cycles the strength is constant at 53,400 lb.

The reference just indicated sets forth the results of a number of tests on rail steel. The tests were made on specimens cut from the A and B rails of the middle ingots from eleven heats of open-hearth steel. The carbon content of these rails ranged from 0.62 to 0.75 per cent and the manganese content from 0.68 to 0.813 per cent. The data in Table I from these tests are typical of what may be expected from endurance tests on rail steel.

Rails and Car Axles Suffer Fatigue

Steel rails suffer from the repeated stresses set up by the passage of rolling stock over the track. The bearing surface of the rail-head is subject to particularly heavy loading and fatigue doubtless plays a part in such common head failures as surface pitting, transverse cracks, detrusion of the head metal and surface corrugation, as well as in some of the failures of the rail as a whole.

Prof. H. F. Moore, who has had charge of the extensive fatigue investigations being carried on at the University of Illinois during the last ten years, gives the data shown in Table II on car-axle steels (Bulletin No. 165 of the Engineering Experiment Station, University of Illinois).

In these tests the specimens were in a general way similar in shape to a car axle and therefore had somewhat sharp fillets. Sharp fillets produce stress concentrations, and standard fatigue test specimens are designed to avoid such concentrations. Standard specimens cut from the axle of Test No. 3 gave an endurance limit of 35,000 lb. per square inch and an endurance ratio of 0.38. These figures are 46 per cent higher than those in Table II and show the marked effect of specimen shape on the test results.

TABLE I—ENDURANCE DATA ON RAIL STEELS FROM THE MIDDLE INGOTS OF ELEVEN HEATS

Heat Number	Rail	Strength in Pounds per Square Inch: Ultimate Tensile Strength	Endurance Limit	Endurance Ratio
1	A	120,400	47,800	0.40
1	B	119,900	50,400	0.42
3	A	129,750	55,000	0.42
3	B	131,880	54,200	0.40
10	A	132,400	46,200	0.35
10	B	125,650	47,800	0.38
19	A	134,750	59,200	0.44
20	A	115,750	53,600	0.46
21	B	121,500	53,800	0.44

TABLE II—ENDURANCE DATA ON TYPICAL SAMPLES OF CAR AXLE STEELS

Test Number	Chemical Content: Carbon	Chemical Content: Manganese	Strength in Pounds per Square Inch: Proportional Elastic Limit	Strength in Pounds per Square Inch: Ultimate Tensile Strength	Endurance Limit	Endurance Ratio
1	0.45	0.49	57,000	92,000	27,000	0.29
2	0.47	0.66	59,500	100,500	28,000	0.28
3	0.46	0.40	40,800	91,700	24,000	0.26
4	0.62	0.43	53,500	105,100	26,000	0.25

TABLE III—TYPICAL ENDURANCE DATA ON QUENCHED PLAIN CARBON STEELS

Per Cent Carbon in Material	Strength in Pounds per Square Inch: Proportional Elastic Limit	Ultimate Strength	Endurance Limit	Endurance Ratio*	Authority
0.24	47,500	67,500	29,500	0.44	McAdam
0.38	60,000	91,500	33,500	0.37	McAdam
Sorbitic 0.37	80,000	102,600	57,000	0.56	Moore and Kommers
0.49	72,000	126,500	65,000	0.51	Moore and Jasper
1.02	109,000	200,400	105,000	0.51	Moore and Jasper

*Calculated by the author.

From these data may be drawn the conclusion—substantiated by the observations of many other experimenters—that commercial forms are likely to have a lower endurance limit than standard test specimens. Standard endurance limit data, then, represent maximum values. For safety the working stresses should be very much lower than the values of endurance limit as determined on standard specimens.

The first thought of the designer of structures or machine parts is usually to make the design with a certain factor of safety based on the ultimate strength of the material. It appears wiser to use the endurance limit as a basis for the safety factor whenever dynamic loadings must be given consideration.

Endurance Data for Other Steels

Other typical data collected from several sources for plain and quenched carbon steels and for alloy steels are set forth in Tables III, IV and V. Data for cast steels, which are much used in rolling stock parts and as such are usually subjected to dynamic loads, are given in Table VI.

The most common fatigue failure in machines and structures is that from repeated flexure and all the above data were made on specimens subject to reversed flexural stresses.

In some machine parts and structures, the stresses are not completely reversed during a cycle of action but range between a maximum and a minimum. For such incomplete reversal the endurance limit is lighter. Moore and Kommers, in their textbook, "Fatigue of Materials," recommended the following empirical formula:

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TABLE IV—TYPICAL ENDURANCE DATA FOR UNQUENCHED PLAIN CARBON STEEL

Per Cent Carbon in Material	Strength in Pounds per Square Inch—Proportional Elastic Limit	Ultimate Tensile Strength	Endurance Limit	Endurance Ratio*	Authority
0.14	33,500	62,700	30,900	0.49	Lea
0.21	39,900	70,700	33,400	0.47	McAdam
0.32	37,400	65,700	31,300	0.48	Rogers

*Calculated by the author.

TABLE V—ENDURANCE DATA FOR A FEW ALLOY STEELS

Material	Strength in Pounds per Square Inch—Proportional Elastic Limit	Ultimate Strength	Endurance Limit	Endurance Ratio*	Authority
Unquenched nickel steel...	60,800	101,600	54,000	0.53	Moore and Jasper
Unquenched nickel steel.....	50,500	103,900	49,500	0.48	McAdam
Chrome-nickel steel, unquenched.....	55,500	117,800	50,000	0.42	McAdam
Nickel-steel, quenched.....	139,000	154,200	74,000	0.48	McAdam
Chrome-nickel steel,quenched	129,500	164,500	84,500	0.51	McAdam
Chrome-vanadium steel, quenched.....	129,500	164,400	92,000	0.56	McAdam

*Calculated by the author.

TABLE VI—TYPICAL ENDURANCE DATA FOR CAST STEELS

Material—Per Cent Carbon	Per Cent Manganese	Condition	Strength in Pounds per Square Inch—Proportional Elastic Limit	Ultimate Strength	Endurance Limit	Endurance Ratio*	Authority
0.352	1.71	Untreated	39,000	80,800	32,000	0.40	Moore
		Heat-treated	42,400	108,900	45,000	0.41	
0.25	0.68	Untreated	23,600	67,200	27,000	0.40	Moore
		Heat-treated	42,800	76,600	35,000	0.46	
0.18	0.82	Untreated	22,000	60,000	26,000	0.43	Lessells
		Annealed	28,500	63,000	26,500	0.42	
0.30	0.78	Untreated	22,500	80,800	39,000	0.48	Lessells
Vanadium...	0.18	Annealed	32,000	90,000	42,000	0.52	
		Normalized	50,500	89,000	42,000	0.47	

*Calculated by the author.

$$\text{Maximum stress} = S_{max.} = \frac{1.5\,S}{1 - 0.5\,r},$$

where

S = endurance limit for complete reversal;

$S_{max.}$ = maximum stress attained during the cycle;

$S_{min.}$ = minimum stress attained during the cycle (equals $-S_{max.}$ for complete reversal);

$r = \frac{S_{min.}}{S_{max.}}$ (this will be equal to —1 for complete reversal).

When $S_{min.} = 0$, $r = 0$ and $S_{max.} = 1.5\,S$.

When $S_{min.} = -S_{max.}$, $r = -1$ and $S_{max.} = S$.

Thus the maximum stress due to any cause should not exceed 1½ times the endurance limit when the stress varies between zero and a maximum, and should not exceed the endurance limit when the stress reverses during the cycle of action.

Aside from the quantitative data available, the principal facts and conclusions relative to what happens when "steel gets tired" may be summed up as follows:

1. The endurance limit bears a fairly definite relationship to the ultimate strength of the steel. The ratio between these varies from 0.35 to 0.55 for rolled steel and has a mean value of about 0.45. The mean value of the ratio for cast steel is about 0.42.

2. The endurance limit is roughly proportional to the Brinell hardness number—Prof. H. F. Moore suggests that it is equal to 250 times the hardness number for steels below 350 Brinell.

3. Test specimens with nicks, cracks, grooves, sharp fillets, rough surfaces, etc., may show endurance limits 50 per cent lower in value than for standard specimens.

4. The endurance limit is not correlated with the elastic limit or yield point.

5. The endurance limit seems to bear no definite relation to the ductility as measured by per cent, elongation and reduction in area.

6. Chemical composition does not seem to affect fatigue properties greatly except as it affects the ultimate tensile strength.

7. Where localized stresses may exist full-sized shapes have lower endurance properties than the standard test specimens.

8. Stresses above the endurance limit, caused either by a heavy overload applied a few times or a light overload applied many times, reduce the endurance limit.

9. The maximum stress to which a material is subjected should not exceed the endurance limit when the stress is subject to complete reversal, but may be somewhat higher if the stress simply varies from zero to a maximum in one direction.

10. The endurance limit is often considerably below the elastic limit.

11. For ordinary speeds of stress reversal, the endurance limit is independent of the frequency of reversal.

12. Steel which has been subjected to a large number of reversals of a stress below the endurance limit may show a higher endurance limit.

13. Coarse-grained steels and those containing inclusions of foreign matter have lower endurance properties than fine-grained steels.

14. Heat treatment usually improves the endurance properties of steel.

15. The endurance limit is usually higher if periods of rest occur between the loadings.

Trackless Trolley Installed in Japan

RECENTLY two trackless cars were put in service between Shinhanayashiki and Hanayashiki, Japan, by the Hanshin Highspeed Electric Railway, according to the *Far Eastern Review*. This is the first trackless trolley undertaking in Japan. When application was filed in 1925 for permission to operate a trackless car line, there were no regulations to govern its operation. After prolonged consideration by the local authorities, however, it was decided that regulations governing automobile transportation should be applied to the enterprise and the company obtained the franchise to construct the line.

Shinhanayashiki is a newly opened pleasure resort located near the Hanshin Highspeed Electric Railway connecting Osaka and Kobe, and the trackless trolley line was opened to give service to residents and excursionists visiting the resort. The road on which the cars operate has a width ranging from 7 to 10 meters, the average gradient being 1 in 10 and the maximum gradient 1 in 7. Each car will accommodate 28 passengers and is equipped with two 20-hp. 1,500-r.p.m. direct-current motors. It has four brakes; namely, electric brake, contraction system foot brake, expansion system handbrake and center foot brake. Trolley wire suspension is of the compound catenary system. Steel poles, imbedded in concrete on both sides of the road at an interval of 32 meters, were erected as supports.

Following the completion of this line, applications for government sanction for other lines have been filed; one in Osaka, two in Fukushima, eight in Ibaraki, one in Ishikawa, one in Yamanashi and one in Aichi.

Electric Operation Profitable in Switzerland

BY THE end of last year 98.5 per cent of the principal lines of the Swiss Federal Railways had been electrified. Results of operation of the Federal Railways for the year 1928 were very satisfactory, the net profit being 17,000,000 francs. Gross earnings increased from 395,500,000 francs in 1927 to 418,000,000 francs in 1928, while gross expenditure rose only slightly and totaled 254,000,000 francs.

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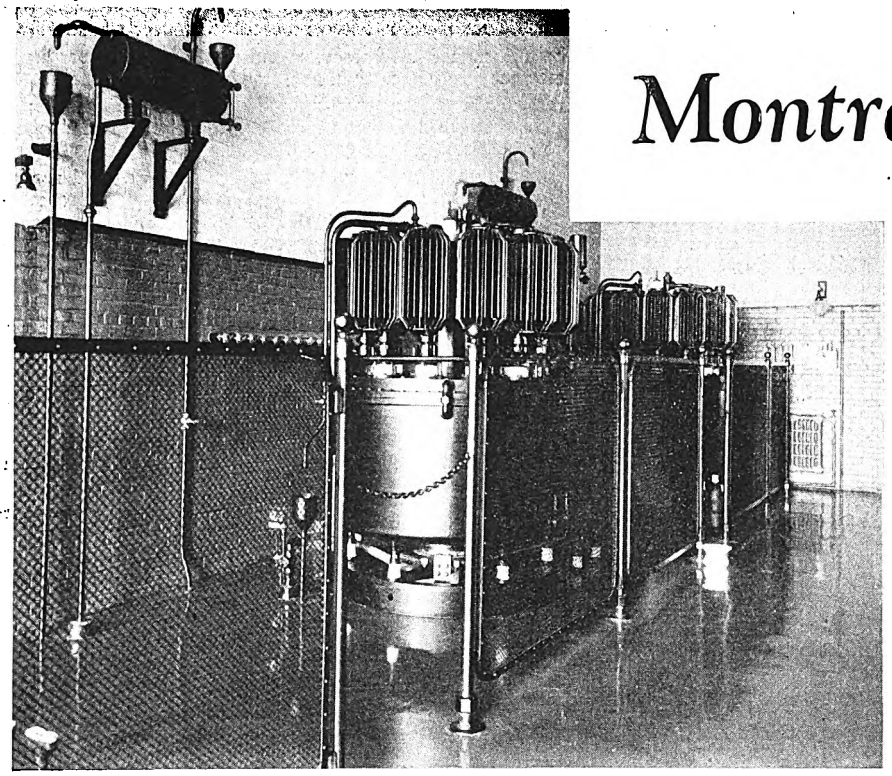


At present two 1,200-kw. rectifiers are installed in the Rockfield station. Space is provided for two additional units

Montreal Tramways Mercury

Results with earlier installation at Verdun prompted the construction of a new station

By

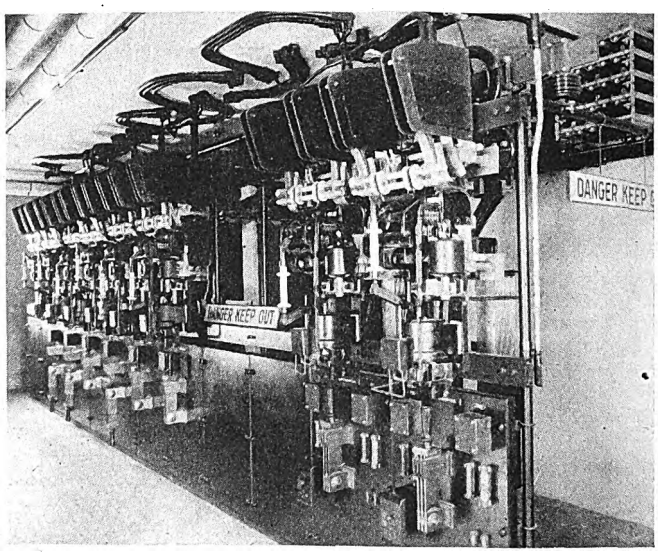
M. L. de ANGELIS

Assistant Electrical Engineer
Montreal Tramways, Montreal, Canada

PROGRESS in the design of rectifying equipment has been so great in the past few years that when, after experience of nearly two years with the Verdun substation, the Montreal Tramways decided to install a second automatic substation using rectifiers it was found possible to make a considerable saving in size and arrangement of the units. The earlier installation was the subject of an article in this paper for April 30, 1927, page 766. Originally two rectifier units, each consisting of two 600-kw. cylinders, were included. Later a third unit was installed, bringing the capacity of the Verdun station up to its designed maximum of 3,600 kw. The dimensions of the building were approximately 37 ft. 6 in. x 79 ft. 6 in. x 34 ft. high, or 28.2 cu.ft. per kilowatt installed capacity.

Before the new Rockfield station, which is located in the suburban town of Ville St. Pierre, approximately two miles west of the Montreal city limits, was designed, the progress in mercury arc rectifiers had been so great that the Brown-Boveri Electric Company, which through Griswold & Company, Ltd., of Montreal, furnished the equipment for both installations, was able to supply rectifiers delivering 1,200 kw. from a single cylinder of a size only slightly larger than that of the 600-kw. cylinders at Verdun. Switching and control apparatus have likewise been refined. It was found possible to construct a building 78 ft. 4 in. x 36 ft. 3 in. x 30 ft. high to house all equipment for four 1,200-kw. units, or a volume of 17.7 cu.ft. per kilowatt of ultimate capacity. At present only two units are installed.

The substation is built of brick with a concrete basement, carefully waterproofed. The main rectifier room is finished in red brick, with concrete floor and roof. The high-tension oil circuit breaker cells and bus structure are along one side of the main room, while the rectifier units are on the opposite side. The circuit breaker cells are built of concrete, and are enclosed at the front by fireproof cell doors. An I-beam supported from the roof immediately over the rectifiers carries a 5-ton chain block for use in dismantling them. The floor of the transformer compartment rests directly on the ground. As the rectifiers are light in weight, no special foundations were needed.



The direct-current feeder switchboard is on the floor directly below the a.c. control board

The basement has a ceiling height of 9 ft. It contains the main room in which are placed the auxiliary devices and the reactors, a furnace room and a toilet. To ventilate the basement there is one large

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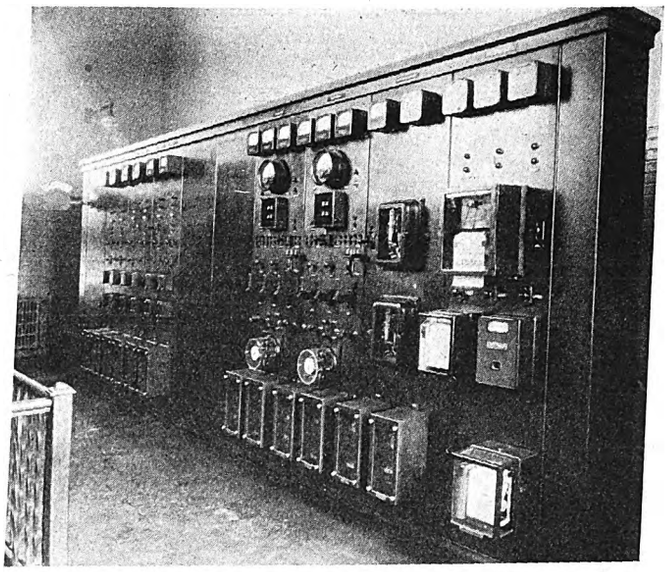
l Tram xtends Use of

Mer rc Rectifiers



The control switchboard handles all the alternating circuits of the entering lines and the input to the rectifiers. The vacant panels are for two additional rectifiers

opening in the wall, which is equipped with shutters and screens. Flues are provided to exhaust the hot air from the recoolers. The building is fireproof throughout.

Energy at present is supplied by one 12,000-volt three-phase, 60-cycle aerial feeder, but switching equipment is available for an additional one. The oil circuit breakers on these feeders are not of the self-closing type, but must be closed by suitable control switches on the sub-station switchboard.

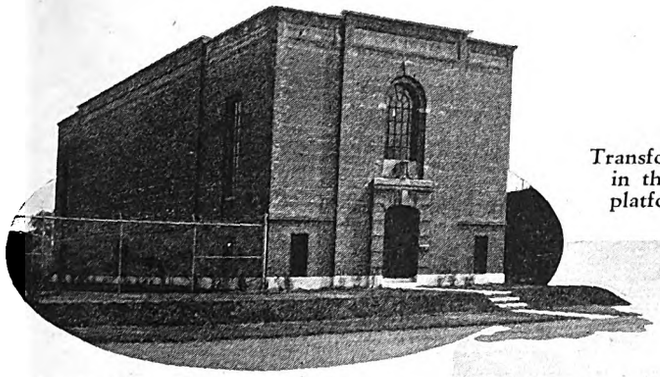
Each rectifier unit consists of one 2,000-amp., 600-volt cylinder fed from a three-phase double-six-phase 12,000/490-volt transformer of the oil-insulated, self-cooled type for outdoor installation, an ignition-excitation set and the necessary vacuum pumps. The rectifier unit weighs 6,100 lb. and the complete transformer 21,200 lb. For feeding the trolley lines there are six 2,000-amp. feeders, with a blank panel for two future feeders.

The rectifiers are cooled by a closed water circulating system, with a radiator-type cooler. Circulation is by centrifugal pumps and blower fans are used to force air through the radiator. The air is taken in from the basement and is discharged through flues from the building. The high-vacuum pumps are cooled with city water, but their consumption is small.

The transformer cells are at the side of the building nearest the rectifiers and are separated from the interior by a fireproof wall. They are roofed over, but the fronts are left open for removal and for ventilation. They are protected with heavy wire screens and may be closed entirely by Kinnear rolling steel doors. Louvers in the walls above the doors, and ventilators in the roof provide for additional ventilation. A feature of the transformer installation is that each transformer is mounted on a truck which runs on a track at the level of the deck of a flat car which may be run on a siding alongside the building.

OPERATING STATISTICS OF ROCKFIELD MERCURY ARC RECTIFIER SUBSTATION, MONTREAL TRAMWAYS, JAN 5 UP TO JUNE 1, 1929

	Unit No. 1	Unit No. 2	Total or Average
Hours of operation	1,548.36	1,598.26	3,146.62
Output in d.c. kilowatt-hours	597,870	594,960	1,192,830
Input in a.c. kilowatt-hours	.....	.....	1,285,480
Average efficiency including all auxiliaries, per cent	.....	.....	92.5
Maximum d.c. load on station, kw	.....	.....	1,210
Water used for cooling high-vacuum pumps, gal.	30,960	31,960	62,920
Time during which units were not available for service, hours	23	0	.....
Time during which units were not available, per cent of total	0.66	0	.....



The Rockfield substation is located in a rapidly-developing section of the city, adjacent to the Lachine canal

Transformers are housed in individual fireproof compartments, with tracks in the floor at the height above the railroad siding of a freight car platform. Kinnear steel doors protect them from the weather

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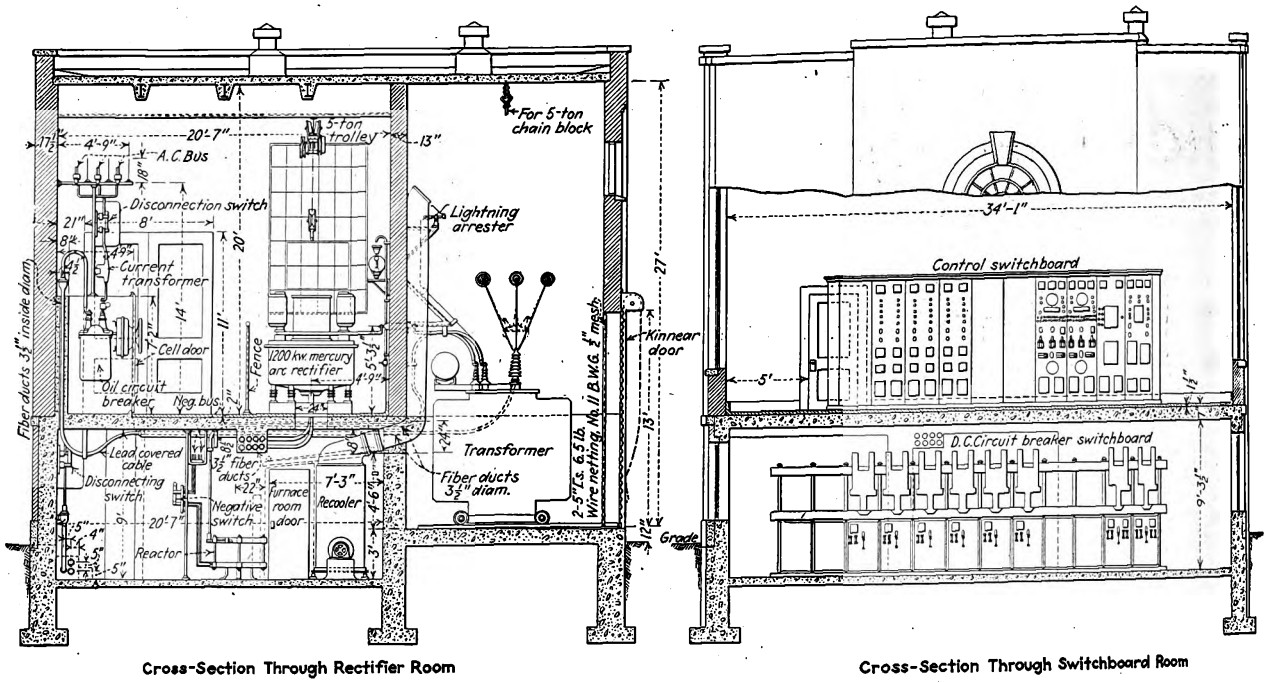
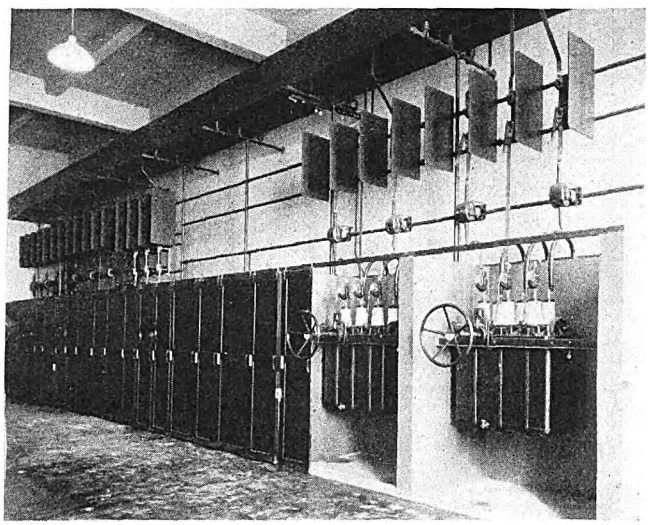


Cross-Section Through Rectifier Room

Cross-Section Through Switchboard Room

Sections through the main rectifier room and basement and through the switchboard room. The a.c. control switchboard is on the main floor and the d.c. feeder board is beneath at the basement level

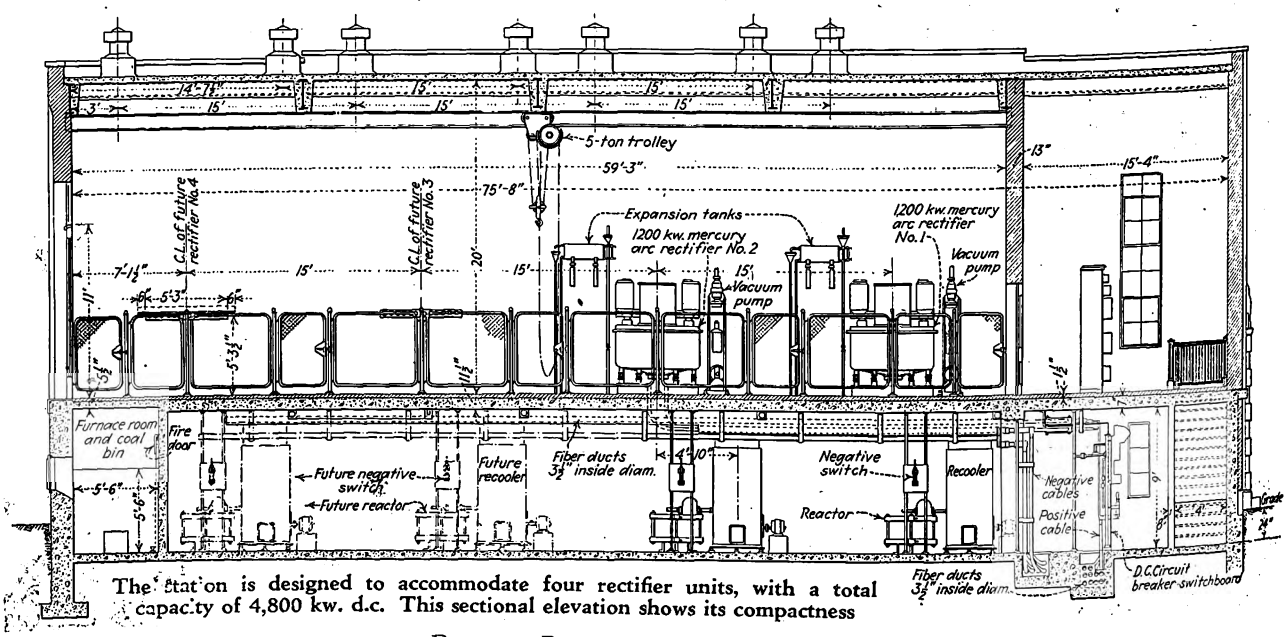


The high-tension oil breakers are housed in concrete compartments in the main room

An innovation in the Rockfield station is that the main control switchboard is in a separate room in the front of the building. It contains the operating switches and automatic control for the entire station, except for the direct-current lines. The feeder board is in a separate room in the basement directly beneath the main control board. The wiring between the two is thus made short and direct.

The equipment is so designed that the station is entirely automatic. It will start either at a predetermined value of 540 volts d.c. on the trolley, by clock or remote control. The sequence consists in closing the high-tension rectifier circuit breaker, starting the vacuum pumps, the ignition and the excitation anodes, and closing the d.c. rectifier breaker on the 600-volt bus. It can be disconnected automatically either at a predetermined low value of about 10 per cent of full load, by clock or by remote control.

The rectifiers are protected against overload, arc-



The station is designed to accommodate four rectifier units, with a total capacity of 4,800 kw. d.c. This sectional elevation shows its compactness

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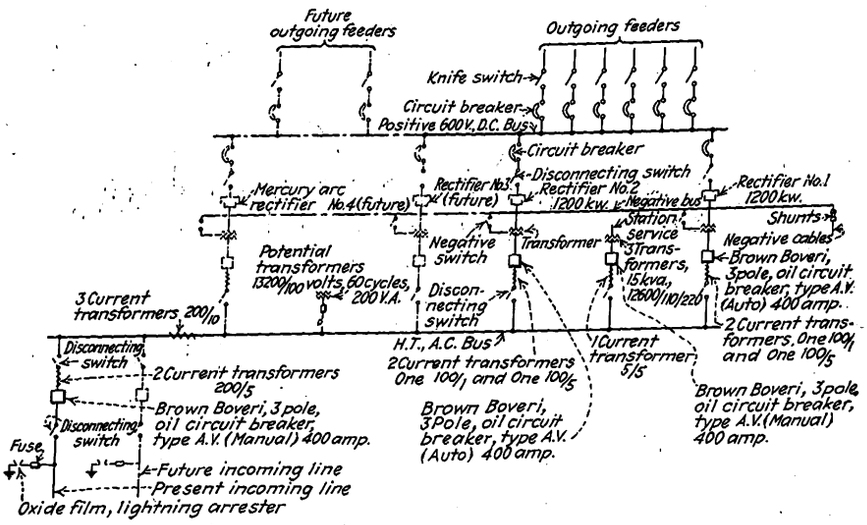
backs, overheating of anodes, failure of vacuum and of cooling water. In the event of an overload or a short circuit the breakers will reclose after each tripping for three times at predetermined time intervals. After this, if abnormal conditions still prevail, the unit or units are locked out. The circuit breaker also will trip and be locked out by excessive heating of the rectifier, by failure of cooling water, by reversed phase or single-phase conditions, or by excessive low vacuum. The plant will not restart until the inspector has reset the lockout switch.

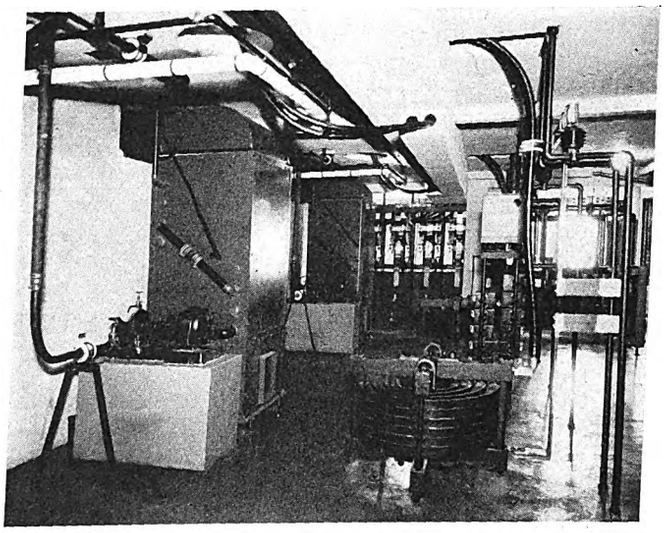
The mercury condensation high-vacuum pumps always are in operation when the rectifiers are in service, but the rotary or roughing pumps operate only according to the degree of vacuum in the rectifier cylinder.



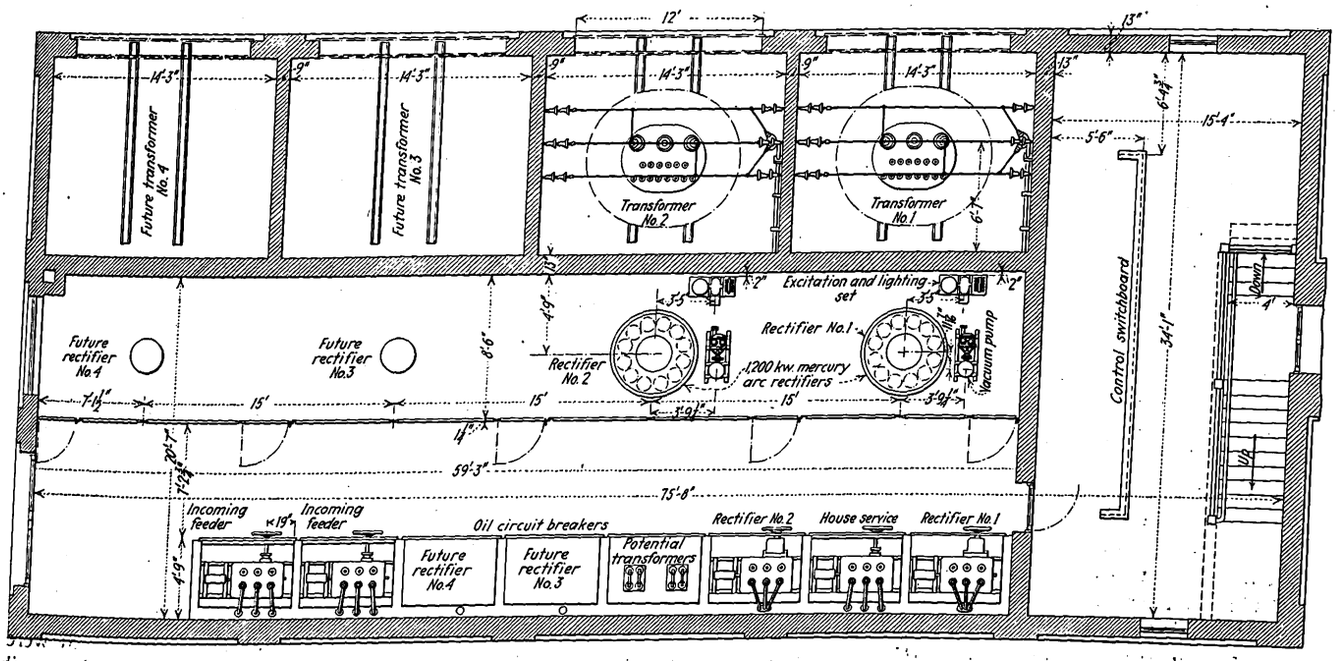
This one-line schematic diagram shows the connections of the two rectifiers installed and the provisions for the two future units. Every effort has been made to keep the equipment simple and reliable

The d.c. feeder breakers are independent of the rectifiers and normally are closed. If tripped by overload or short circuit, they reclose automatically three times at predetermined time intervals. If tripped after the last reclosure they are locked out and must be reset by the inspector.

The station feeds the Lachine and Montreal West divisions of the Montreal Tramways. The building was begun in the spring of 1928 and completed in the fall of the same year. The equipment was then installed and was placed in service on Jan. 5 of this year and has been in service continuously since then, being in operation for 3,146.62 hours out of a total of 3,504 hours of elapsed time. One rectifier has been available for service throughout this period, and the other was out of service 23 hours, or 0.66 per cent of the total time. Because of the present distribution system the station cannot be loaded more heavily, but contemplated changes will in the very near future allot more load to the equipment. Operating statistics are given in the accompanying table.



In the basement are located the recooler, the reactors, the negative bus and the house transformers. The reactors shown in the foreground are to eliminate telephone interference



Plan of the Rockfield substation of the Montreal Tramways. The transformers are in separate compartments, with fire walls between each other and the main operating room. The switchboards are in a separate section at the front of the building by a fire wall

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Promotion of

More Profitable Business

Outstanding Topic at C.E.R.A. Convention

MEMBERS and guests of the Central Electric Railway Association assembled at the Golfmore Hotel, Grand Beach, Mich., on June 27 and 28 for a convention, which was one of the most interesting and profitable meetings ever held by the association. The sessions were all well attended, and much interest was shown in all the papers presented. The outstanding feature of the two-day program was a symposium on the promotion of more profitable business, sponsored by D. R. Thomas, president of the Electric Railways Freight Company. Papers on the fundamental problems of the industry and subjects of special interest gave the program excellent balance. The sessions were presided over by President L. M. Brown, vice-president Interstate Public Service Company, Indianapolis, Ind.

The symposium arranged by Mr. Thomas was participated in by seven speakers, who developed the subjects of urban railway business, freight business, truck and trailer interurban operation, express service and advertising. The first paper of the group, on "Promotion of More Profitable Urban Railway Business," was presented by R. N. Graham, manager of railways Penn-Ohio System, Youngstown, Ohio. Mr. Graham pointed out the various factors that have been responsible for the large increase in revenue on his system, emphasizing particularly the results of instituting the weekly pass. He stated that the most logical way to build up more business was to encourage riding in the off-peak hours, when the cars usually carry light loads, by offering the public this service at a more attractive rate. Mr. Graham pointed out the effectiveness of the weekly pass in building up this off-peak riding and how it was proving a time saver to both the patrons boarding the cars and the operators. He also asserted that the pass was serving as a good-will builder for his company.

"The promotion of a more profitable freight business for the electric railway means the promotion of a more profitable service for the customer. Business means service, and unless service is rendered there will be no business—and by service is meant actual performance and not clever conversation." Developing this thought, Frank W. Gerlach, assistant to the president Electric Railways Freight Company, Cleveland, Ohio, pointed out that it is necessary for the electric railways to render the service required by the public in a more satisfactory manner than can be rendered by any other carrier. According to Mr. Gerlach, to meet fully the freight transportation requirements of the public and to promote business in the greatest degree, the electric railways must do one or more of the following things, dependent upon the local conditions affecting the operation of each company:

1. Co-ordinate rail and truck operation, so as to serve off-line points, these truck lines to be used as feeders for the electric railway lines.
2. Provide the shippers and consignees with pick-up and delivery service.
3. Render container service to attract the higher class commodities now carried by truck companies.
4. Encourage the development of carload forwarding companies that will specialize in handling business over the electric railway lines.
5. Take advantage of profitable opportunities to co-ordinate electric railway facilities with those of steam railroad, water navigation and airway companies.
6. Operate freight trains on limited passenger train schedules.
7. Fix the departure of trains at hours most suitable to the shipper, and maintain a force at terminals to meet requirements of the shipper and consignee.
8. Develop the initiative and promotional ingenuity of the sales organization and station agents.
9. Utilize the purchasing power of the company.
10. Improve the appearance of electric railway freight equipment.

Development of an extensive truck and trailer operation in southern Michigan, as well as between Flint, Saginaw and Bay City, by the Southern Michigan Transportation Company, was described by G. W. Quackenbush, traffic manager Michigan Railroad, Grand Rapids, Mich. Mr. Quackenbush could not give a comprehensive report as to the operating efficiency of the system nor figures as to the value of traffic handled, since the new service was instituted only recently, but he did give a clear picture of the character of service offered and the extent of the company's system.

Revenue Possibilities in Express Service

Real express service on electric railways was the subject of a paper by F. W. Brown, general manager Electric Package Agency, Cleveland, Ohio. Mr. Brown explained the character of the service which his company offers and pointed out that real express service is a distinct field, entirely separate from and non-competitive with any other class of service offered by electric railways. He showed that the service could be instituted practically on almost any interurban system and outlined the many advantages of such an express service. An abstract of the paper accompanies this report.

"It is axiomatic," stated W. S. Rodger, traffic manager Eastern Michigan Railways, Detroit, Mich., speaking on the subject of public demands on our transportation system, "that our patrons are demanding speed, safety and comfort from transportation companies in a constantly increasing manner. The demands made upon us for improvements," he continued, "may be the result of our competitors stepping faster than we do and inaugurating methods, which we have silently realized were desirable, but which were withheld from adoption until we were forced to do so, because of inertia or lack of

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capital. It is also true that competitors have been stirred to action by our efforts. The continued advancement that is being made in our industry is the result of development by all who are engaged in it, and it is up to us to keep at the head of the parade of progress if we expect to succeed and get our share of the constantly increasing volume of traffic which is offered for handling by some means or other. We cannot afford to sit idly by and let the private automobile handle the passengers or the highway truck handle the freight."

The final speaker of the symposium on the promotion of more profitable business was Labert St. Clair, di-

Real Express Service Offers Revenue Possibilities

By F. W. Brown
General Manager Electric Package Agency
Cleveland, Ohio

ELECTRIC railways, keen for new sources of revenue, will find in express service a source entirely undeveloped and with very promising possibilities. With proper encouragement and development it can be made into a profitable activity, not competitive with any other class of service but bringing new shippers into the fold and creating entirely new revenue.

Express service must not be confused with fast freight. It is a different class of service, to serve a different class of shipper. It's the terminal service on shipments and other special features that distinguish it from freight service. The two services do not conflict in any way, and the demand for one is not satisfied when supplied with the other. The public has more in mind when demanding express service than rapid movement between two points. It may have in mind the free pick-up or delivery at point of origin or destination, or that such pick-up would be made long after freight houses are closed, or delivery at destination for an early market, also long before freight shipments would be available. Again, it may desire that the invoice price of the shipment be collected before the consignee can get possession, it might carry an unusual value making insurance desirable or the shipment may be routed over a transfer point, in which case there is often 24 hours quicker service by express than by freight. These are some of the features that the public quite likely has in mind when demanding express service.

The pick-up service at point of origin gets to the small shipper who does not maintain his own truck. It is usually cheaper to call for the express company than to hire a truck to take the goods to the freight house. It also furnishes service without regard to the closing regulations of freight houses.

Delivery service at destination is another feature which the freight department cannot supply at the rate charged for freight transportation. Delivery at 4 a.m. on the market, often with C.O.D. collection to be made, department store purchases of the previous night that must be at the door when the store is opened the next morning, and delivery of individual packages are examples of service that would be impossible by freight.

The classification provided by the express companies permits of the handling of shipments without the same rigid requirements as to containers and packing insisted upon by freight. Trunks and suitcases are handled under a seal, household goods without the necessity of crating and boxing as when sent by freight, and the higher rate secured for the service is based on those conditions.

A great many C.O.D. shipments are handled where the collections are small, and other times when they run into a large amount, but with the rapid movement of shipments by electric freight it is impossible to get an order bill of lading through the bank as soon as the shipment reaches destination. Therefore the handling of C.O.D. shipments by express allows the shipper to get his merchandise to the consignee and collection of the charges at the same time. It also provides an additional source of revenue in the return of money to the shipper.

Ordinary express rates are based on a valuation of $50, and if the shipment carries a greater value an additional charge is made. Therefore, it is possible for a shipper to place the true value on his shipment, pay the necessary fee and have the merchandise insured.

Express rates are usually of two classes, first and second, the first class rate being approximately three times that of first class freight and the second class rate about 25 per cent less than first class. Food products generally fall into the second class.

Express service as described is offered on the electric railways operating into Cleveland and on some of their connecting lines by the Electric Package Agency, which started its service at Cleveland more than 25 years ago, long before freight service was provided on these lines. When regular freight service was instituted the Electric Package Agency continued to serve as an express carrier only. It now provides almost identically the same service on the electric lines over which it operates as the American Railway Express provides on steam railroads.

Complete merchandise express service is provided by the Electric Package Agency over the lines of the Lake Shore Electric Railway; the Cleveland, Southwestern Railway & Light Company; the Northern Ohio Power & Light Company; the Pennsylvania-Ohio System; the Stark Electric Railroad, and to Detroit over the Eastern Michigan lines. It is an entirely separate organization, the directors being the managers of certain of the lines over which it operates, but its management, accounting, supervising and soliciting are entirely separate.

Under the contract with the railways every phase of the service except the actual transportation between point of origin and destination and the station service at such points is performed by the Electric Package Agency. This includes responsibility for shipments between shipper's door and warehouse at point of origin and after received from the railway at destination, supervising, soliciting, advertising, auditing and costs of necessary supplies. The railway receives a shipment from a driver at a point of origin, bills it on an Electric Package waybill and delivers it to a driver at the destination, who collects charges and returns same to the agent. Thus the service performed by the railway is less than for interline or local freight shipments, as no accounting, except that of the local agent, is required, nor is warehouse storage space needed. The average rate received by

Trucks used by the Electric Package Agency for the collection and delivery of express shipments in Cleveland

the railway for this service is 1½ times first-class freight rate on local shipments and above first-class freight rate on interline shipments. Each railway is furnished a settlement report by the 15th of each succeeding month, together with a check for its proportion of earnings.

The advantages of express service may be summed up as follows: The rates charged are the same as those of the old line express company, which are about three times first-class freight rates and, after deducting the cost of the extra terminal service, leaves to carriers a rate per 100 lb. above first-class freight rate, about double the average per 100-lb. rate received for freight shipments. The service adds new business at this high rate which cannot be secured unless you supply all of the features of this class of service, and which the shipper is paying for but finds is essential. It does not conflict with any other class of business you are now handling, either "dispatch freight" or regular freight with free truck service for large shipments. It does not add greatly to operating costs, and in many cases adds nothing at all. It adds a new shipper to your line, who brings the business to your warehouse and takes it away promptly, thus not congesting your terminal, and it pays you liberally and well for your service.

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rector of advertising American Electric Railway Association. Mr. St. Clair confined his remarks to the securing of newspaper publicity, advertising that does not cost. He stated that the public is interested in stocks and business at the present time, and that newspapers are anxious to receive public utility news. Have a reporter call if you have something of interest for the newspaper, was the advice of Mr. St. Clair. He urged that all contributions be made brief and suggested as likely material, speeches, live pictures and editorial thoughts.

Likening the flat and cut rate taxicab operations in the country to a virulent disease with the unhealthy ability to spread throughout the country with disastrous results, H. A. Inness Brown, editor of *Taxi Weekly*, urged that the electric railways co-operate with the legitimate metered taxicab companies in battling this evil. Mr. Brown indicated that the present expansion of cut rate taxicab operation is similar to the jitney peril, which so seriously injured the electric railways several years ago, before being forced out of business. Mr. Brown's paper appears in abstract below.

"One of the foremost problems facing the street railway industry is the formulation of its policy with regard

Flat and Cut-Rate Taxicabs a Serious Menace

By H. A. Inness Brown
Editor "Taxi Weekly"

FLAT and cut-rate taxicab operations, in spite of being basically unsound, constantly demonstrate the unhealthy ability of a virulent disease to spread throughout the transportation system of this country. There is nothing really new about this disease. The railways had an attack of it just about fifteen years ago. At that time it was called the "jitney peril."

The street car companies, being unprotected by proper legislation, were seriously injured by these jitneys, some of them being actually forced out of operation. Gradually, however, by drawing public attention to the menace, and by obtaining proper laws against such unfair competition, the jitneys were forced to discontinue. But before such legislation could be obtained hundreds of thousands of dollars had been lost by the street car companies as well as by the jitney operator.

Meanwhile the taxicab business developed. Companies built up good service and a following by furnishing comfortable, standardized cabs with capable, polite drivers. They created the measured mile so that the passenger might pay at a reasonable rate for the actual transportation used. The tendency was to complete personal service with better taxicabs and better drivers.

From 1914 to 1928 the legitimate cab companies prospered. They attracted capital. They made friends. It looked as if nothing could wreck or hurt the business. But in the business itself there were growing up a number of men who knew nothing about costs but who saw an opportunity to "put over something" on the old-time taxicab operator. The taxicab business was suddenly subjected to a similar disease as that which attacked the street railway companies in 1913. Here's how it occurred:

In the spring of 1927 a cab driver in the city of Rochester, N. Y., who had been discharged by his employer, conceived the idea of establishing a cab company which would operate upon rates of fare much lower than those in existence. He received credit from pleasure car dealers, from the tire companies and from the gasoline and oil people. He brought his cabs out at a cut rate of 25 cents and obtained a great volume of business immediately—some of which came from former taxicab patrons of the legitimate taxicab company and some of which came from the street railway company.

All of this business, however, was obtained at a loss and the company was finally abandoned and its promoter had to go elsewhere. Either through his own efforts or through some of his friends, he established, however, other cab operations in Syracuse and Utica. The idea began to spread. Money, taxicab drivers were told, could be made by operating at cut rates. Almost immediately cut-rate operations started in various parts of the country, most of them being financed by pleasure car dealers.

While this Rochester operator did not make money for himself he had caused great losses to the legitimate cab business in the various cities where he had started operations, often forcing the legitimate cab company to reduce its prices so that it in turn competed with the street car companies for riders. For a brief time, it looked as if this new sort of flat-rate operation was profitable. The cars were new and they needed little attention. Soon, however, depreciation began to get in its work—and the cab companies, including those started by the original promoter, began to look for a way back to higher rates and measured miles.

A good example of the outcome of this type of operation is afforded in Columbus, Ohio, where, after a comparatively short period, three companies went bankrupt and Cy Hill, the driver who introduced the flat-rate cabs, left town. His company was overwhelmed in debt, his drivers unpaid, judgments unsatisfied and his cabs worn out. The legitimate cab companies lost money by the invasion and the electric railway suffered a severe reduction in revenue during the period.

But the picture of Columbus might well be the picture of any reasonably large town in America. More than 100 cab companies, which attempted flat rates in the last year, are now in the process of reorganization or liquidation.

It is unfortunate that these failures are not solving the problem of cut rates. Promotions of cut-rate cabs are still going through the country. These promotions are based on the product of one of the largest cheap car manufacturers in America. The method is to offer the cabs for sale to the legitimate cab company. If this company cannot buy them, because they are unsuitable to cab operation, the automobile company's representatives then offer them to the drivers or form a company to operate them at a rate below the standard. The result is a taxicab operation below costs—a taxicab operation that offers a ride at street car prices—a taxicab operation that makes no money but makes everyone in the transportation business lose money.

This problem may seem to be only a taxicab problem. But is it really limited to taxicabs? Has it any effect on the revenue of the street railway company? I believe it has a devastating effect. In Seattle, for instance, the electric railway there reported a loss of $800 a day, due to flat-rate operation. In Columbus a 25 per cent reduction in the number of street car riders occurred during the height of the flat-rate war at a cost of about $20,000 a month to the railway. In Providence the railway said that unless something was done to give them protection from flat-rate taxicab operators that they would be forced to abandon their franchises. In Worcester a similar condition existed, while in at least five other cities of reasonable size, including Richmond, flat-rate operation caused a loss of from $250 to $2,000 a day to regular street car lines.

138 Cities Have Cut-Rate Cabs

Cut rate operations, running at rates per person below the fare on the electric railway lines, have been established in Dayton, Columbus, Akron, Cleveland, Providence, Boston, Baltimore, Rochester, Richmond, Charleston, S. C., San Francisco, Seattle, San Diego, Cincinnati, Louisville, Detroit and 122 smaller cities.

In the West there is one cab company, operating at an extremely low rate, that is planning operations throughout the West and Middle West at rates below the cost of operation. This company's plans, as announced to the public, included the establishment of cut-rate cab companies in small cities as well as larger centers. They state frankly that their form of operation, which gives only transportation to the passenger, without any frills, is likely to cause the legitimate cab company great loss in business. They are after volume—the greatest number of riders at the cheapest possible price. This is vital news. It means that something must be done to prevent a new crop of cut-rate cabs.

The only real solution possible is protective legislation. And such legislation, if it is going to be really protective, must be sought by the electric railways as well as the taxicab companies. The cut rate business hurts the railways as much as it hurts the taxicab man. The taxicab company can meet the competition by cutting rates, but the railways must keep the same rates and fight the competition by the best possible service. If they are going to have the competition of the converted pleasure car or jitney lines, they must find some means of fighting it.

In the wake of flat-rate operations follow bankruptcy petitions, greatly increased traffic hazards, violations of municipal and state laws, demoralization of the transit lines, and an increased volume of rides at a loss. These are facts that force the thinking men in the taxicab business and in the electric railway business to realize that something must be done.

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to bus operation." With this statement, Thomas Fitzgerald, vice-president Pittsburgh Railways, Pittsburgh, Pa., launched a discussion on the fundamental principles involved in determining the bus policies of an electric railway. "The adoption of a hard and fast policy," Mr. Fitzgerald continued, "is believed to be impracticable, if not impossible. If we grant that the success of policies of public utilities in a large measure are dependent upon meeting and satisfying public opinion, it is self-evident that the bus policy of an electric railway must be adapted and adaptable to changing public opinion. Such a policy should be sufficiently flexible to meet the changing conditions not only in the field of bus operations as they develop, but in the field of electric railway operations as well."

In reviewing the elements which have contributed to the problem of determining the proper bus policy, Mr. Fitzgerald first pointed to the development of automotive vehicles and their effect. He held that it would be unwise to assume that the time has come to determine upon a definite policy toward the bus, in view of the continued expansion of the automotive industry. He warned that if railways continued to offer street car service, which is generally very little different from that offered to a former generation, and if at the same time, bus facilities and service are developed rapidly along modern lines, the effect on the public attitude must be unfavorable to the railway and favorable to the bus.

Mr. Fitzgerald named economy, through which more frequent car service may be provided, speed, reliability of service, greater comfort and elimination of noise as necessary elements in improving the railway service. He stressed the fact that public attitude toward electric railway management, over a long period of time, is based upon the efficiency with which the service is rendered. "This efficiency," he stated, "is directly dependent upon the financial strength of the electric railway, and the management, therefore, must preserve the financial and physical condition of their facilities to obtain success. From this viewpoint, the indicated policy toward the bus operation is that of employing the bus only when the results contribute to the economic well-being of the railway and bus facilities combined." Mr. Fitzgerald listed the fields in which the bus has been demonstrated to be effective and other developments that hold promise.

John R. Blackhall, general manager Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., speaking on the subject of improved interurban operation, named as the three main factors to consider in the operation of an interurban railroad the public, the employees and the investors. "If these three factors," he stated, "are constantly kept in mind by the management, operation will be reasonably successful, unless there is something basically wrong in the rates or financial structure of the organization and the location of the property." It is Mr. Blackhall's opinion that convenience of service is the strongest selling point the interurban railroad can put forward when bidding for the patronage of the public. He defined convenient service as transporting people from where they are to where they wish to go, with safety and comfort, in the shortest possible space of time—but above all, at the time they wish to go. He stressed the importance of making a thorough study of the traveling habits and requirements of the people in the communities served and scheduling trains to meet their requirements in the best possible manner. "The next important thing," he said, "is to see that the trains make the time shown on the time-table."

Expanding on the second factor, employees, Mr. Blackhall stated emphatically that it is impossible for the management of a company to give the public satisfactory service without the active co-operation of the employees. He told of the training given North Shore employees in the handling of customers, and stressed particularly the developing of interest in this work by continuing the training after the preliminary work. Mr. Blackhall told also of the training given North Shore employees in selling rides. He emphasized the point that employees cannot be expected to sell the service without the necessary training to equip them for that work.

"Make your product purchasable without petty irritation and through a price plan that automatically incites voluntary use of your service" was the advice of Walter Jackson, consultant on fares and motor buses, Mt. Vernon, N. Y., for winning and holding customers. Mr. Jackson referred to "habit-creating" fares as essential, along with improved equipment and service, in attracting patrons, and cited the merits of the weekly pass that make it an effective ride promoter.

Three Bus Sizes Meet Most Needs

In answering the question, "What size bus is best suited for city transportation?" Del A. Smith, general manager Department of Street Railways, Detroit, Mich., divided all regular bus lines into three general classifications and gave the type of bus considered best for each class of service as follows:

1. For light, feeder and shuttle service, as well as short extensions into thinly populated territory and outlying districts, the small 21-passenger bus is satisfactory because it makes possible the maximum frequency of service at the minimum cost per mile, providing no extreme peaks are encountered.
2. On secondary or medium lines which have a considerable volume of traffic with a fairly heavy peak load, the 29-passenger bus is desirable and economical because of the greater passenger appeal afforded without seriously lengthening the headway.
3. For main trunk lines and lines where the population is pyramiding or wherever extreme peak loads are encountered, the single-deck street car type bus seating 40 passengers is justified, because it has been proved that the operating cost per mile is but 50 per cent more than for the 21-passenger bus and about 25 per cent more than for the 29-passenger type, giving twice the seating capacity and room for four times as many standees as the 21-passenger unit. In short, the 40-passenger single-deck bus is preferable in service approaching mass transportation.

Mr. Smith also referred to special classes of service, such as de luxe express operation and the use of small capacity buses to replace jitneys. The paper was presented by Homer E. Libby.

The requirements of modern automatic control, as listed by B. O. Austin, control engineer Westinghouse Electric & Manufacturing Company, in his paper, are variable tractive effort, quick response to any change in the controller handle position, smooth and rapid acceleration, effective notching, ability to stop and hold the control at any point, adaptability to foot and hand operation, non-interference with safety devices, simplicity and reliability. Mr. Austin named the fundamental advantages of automatic control as variable automatic accelerating rates, maximum operating efficiency, foot control and low operating cost. Mr. Austin's paper was discussed by W. A. Clough, railway and bus equipment engineer, General Electric Company.

A golf tournament on the afternoon of the first day was the high spot of the entertainment program. At the banquet held the same evening, the entertainment was furnished by the South Shore Chorus, "Mary and Jim," popular radio artists, and a première danseuse from Chicago. Following the banquet a dance was held.

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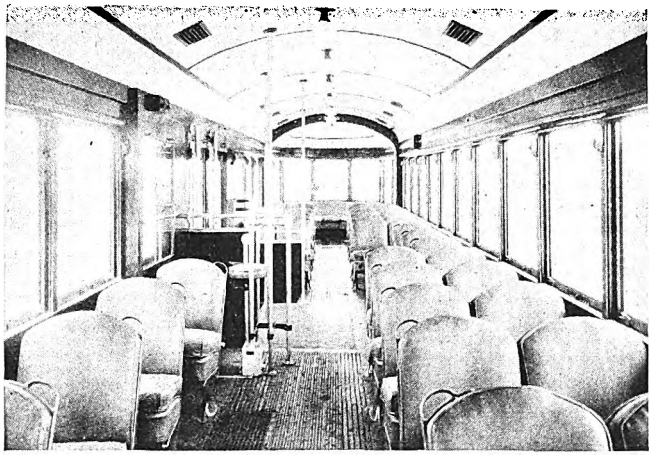


Interior of new Detroit car

Speedy Light-Weight Car Built at Detroit

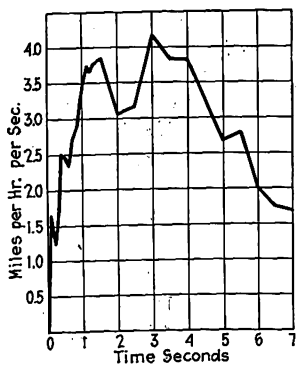
Design of experimental vehicle includes extensive use of aluminum. Four high-speed 50-hp. motors are mounted on Timken trucks

LIGHT WEIGHT, rapid acceleration, and high free-running speed are features of an experimental car recently built by the Department of Street Railways, Detroit. Factors which have contributed to keeping down the weight are: Light-weight motors and trucks, reduced amount of steel framing in car body, absence of heavy brake rigging, use of aluminum as the material for the trolley pole, bumpers, door engines, air compressor and piping.

	New Car, Pounds	Old Car, Pounds
Car body weight	19,400	21,320
Trucks	9,280 (incl. gears)	9,940
Motors	3,820	5,240 (incl. gears)
	32,500	36,500 lbs.

In general, the car follows the Peter Witt design now standard on this system. Four Westinghouse 300-volt 60-hp. motors are mounted on Timken model 52 trucks. General Electric 16-point automatic control is used. The following comparison shows where the reductions in weight have been made.

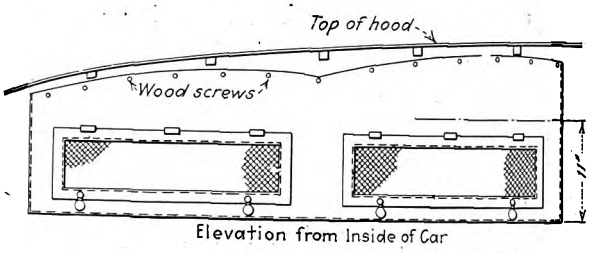
Preliminary tests show this equipment to produce an acceleration rate of 4.18 m.p.h.p.s. in the first three seconds. The acceleration is of such a smooth character as to cause no inconvenience to the passenger, although he cannot fail to notice the speedy action of the car. The numerical value of the rate of acceleration has been determined by the use of a Cambridge recording accelerometer, and a typical acceleration curve is shown in an accompanying illustration.



Rapid acceleration shown by tests of new Detroit car

The braking system is straight air but has the novel feature of using a foot-operated brake valve of the G. E. VB-2 type. This is a balanced air pressure valve and gives an operation akin to that of braking an ordinary automobile. The pedal is spring controlled and may be locked in the application position. The air brake piping is made of dead soft aluminum tubing. The radiating coil for the air brake system is made of a finned type of pipe recently designed by the Peter Smith Heater Company. It possesses the advantage of reduced weight, less internal friction and simplified installation.

The body is of steel construction and uses U-shaped posts and carlines. Wooden post fillers are not used but aluminum post facing of a section shown in an accompanying sketch. The seating arrangement is much the same as previously used except that cross seats have been substituted for longitudinal seats in the forward section. The seats are of an individual type and are deep upholstered with cushioned backs, giving the maximum of seating comfort. The upholstery is Delft blue leather which, with mahogany woodwork, makes a pleasing combination.

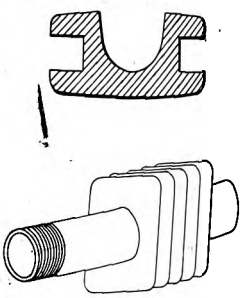


Novel devices included in design

Above: Ventilated cover for door engine allows warm air to circulate around apparatus and prevents freezing in winter.

At right: Cross-section of aluminum window post facing.

Below: Finned pipe radiating coil for braking system.



As a departure from customary practice on this property a single sash was substituted for the usual upper and lower sash, and as the post centers were increased from 29¼ in. to 33½ in. the sash is wider, thus improving the appearance of the car. A wide bottom sash rail was used and into each was fitted an individual ventilator. Forced ventilation is used, following a design developed by the Peter Smith Heater Company. With this system air is admitted to the car through intake ventilators on the roof and exhausted through four grilles distributed in the floor. The exhaust is accomplished by means of a motor-driven exhaust fan suspended under the car floor and connected to the floor grilles by flexible metal tubing.

Reduction of unsprung weight is one of the most important of several noise reduction features that have been included in the design, others are worm gear drive, rubber spring supports, rubber motor supports, rubber mounting of air compressor and trolley base, and sound insulating of the floor with felt. The operation of the car from the noise standpoint has proved highly satisfactory.

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A.I.E.E. Discusses

Railway Electrification

At the transportation session during the Swampscott convention the Mexican Railway electrification, contact wire wear and substation design were important topics

PROMINENT on the program of the summer convention of the American Institute of Electrical Engineers, held at Swampscott, Mass., June 24-28, was the subject of transportation. The committee on that subject, headed by W. M. Vandersluis, presented a report showing the progress of electrification of steam railroads during the year. Reference was made to the projects of the Pennsylvania Railroad, the Great Northern Railway, the Cleveland Union Terminal Company, the Reading Company, the Delaware, Lackawanna & Western Railroad, the Boston, Revere Beach & Lynn Railroad and the city of Rochester. These have been mentioned in this paper from time to time. Diesel-electric locomotives, rail cars, supervisory control for substations, mercury arc rectifiers and high-speed circuit breakers are also included among the developments of the year.

Four papers of interest to electric railway engineers were presented. These covered the electrification of the Mexican Railway, contact wire wear on electric railroads, an alternating-current electric railroad substation of the Pennsylvania, and the direct-current substations supplying the Illinois Central. Brief abstracts of these papers follow.

Mexican Railway Electrification Discussed

The paper on this subject, by J. B. Cox of the General Electric Company, gives operating results of the electrification of the Mexican Railway, Ltd., which was the first railway built in Mexico, having been opened to traffic on Jan. 1, 1873. The main line runs between Mexico City and Vera Cruz and is 264 miles long. There are six branch lines which increase the route miles to a total of 482. The most difficult portion of the line consists of 19 miles of 4.7 per cent grade between Encinar and Boca del Monte, where the table-land is reached. In 1921, when the road was returned to its owners following five years of government operation, the property was found to be in unsatisfactory condition, with operating expenses more than doubled, thereby increasing the operating ratio from 0.51 in 1924 to 0.79 in 1920. Higher wages and new working agreements were largely responsible and continued to become more difficult. The mountain division had about reached its maximum capacity with the existing equipment, making it necessary to consider improvements.

A study of the operating costs of this section was made in 1921, from which it was apparent that electrification would relieve the congestion and make it possible to more than double the capacity of the line and at the same time make a yearly saving of $523,000 in operating expense. The electrification was estimated to cost $2,420,000, thus indicating a return of 21 per cent on the gross investment including electric locomotives, in addition to the increased capacity and many other advantages.

Construction work was started in January, 1923, and electric operation between Orizaba and Esperenza was complete in January, 1925. The total cost for the 29-mile section was $2,427,480. Internal disturbances delayed the work several months and reduced the traffic greatly. In March and April, 1928, the traffic became comparable with that of September and October, 1921, for which period the actual traffic records and operating costs with steam had been used as a basis for comparison with the estimated cost of an equal traffic with electric operation.

In the meantime the general results had been so satisfactory that the electrification was extended 35 miles south to Paso del Macho, making a total of 64 miles at a cost of $3,606,937.

The system is operated with 3,000 volts direct current, supplied from a simple catenary system with double No. 0000 trolley wire on the main line and single No. 0000 trolley in yards and passing tracks. There are two 500,000 circ.mil positive feeders and one No. 0000 negative feeder between Orizaba and Boca del Monte. Originally a single substation was installed near Maltrata, being almost in the center of the feeder circuit. This station contains two 3,000-kw., 3,000-volt, three-unit synchronous motor-generator sets for supplying power to the original 29.5-mile electrification. With the extension of the electric zone to Paso del Macho, making the total length of route approximately 64 miles, a second substation was installed at Portrero. This contains two 1,500-kw. units which are similar, except for size, to the original equipment. Both stations are supplied with power purchased from the Puebla Tramway, Light & Power Company at 42,000 volts, 60 cycles.

The initial installation included ten locomotive units suitable for handling both passenger and freight trains. They are of the twin-geared six-motor articulated-truck type, capable of operating at a maximum speed of 40 m.p.h. and provided with equipment for regenerative electric braking. The motors are designed for 1,500 volts per commutator, two being permanently in series.

The Orizaba-Esperenza section has now been in complete operation electrically since January, 1925, and the full records for four years are available. During March and April, 1928, the traffic reached a new maximum

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which was in excess of that which was attained with steam. Briefly, the ten electric locomotives handled 36 per cent more tons than were handled by more than double the number of steam locomotives in September and October, 1921, with 8 per cent less trains and 40 per cent less train-hours on the road, and at 50 per cent of the corresponding total cost of steam operation for 26 per cent less tonnage. The saving was $67,102 for the two months, or at the rate of $402,612 per year, which alone represents more than 15 per cent on the total gross cost of electrification. This does not represent the total saving, as labor costs had increased sharply in the meantime. When the costs were adjusted to equal traffic and equal wages, it was shown that the equivalent costs for steam service would be $1,068,000 per annum and the electric costs $404,652. The indicated annual saving is thus $663,348, as compared with an estimate of $523,029.

Securing Flexibility in Contact Line

In his paper on contact wire wear on electric railroads, I. T. Landhy, assistant engineer Illinois Central Railroad, described the contact systems of several electrified roads. Flexibility in the contact plane is important, he held, and it can best be secured by staggering the points of support of the contact wire with respect to the messenger, while at the same time damping out the unwanted harmonic wave ahead of the pantograph by means of as high a tension in the contact wire as it will permit. Pantograph design resolves itself into a judicious composition of the following essentials: (1) Sufficient current-collecting surface; (2) lightweight moving parts; (3) sufficient uniform upward pressure; (4) freedom from friction in the bearings. Intrinsically, he said, lubrication plays an important rôle in reducing wear. On long tangents where the contact wire is in the middle of the pantograph the greater part of the time, the lubricant becomes depleted and wear is increased. On curves where the pantograph is wiped across the contact wire the wear is less, the lubricant from the ends of the pantographs being distributed over the whole surface. A comparison of contact wire measurements shows that there is approximately 30 per cent more wear on tangent track than on curves. The experience of the New Haven has been that, generally, the higher the speed the less the wear of the contact wire. The effect of contact wire wear of current collected is not so well known, but the general impression is that the greater the current the greater the wear.

Substations of the Illinois Central and Pennsylvania Described

J. V. B. Duer, electrical engineer Pennsylvania Railroad, described one of the a.c. outdoor substations supplying 11,000 volts single phase for the Philadelphia-Wilmington electrification. In this station all apparatus is in the open except the control board, which is located in a house designed for the purpose.

The railway substations for the 1,500-volt d.c. electrification of the Illinois Central were described by A. M. Garrett, engineer of substations, Commonwealth Edison Company. These substations, owned and operated by the Commonwealth Edison Company and the Public Service Company of Northern Illinois, receive the 60-cycle energy for conversion to direct current from the 12-kv. transmission system of the former and the 33-kv. system of the latter power company. Approximately 80 per cent of the conversion capacity is in synchronous converters and the remainder in mercury rectifiers. The decision to use rectifiers for a part of the load can be assigned to several reasons, principal among them being that this new type had the natural advantage which a unit with no moving parts has over one with rotating parts and wearable and friction surfaces. Other reasons included high efficiency with fluctuating loads, absence of noise and vibration, low maintenance expense, and the elimination of extensive ventilation facilities.

Discussion of the papers presented was called for en bloc by Chairman N. W. Storer, of the Westinghouse company, who presided. Prof. D. C. Jackson of Jackson & Moreland, Boston, commended Mr. Cox's paper because of the cost data included in it.

General Discussion Shows Interest in Electrification Problems

Sidney Withington, electrical engineer of the New Haven road, said the data presented by Mr. Cox would be more convincing if contrasts were made between the most modern steam locomotive power units and electrical equipment. The economies of superheaters, feed water heaters, etc., should be taken into account in modern comparisons. Referring to Mr. Landhy's paper, he said that it is still a question whether to lubricate the railway trolley wire or the pantograph shoe. It may be necessary to utilize some auxiliary moving part on top of the pantograph in order to cut down vibration. Chromium plated material may be useful in future pantograph design. Observation of trolley wear on the Providence-Fall River, Mass., electric branch indicates increased wear on sections of the line leaving stations, heavy accelerating currents being taken from the wire on these stretches.

C. S. Anderson, American Brass Company, pointed out that from 15 to 20 per cent less wear is being secured with cadmium-copper bronzes than with tin-copper bronzes. The former do not become brittle or "hot short" when overloaded.

Major E. L. Moreland, Boston, raised the point that the use of one vs. two contact shoes on pantographs deserves more thorough study in relation to wear. Several speakers maintained that the use of two shoes insures better contact, but the cost of such practice in terms of increased wear was not definitely acknowledged. Most of the speakers preferred two shoes.

W. B. Potter, consulting engineer General Electric Company, said that the electric locomotive presents the greatest problem in railroad electrification from the cost standpoint, in many cases running between 40 and 50 per cent of the total cost of electrifying. He said further that the mercury arc rectifier will be utilized more widely in the future, perhaps being available for 5,000-volt d.c. service in time. The unidirectional characteristics of its output make it promising in electrochemical applications. The future of railroad electrification is very bright, Mr. Potter declared.

In the closing remarks by the authors, it was brought out that the use of high towers by the Pennsylvania Railroad electrification was predicated by the spacing required for 132-kv. transmission. Mr. Garrett pointed out that a good deal remains to be learned about the operation of mercury arc rectifiers, including study of their interior performance, possible improvements and limitations. Results thus far obtained are good, but the subject is not a closed book.

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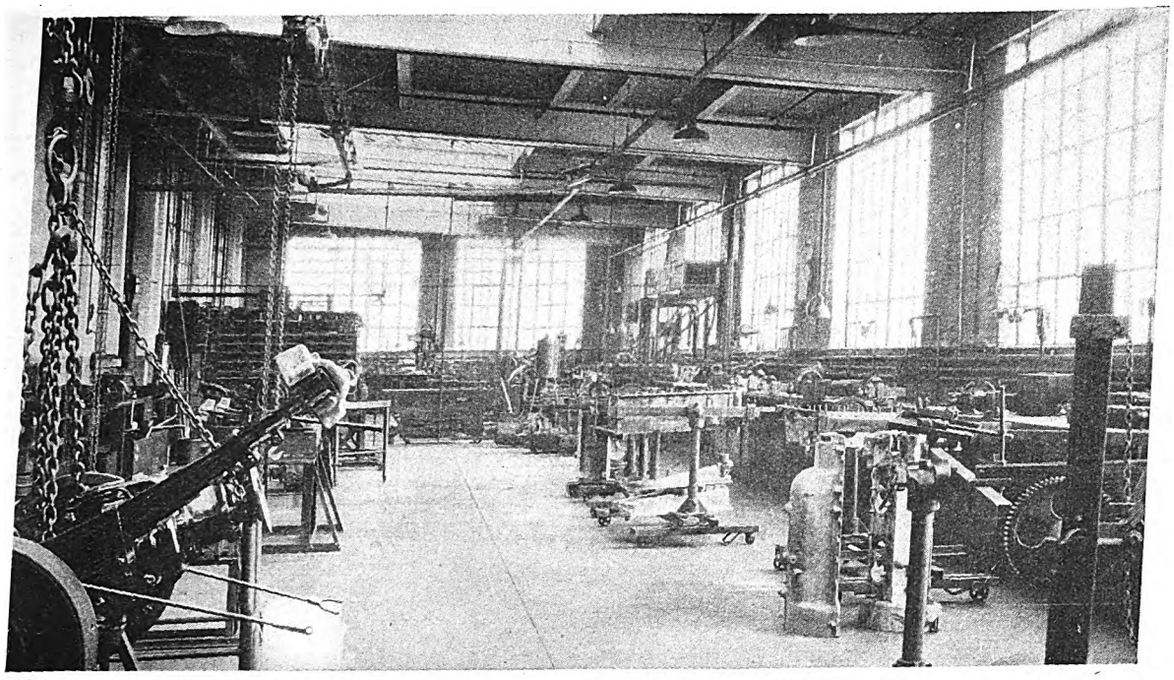

Transmission and axle overhaul is kept separate from motor rebuilding in New Haven bus shop of the Connecticut Company

DAILY CHECK

Shows Condition of Bus Fleet

Comprehensive reports keep Connecticut Company officials well posted concerning condition of equipment. Inspection and maintenance work is done at 15 operating garages. All overhauling is done at the New Haven shop on unit replacement basis. Painting not synchronized with overhaul.

MAINTENANCE of buses operated by the Connecticut Company is based on a mileage system, with the exception of painting, which takes place on an average of once every 12½ months. In order to know exactly when a bus has traveled the required distance for motor overhauling or general unit changes, the comptroller's office keeps accurate records of the distance traveled by each vehicle. When a bus has completed the specified mileage the maintenance department is informed promptly and it is taken out of service.

Experience has convinced the management that it is a good policy to overhaul the various units at predetermined intervals. One of the first requirements in keeping a bus constantly available is that any defect, however small, is brought immediately to the attention of the repair force. To accomplish this, the company has designed a "Motor Coach Defect Card" which is issued to each driver before he starts on his daily run. On this card, the various parts of the bus are listed under fifty-seven headings. Should a defect occur the driver indicates the item by a punch mark on the card, adding any other information which he deems necessary regarding the trouble. At the end of his daily run this card is deposited in a box in the garage. It is collected by a member of the shop force who repairs the item indicated, and, at the same time, notes this fact on a "Motor Coach Inspection Record," which is kept for each bus.

When the bus has traveled 2,000 miles, this record of repairs is used as the basis for inspection. The bus is thoroughly gone over and all defects which have developed since the last 2,000 mile inspection are carefully checked to see that the respective parts are in proper running condition. At every 2,000 mile inspection, this record is compared with the previous one to see if certain defects have recurred. In such instances this is investigated and particular care is taken that the same

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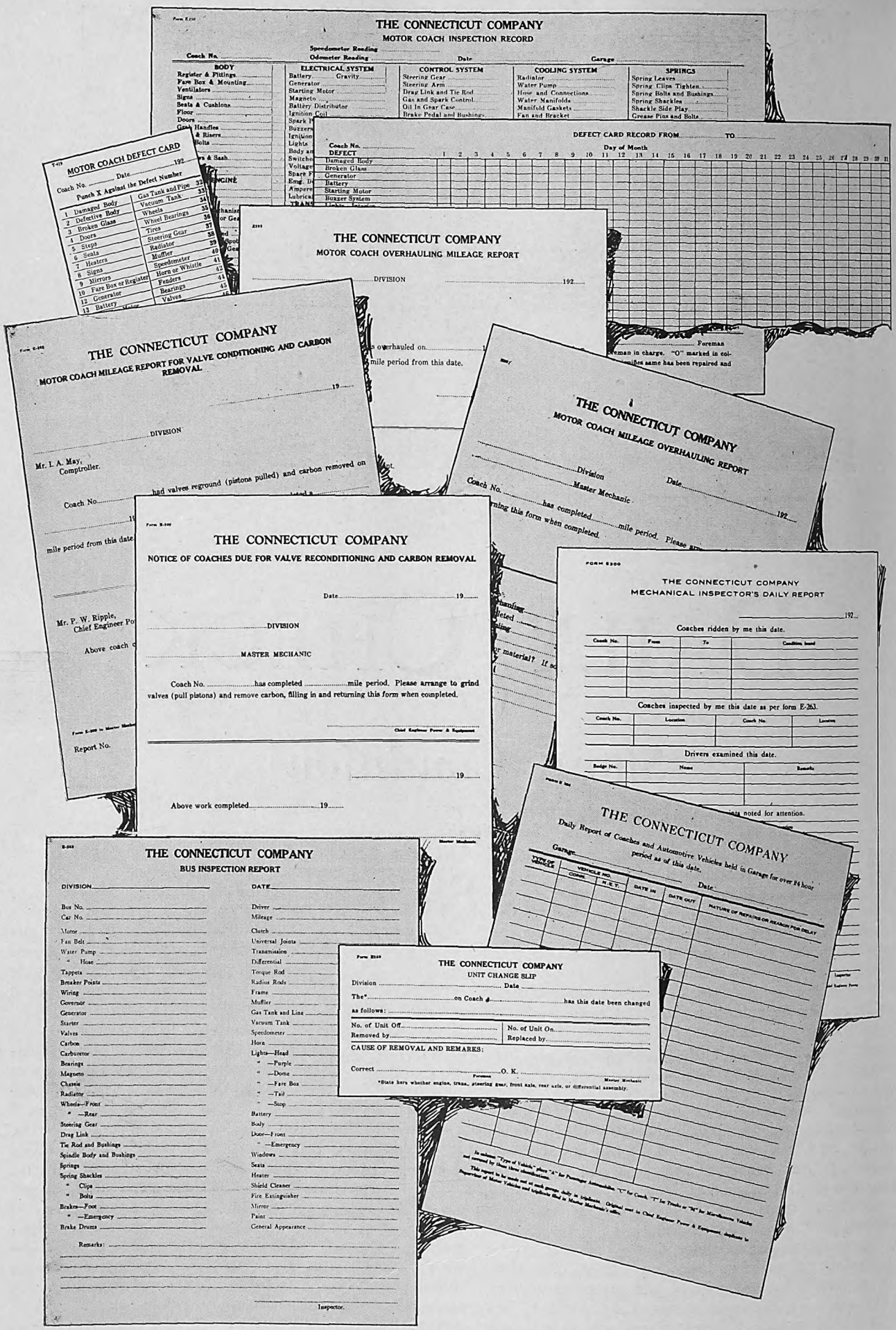

Close check of the condition of the buses is maintained by a detailed record system

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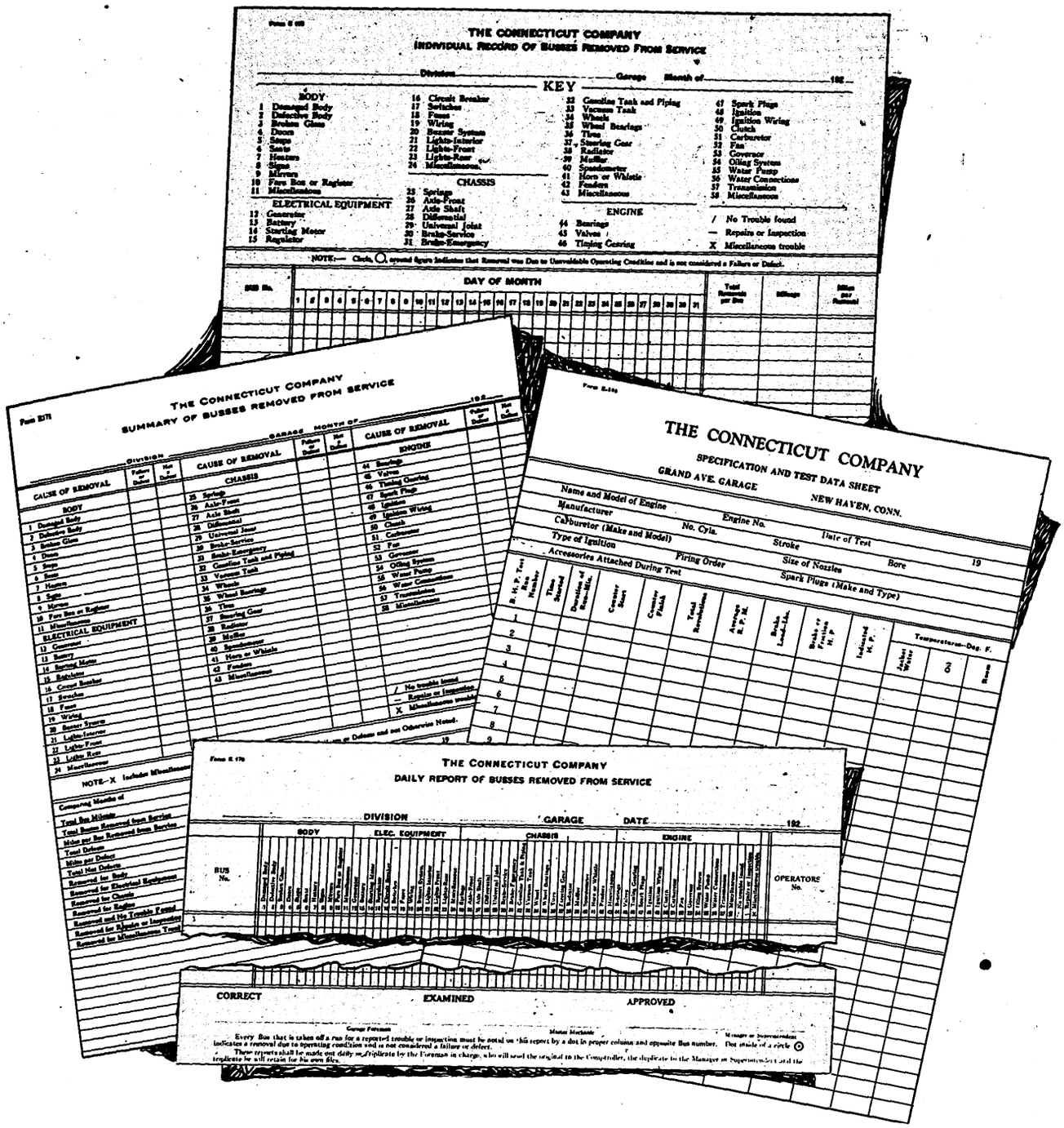

Forms used for recording information on buses removed from service, and a sample specification sheet

defect does not occur again. These records are kept for three years in order to have available at any time the written proof of the durability or weakness of the various parts of the bus.

Besides keeping the coach continually in first-class running condition by repairing all minor defects, the company recognizes the necessity of reconditioning the motor at intervals independent of the general overhaul or unit change, which takes place after every 75,000 miles of operation. Due to the different construction of the sleeve-valve motor and the poppet-valve type, the removal of carbon from these two types of engines takes place at different intervals. Best results are believed to be obtained when the cylinders are cleaned and the valves reground in the poppet-valve motor after every 10,000 miles and cylinders cleaned in sleeve valve engines every 20,000 miles.

When the carbon has been removed and the valves reground, the master mechanic notifies the maintenance department, which advises the office of the comptroller that the bus has been put in service. He also requests to be notified when that bus has traveled another 10,000 or 20,000 miles, depending on the type of motor. The report sent by the maintenance department to the comptroller's office with the information when a particular bus should be brought in for reconditioning of motor is called "Motor Coach Mileage Report for Valve Conditioning and Carbon Removal," and the notice sent by the maintenance department to the master mechanic is called "Notice of Coaches Due for Valve Reconditioning and Carbon Removal."

When a coach has traveled 75,000 miles, it is considered necessary to take it out of service for a complete unit charge, and the auditing department sends the

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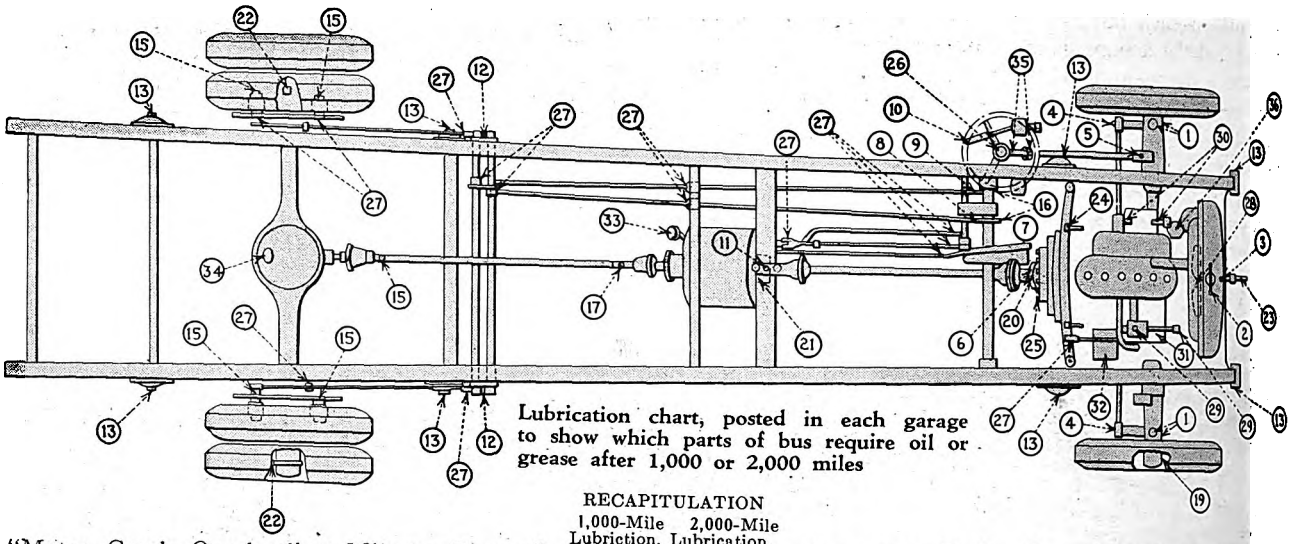


Lubrication chart, posted in each garage to show which parts of bus require oil or grease after 1,000 or 2,000 miles

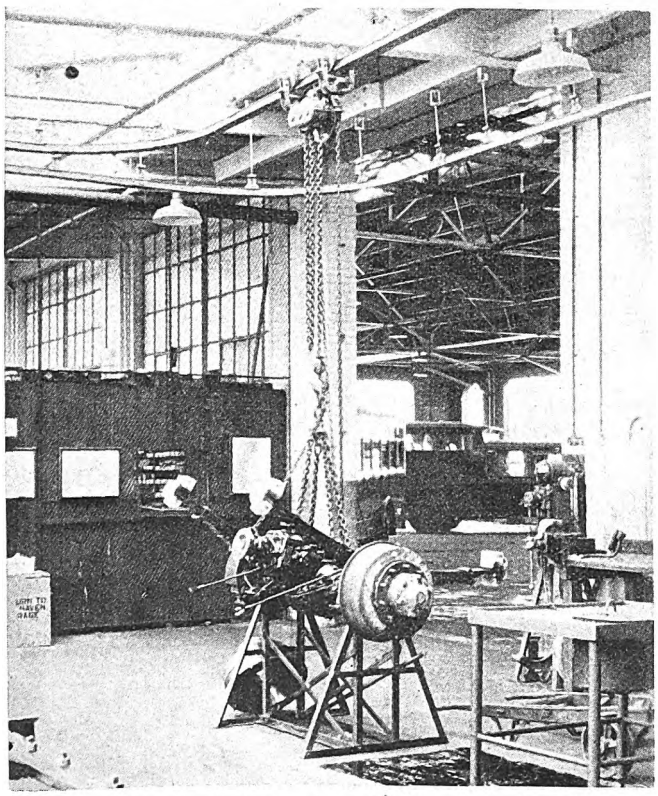
RECAPITULATION

1,000-Mile Lubriction, Part No.	2,000-Mile Lubrication, Part No.
1	2
4	3
5	8
6	9
7	10
13	11
17	12
18	15
20	16
29	19
..	21
..	22
..	23
..	24
..	25
..	26
..	27
..	28
..	30
..	31
..	32
..	33
..	34
..	35
..	36

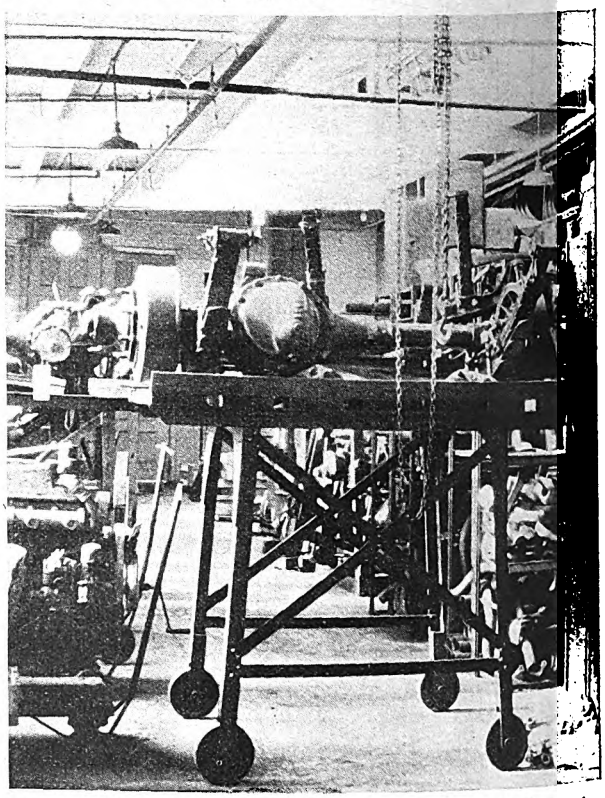
"Motor Coach Overhauling Mileage Report" to the maintenance department, advising that a bus has traveled the specified distance. The maintenance department then notifies the master mechanic in whose division the bus operates and instructs him to take this vehicle out of service and send it to the central repair shop in New Haven.

All necessary repairs are made there, while anything which has been brought to the attention of the division repair force at the 2,000 mile inspections is again carefully gone over to insure that recurrence will not take place. All units such as steering gear, motors, front axle, rear axle, transmission and differential are removed from the bus and replaced by reconditioned units from the storeroom. By following this method, the time out of service is reduced to a minimum. When the bus is finally O.K. for service, it is sent back to its division, and the maintenance department informs the comptroller's office of this, to enable them to keep a record and to advise the chief engineer of power and equipment when the bus should again be taken out for a reconditioning of motor or an annual overhaul. The maintenance department keeps a record of any unit change which takes place and a so-called "Unit Change Slip" is filled out by the foreman in whose shop the change takes place, giving all the information required. In this manner, a careful check is obtained on the performance of all units in operation on the entire fleet.

In order to keep fully posted on the efficiency of the various division repair shops, the company has a number of so-called "floating inspectors" who ride the buses and bring any irregularity to the attention of the master mechanic responsible, while a copy of their daily findings is sent to the main office. Besides filling out this so-called "Mechanical Inspectors' Daily Report," they make



Rear axle completely overhauled and ready to be taken to storeroom



Motor and axle assemblies are stored on specially designed carriages with the motor under the axle

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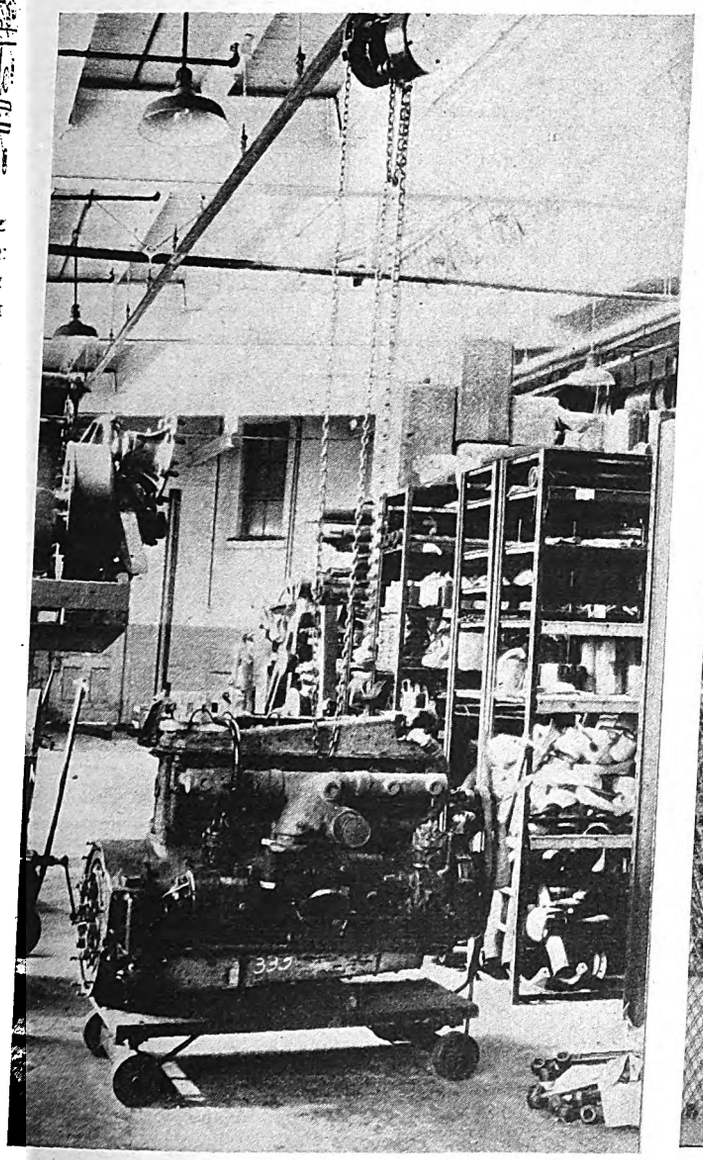
a report on each bus they ride, noting the defects observed and the action taken. Independent of the maintenance department, the chief engineer of power and equipment is informed daily by the transportation department which coaches have been held in the garage for more than 24 hours.

A report is received daily of the total number of buses removed from service and an individual record is kept also of buses removed thus indicating weak points in the upkeep of the rolling stock. A list of all buses removed from service is kept for each month, and the chief engineer can thus determine immediately why the buses are kept out of service and detect any laxity or inefficiency in maintenance work.

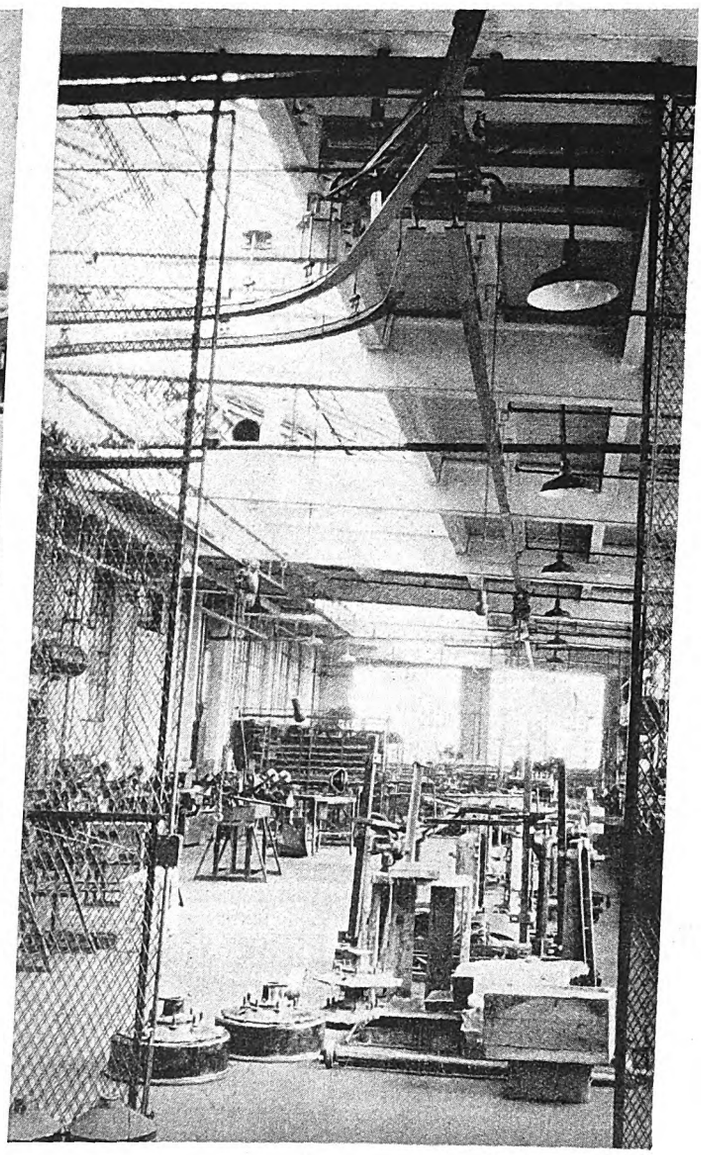
The units changed after the completion of every 75,000 miles are thoroughly overhauled and parts which require repair are replaced by those which have been reconditioned or are new, so that the bus will be available again in the shortest possible time. Replacement units are kept always available in the central repair shop storeroom. These include engines, transmissions, steering gears, front axles, rear axles and differential assemblies. Should an emergency call come in from one of the divisions for a replacement unit prior to the 75,000 mile overhaul, it can be shipped immediately and the damaged unit sent to the repair shop where it is overhauled and put into the storeroom. Before an engine is again O.K.'d for service and placed in the storeroom, a thorough test is made on the dynamometer.

The layout of the shop is such that the least possible time is required for the conveyance of units from the buses to the various places in the shop where the units are to be repaired. A monorail hoist system beginning at the platforms where the buses are overhauled, conveys the units taken out to the repair bays and through a switch system. The unit can be brought either to the left or the right side of the repair shop for repairs.

Painting of the buses is done entirely independent of the central repair shop. In the territory where the buses operate there are in all five paint shops. In New Haven this takes place in the paint shop of the carhouse. A bus is given one to three coats of paint depending on its condition and dried in a specially designed electrically heated shed, described in the April 28, 1928, issue of the ELECTRIC RAILWAY JOURNAL. By this means it is possible to turn out a completely repainted job in three days, thus reducing considerably the time required for this kind of work, which formerly was about six days.



Completely overhauled motor, tested on the dynamometer and ready for installation in a bus



Monorail hoist system takes units from stockroom to the place where repair work is done

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Cleveland Railway Wins Company Prize in Maintenance

Company prize for year, three of the four departmental certificates of merit, the individual cash prize of $200, and three of the quarterly prizes go to Cleveland. Other awards made to the Cincinnati Street Railway and the San Diego Electric Railway

FAR outdistancing all competitors, the Cleveland Railway was pronounced by the judges to be the winner of the company prize in ELECTRIC RAILWAY JOURNAL'S Maintenance Contest for the year ended July 15, 1929. The prize, a handsome bronze and silver plaque, is presented to the company which has contributed most to the advancement of maintenance practice through participation in this contest. Not only did representatives of the Cleveland Railway win the company trophy, but also a majority of the departmental awards for the year, and the individual cash prize of $200. The interest felt in this contest by all the various departments is shown by the fact that the quarterly prize in the way and structures department was awarded to a Cleveland man at the end of each of the three three-month periods.

In the bus and garage department, two quarterly prizes went to Cleveland, as did two prizes in the electrical and line department. No other company won more than one quarterly prize except the San Diego Electric Railway, which was awarded a prize in the bus and garage department for the first period, and a prize in the rolling stock and shops department for the second period. This company was the winner of the certificate of merit in the rolling stock and shops department. In the other three departments, the certificates of merit went to Cleveland.

After careful consideration of almost 200 articles submitted in the contest, the committee unanimously agreed on the award of the cash prize of $200 to Joseph Croyle, for his article "One Man Tie Nipper," published in the April issue of the JOURNAL. A close competitor for this prize was the article "Efficient Methods Developed for Stringing Trolley Wires" by Angus G. Scott, assistant superintendent of overhead lines of Cleveland, which received honorable mention by the committee. Both of these articles are the result of the experiences of the writers in the maintenance work of the track and overhead line departments, and show clearly the valuable results that can be accomplished by men who do not merely follow routine methods, but try to improve the quality of the work done and to save the company expense.

How Cleveland Won the Company Trophy

WHEN the Maintenance Contest was started this year, the president of the Cleveland Railway, J. H. Alexander, sent out a letter to all department heads calling their attention to the terms of the contest and the desirability of making a special effort to not only win as many individual prizes as possible, but to earn the trophy for the company as well. The interest in the contest was further stimulated by discussion of the subject at meetings of the company's contact club, comprising executives, department heads and junior department heads, which meetings are held at irregular intervals for the purpose of keeping the organization familiar with company policies and at which time speakers discuss subjects of common interest.

That the result has more than justified the effort is well evidenced by the fact that the company was awarded seven prizes out of a possible twelve in the three groups of the contest; that it received three out of a possible four departmental certificates; that it earned the individual cash prize and honorable mention for the entire year's contest and was awarded the company trophy. The result emphasizes the *esprit de corps* which exists in the Cleveland Railway's organization and shows clearly what can be accomplished when an organization works whole-heartedly as a unit behind its executive head.

Prizes Awarded for Third Quarterly Period

PRIZE winners in each of the four departments for the three-month period ended July 15 were selected at the same time. In the department of rolling stock and shops the award was made to E. J. Jonas, superintendent of equipment Cincinnati Street Railway, for his article "Car Body Turn-

Comparison of Number of Articles Submitted by Various Companies

Name of Company	Rolling Stock and Shops	Way and Structures	Electrical and Line	Buses and Garages	Total
Cleveland Railway	17	16	22	12	67
Virginia Electric & Power Company	11	8	1	8	28
San Diego Electric Railway	13	1	1	4	19
Other companies	56	15	7	3	81
Total submitted in contest	97	40	31	27	195

Prize-Winning Articles in Maintenance Contest

Name of Author and Company	Title of Article	Department	Group Number	Date Published
F. E. Davidson, Cleveland Railway	Double Portable Crossover	Way and structures	I	February 9, 1929
Joseph Croyle, Cleveland Railway	One-Man Tie Nipper	Way and structures	II	April, 1929
A. G. McIntosh, Cleveland Railway	Safety Ground Device for Electric Equipment	Way and structures	III	August, 1929
Leonard S. Rose, Cleveland Railway	Hinged Pit Cover	Bus and garage	II	June, 1929
Leonard S. Rose, Cleveland Railway	Pit Jack for Removing Bus Transmission Units	Bus and garage	III	August, 1929
Angus G. Scott, Cleveland Railway	Pole Brushing Device	Electrical and line	II	June, 1929
Angus G. Scott, Cleveland Railway	Efficient Method Developed for Stringing Trolley Wire	Electrical and line	III	August, 1929
L. H. McAdam, Toronto Transportation Commission	Auxiliary Ground Box for Track Switches	Electrical and line	I	December 15, 1928
Charles Herms, San Diego Electric Railway	Piston Ring Compressor	Bus and garage	I	January 19, 1929
Arthur F. Clegg, San Diego Electric Railway	Method of Adjusting Brush Pressure	Rolling stock and shops	II	April, 1929
Harvey L. Bullock, New York Central Railroad	Automatic Drain Valve	Rolling stock and shops	I	November 17, 1928
E. J. Jonas, Cincinnati Street Railway	Car Body Turnover Truck	Rolling stock and shops	III	August, 1929

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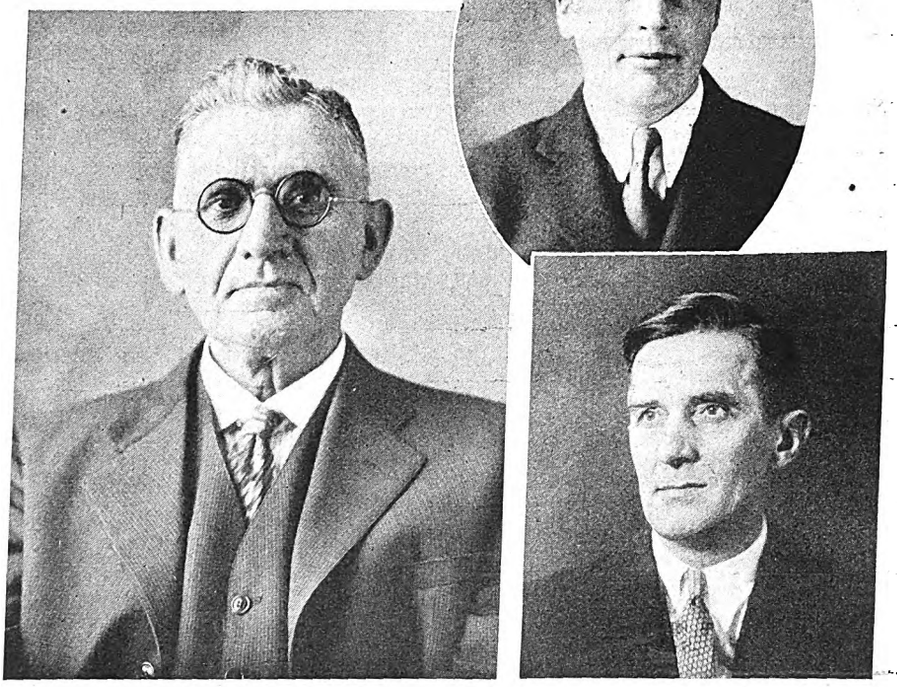
Comp Trophy and Other Awards

nten Contest

over Truck." A. G. McIntosh, superintendent of track Cleveland Railway, was awarded the prize in the department of way and structures for his article, "Safety Ground Device for Electric Equipment." In the electrical and line department, the prize went to Angus G. Scott for his article, "Efficient Method Developed for Stringing Trolley Wires." Leonard S. Rose was awarded the prize in the bus and garage department for his article, "Pit Jack for Removing Bus Transmission Units." All of these articles are published on the following pages in this issue.



Joseph Croyle (In Oval) Angus G. Scott Leonard S. Rose

A Worthy Trio of the Cleveland Railway

THE individual cash prize of $200 for the best single item submitted in the maintenance contest was awarded to Joseph Croyle, track foreman Cleveland Railway, for his article "One-Man Tie Nippers," published in the April issue, page 550. An article giving a description of Mr. Croyle's career appeared on page 673 of the June issue.

The departmental prize in the third period of the Maintenance Contest for the electrical and line department was awarded to Angus G. Scott, assistant superintendent of overhead lines, for his article entitled "Efficient Method Developed for Stringing Trolley Wire." An article describing the career of Mr. Scott will be found in the June issue, page 673.

In the bus and garage department the prize of the third period of the contest went to Leonard S. Rose, assistant superintendent motor coach department Cleveland Railway, for his article "Pit Jack for Removing Bus Transmission Units." A biography of Mr. Rose will be found on page 673 of the June issue.

Emil John Jonas

BORN in Cincinnati, Mr. Jonas was thrown on his own resources at an early age, and had to provide for his own living as well as his education. The latter was made possible by attending the night classes of the Ohio Mechanics Institute for several years. At an early age he was attracted to transportation, especially in connection with the slow-moving cable cars on which he sold newspapers. After he gained a vast amount of practical experience at Chester Park during a year with the St. Louis Street Railway as chief electrician, he went back to the Cincinnati, Georgetown & Portsmouth Railroad as superintendent of power and roadways at the time of its electrification. During his twenty years of service in various capacities with the interurban lines, much pioneering work was done in developing a demand for domestic and industrial electric service in Clermont and Brown Counties. Seeking a larger field, he joined the ranks of the then Cincinnati Traction Company in 1922.

When operation of this system was taken over in 1925 by the Cincinnati Street Railway, Emil John Jonas was assigned to the position of superintendent in charge of rolling stock and shops. His most notable achievement in this capacity was the designing and equipping of the new Winston car shop, which has been accredited by prominent equipment men as being the last word in shop design.

Emil John Jonas

Andrew G. McIntosh

ARRIVING in this country from Scotland in April, 1913, Andrew McIntosh started immediately to work for the Cleveland Railway as welder and on the maintenance of equipment. From 1917 to 1919 he was foreman in charge of welding and burning for the American Ship Building Company in Cleveland, and from 1919 to 1921 Mr. McIntosh was foreman in charge of electric welding for the American Steel & Wire Company. Returning again in 1921 to the Cleveland Railway he became equipment foreman of the way department. He has charge of all electric and thermit welding, burning, spot welding and grinding; also, the maintenance and operation of equipment, such as concrete mixers, concrete breakers, tampers, plows, rollers, sand-drying and sand-blasting machinery, etc., are under his supervision.

Andrew G. McIntosh

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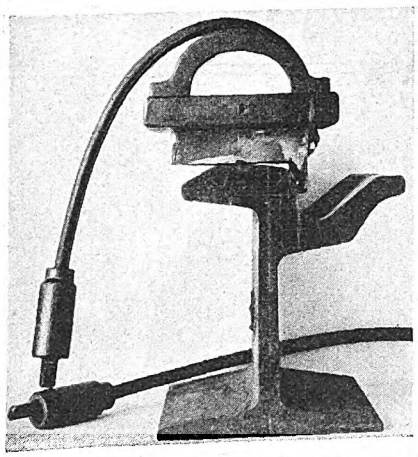
These Items Won Prizes in

Safety Ground Device for Electric Equipment*

By A. G. McIntosh
Superintendent of Track Equipment, Way Department, Cleveland Railway

EXTENSIVE use of electrically-operated equipment on track work of all descriptions emphasizes the need for a safe grounding device. A new type of safety ground has been designed and used successfully



Safety of trackmen is promoted by use of this grounding device

by the Cleveland Railway. It consists of a wrought-iron plate as a contact shoe to which is fastened a ¾-in. fiber top, somewhat larger over all than the iron shoe, for protection from the latter. The handle is made of fiber and all screws are countersunk and the holes filled with sealing pitch. A 12-in. length of lead wire passes through the fiber top and is fastened to the iron contact shoe, terminating in a connecting plug. The wire leading from the machine being operated is equipped with a receptacle into which this connecting plug is inserted, so that the contact shoe may be changed from one machine to another without disconnecting the wire from the machine. This ground can be used on either T or grooved girder rail, and can be made in any machine shop at a very small cost. It can be handled in any kind of weather with perfect safety.

Efficient Method Developed for Stringing Trolley Wire*

By Angus C. Scott
Assistant Superintendent of Overhead Lines, Cleveland Railway

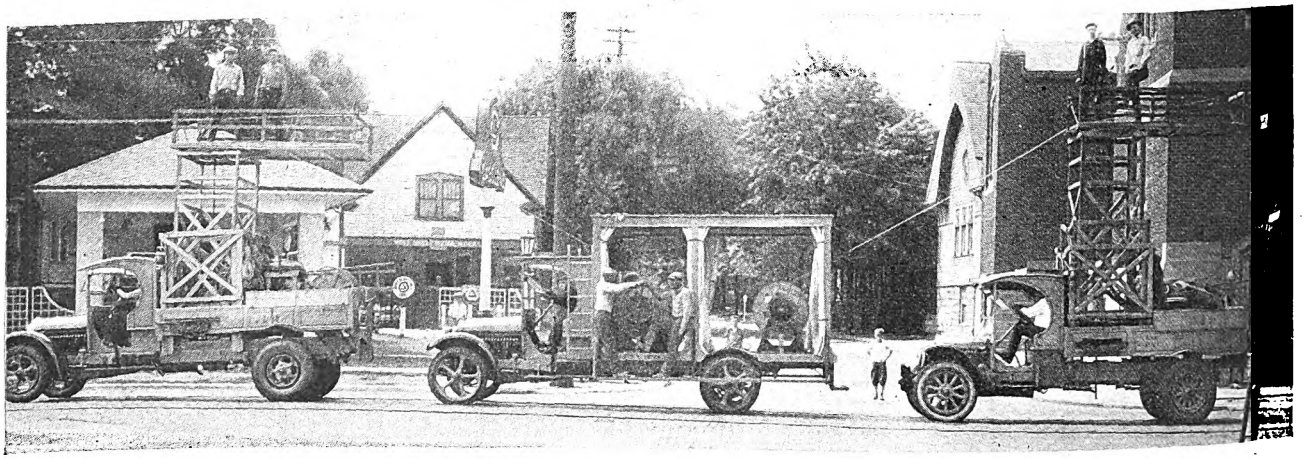
FOR several years a special trolley wire stringing truck has been in service on the lines of the Cleveland Railway. This truck permits the stringing out of the new wire at the tension desired and the taking down of the old wire in one operation. Formerly it was necessary to string out the new wire, attach the fixtures to it, and then either cut down the old wire in sections or reel it up. The cutting down of the old wire and reeling it up in the street is a hazardous operation at any time of the day or night. In stringing out the new wire, it was formerly necessary to pull the wire to the approximate tension desired about every thousand feet. This operation is now only necessary about every one-half mile.

With the new stringing equipment, a full reel of trolley wire is mounted on an arbor on the rear of the truck. A shaft to which two pulleys of pressed paper are attached secures the reel to the arbor. Brake bands lined with regulation automobile brake lining are then installed over the pulleys, and attached to a common crossbar by means of turnbuckles. When pressure is applied to the crossbar by means of a wing nut equal pressure is applied to both pulleys, and the tension at which it is desired to string the trolley wire is secured. The new wire is led over the top of the reel and spliced into the line. The old wire is led into the front of the truck through an opening equipped with rollers and secured to an empty reel. This reel is turned by means of hand labor, four men being required. While it would be possible to make this operation mechanical, it is felt that the initial expense would be too great to justify so doing.

To facilitate loading and unloading the reels, an overhead chainfall has been installed on a runway inside the truck. The truck is well equipped with lights for night stringing. The truck has been equipped with a winch and collapsible derrick which permits of its usage for other work than just wire stringing.

In actual usage, a line truck precedes the stringing outfit and removes the old wire. Behind the reel truck another line truck ties the new wire to the span wires. They also install about every fourth feed-in ear for safety. Another truck follows the stringing crew and clinches the ears and aligns the trolley wire. When a car approaches the stringing crew the three trucks pull off to the side, close

Submitted in Electric Railway Journal Prize Contest.



Use of this double-reel truck has facilitated the process of stringing trolley wire at Cleveland

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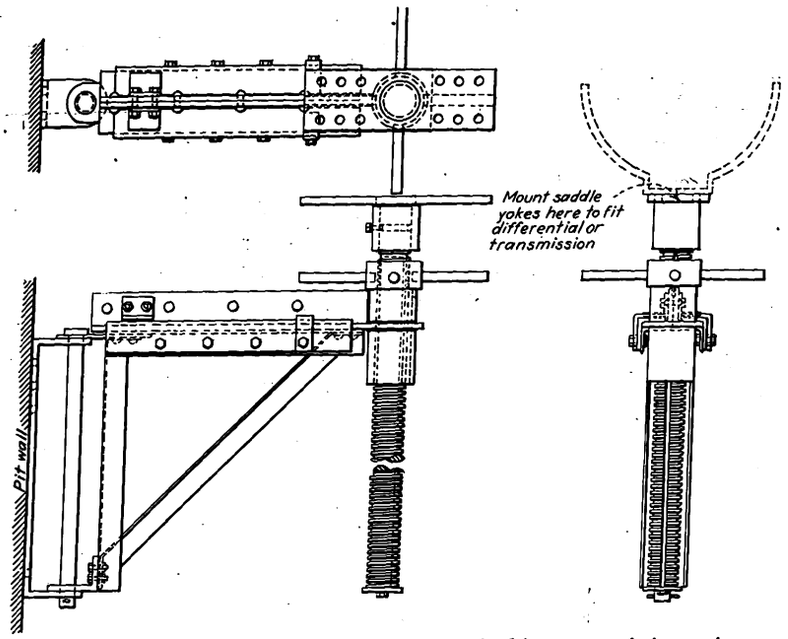
The Last Contest Period



Specially designed pit jack facilitates removal of bus transmission units in shops of Cleveland Railway

up, and the car coasts by. By this method a mile of wire may be taken down and new wire completely installed on hangers in 2¼ hours.

This method of wire stringing and the operation of the truck have both proved economical. One foreman can control the whole operation, there is very little vibration in the overhead due to the fine performance of the reel brake, and the wire may be restrung and taken down in a minimum of time.

Pit Jack for Removing Bus Transmission Units*

By Leonard Rose
Assistant Superintendent Motor Coach Department, Cleveland Railway

PIT jacks, suitable for use in installing or removing transmissions or differential carriers, are almost a necessity in a motor coach overhaul shop having any amount of this kind of repair work to do. The pit jack developed for this purpose by the Cleveland Railway is mounted on the pit wall by means of a hinge pin and wall bracket. By mounting one wall bracket at the front-center of the repair pit, just under the location of the transmission, and another at the rear of the pit at about the location of the rear axle, it is possible to place the jack in either of these two positions by simply removing the hinge pin and reassembling the unit in the desired location. With two brackets located in this manner it is possible to handle all of this kind of work in one pit. Since the brackets are neither bulky nor cumbersome, any number may be mounted along the pit wall at strategic points, to take units of various makes of coaches and different wheelbases.

In operation, yokes or a properly shaped saddle to fit the unit to be removed are mounted on the jack head. The jack is then raised into place, the unit dismounted and the jack lowered. By swinging it around to the pit wall, the unit may be rolled off onto the floor and a replacement rolled on to the jack.

While a jack of this kind is not essential on some equipment, it is almost a necessity on others. The installation of one similar to that shown in an accompanying illustration eliminates much of the difficulty encountered in handling heavy units under the coach, permits faster and more efficient work, and removes an accident hazard of no small importance.

*Submitted in Electric Railway Journal Maintenance Contest.

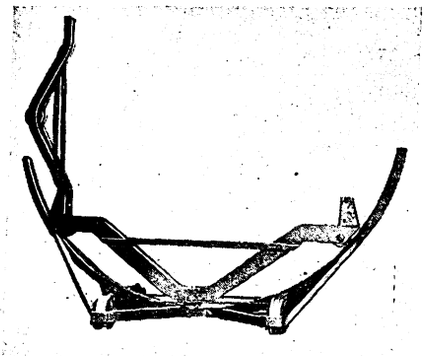
Car Body Turn-Over Truck*

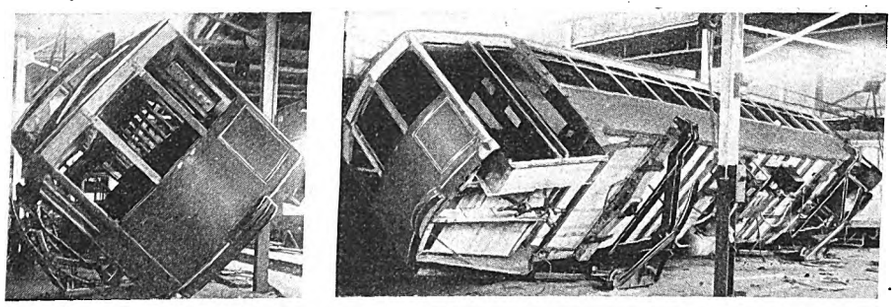
By E. J. Jonas
Superintendent of Equipment Cincinnati Street Railway

WORK on the underside of car bodies is made easier by means of a combination shift truck and car body turn-over device designed and built in the shops of the Cincinnati Street Railway.

All bearings are anti-friction, which makes it possible for four men to push a car body off or on the transfer table, while two men on chain blocks can turn the body over to an angle of 90 deg. to permit work on the roof if desirable.

The greater efficiency with which the men can perform their work—such as cleaning, painting, cable work, and piping on the underside of cars—has resulted in a saving of 25 per cent in time. Additional trucks are to be built and used as shift trucks with the idea that any car body undergoing repairs can be rolled over.





Trucks designed to permit turning over of car bodies in the shops of the Cincinnati Street Railway

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Armature Tests and Testing Equipment Surveyed

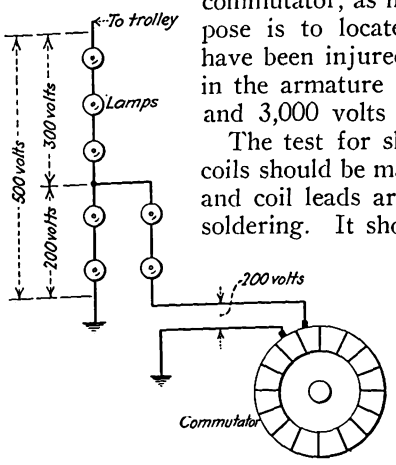
By R. S. Beers
Railway Engineering Department General Electric Company, Schenectady, N. Y.

ARMATURE testing equipment in railway repair shops varies from a minimum of a bank of lamps and a careful, skillful workman to a maximum of a complete testing laboratory where each rewound armature is given a stand test at full load. The minimum testing equipment seems inadequate, and the expense of the maximum seems unjustified. In an effort to strike a happy medium, a survey of the tests used by 30 representative electric railways throughout the United States has been made.

It was found that the tests commonly used when rewinding armatures include: (1) Bar to bar test of commutator; (2) high-potential test of commutator; (3) position of armature coil leads; (4) high-potential test of coils; (5) short and open-circuited coils; (6) high-potential test of complete armature, and (7) running test. Tests 5, 6 and 7 should be applied to overhauled armatures.

The bar-to-bar test of the commutator is a high-potential test to insure good insulation between adjacent bars. The customary method is to use a lamp or lamps in series with the testing terminals. Some operators use trolley voltage on new commutators, while the majority use 110 to 125 volts. This latter seems too low, and the trolley voltage too high for an old commutator. It would appear that a voltage of 200 to 250 would be better. This can be obtained readily by connecting lamps across the trolley, as shown in an accompanying sketch.

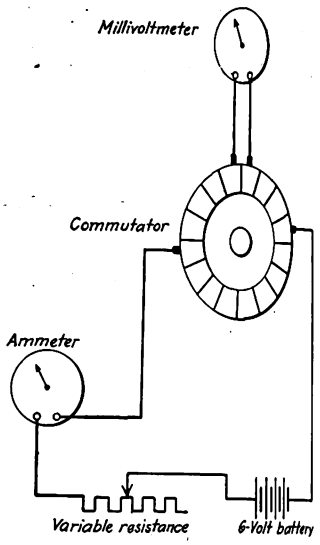
The high-potential test of the commutator is to make sure of good insulation between the commutator bars and the shell. A piece of bare wire is wound around the bars, connecting them together. High potential is applied between shell and bars. Between 2,000 and 3,000 volts should be used. To check the position of armature leads, each armature coil is rung out to insure that there are no connections between adjacent coils, and further to make sure the coil leads come out of the coil in correct order. The high-potential test of coils is made with the coils in place in the armature, bottom leads in place but top leads not connected. A wire is wrapped around the commutator, as in test No. 4. Its purpose is to locate any coils that may have been injured when they were put in the armature slots. Between 2,000 and 3,000 volts should be used.



Method of connecting lamps in a 600-volt circuit to obtain 200 to 250 volts

The test for short or open-circuited coils should be made first when all coils and coil leads are in place and before soldering. It should be repeated after the armature is completed and the commutator turned and slotted. Either a transformer (armature growler) or a millivoltmeter may be used. When applied to overhauled armatures the millivoltmeter will locate broken and partly broken armature leads much better than any other method.

A final high-potential test of the complete armature should be made when the final bindings are in place. A voltage of 2,000 to 3,000 should be used on rewound armatures, and 1,000 to 1,300 volts on overhauled armatures. After the armature is installed in the motor frame, a short run at full speed and load, or a run light at full speed, is very desirable. It tests the bearings and electrical connections in a way none of the other tests does.



Connections for making a bar-to-bar test with a millivoltmeter

The current lead should be located on the commutator so as to obtain a midscale reading of the millivoltmeter. The current should be from 6 to 10 amp. When the current value is determined it should be held constant by means of the variable resistance. The voltmeter will show the same reading between each pair of bars if the coils are right. A broken lead gives a higher reading and a shorted coil a lower reading.

The survey shows some railways believe that any potential test higher than trolley voltage spoils good apparatus. Their idea of testing is to locate existing faults. Those who apply a test voltage higher than trolley voltage believe a test should locate incipient faults as well as existing ones. The latter method is obviously the correct one and is used by the majority, although individual cases can be selected to show the former equally successful.

While high-potential tests vary from trolley voltage to as high as 3,000 for 600-volt armatures and motors, whether old or new, the majority of railways make a distinction between rewound and repaired or overhauled armatures. For the former 2,000 to 2,400 volts, and for the latter 1,000 to 1,300 volts, is the usual practice. The equipment for high-potential testing may be very simple and cheap if one is satisfied with two definite voltages, such as ten and twenty times the local lighting circuit voltages. Where it is desired to vary the test voltage by small increments over a range from 800 or 1,000 volts to 4,000 or 5,000 volts, high-potential testing equipment is required.

Transformer or "growler" testing for short or open circuits in armature coils provides a quick means of locating these defects. It does not indicate partial short or open circuits as effectively as a millivoltmeter. For this reason a millivoltmeter should be used for the final testing for open and short circuits in armatures. The millivoltmeter test of armatures for open and short circuits is the most successful test available for this purpose. When properly made, it will detect cracked and partly broken armature leads, as well as partly shorted armature coils, with more certainty than any other test.

Since this test is but a comparison of resistance values, it is obvious that the current should be held constant. This is best accomplished with a 6-volt storage battery, ammeter and a variable resistance. The customary practice of using trolley current through a bank of lamps, without an ammeter, for this purpose does not insure a sufficiently constant current flow for best results.

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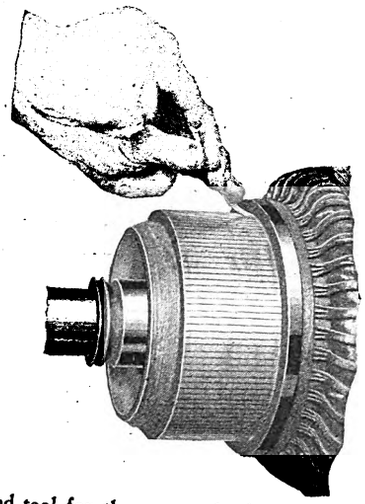
Devices and Practices Found Useful in Expediting

MAINTENANCE WORK

Time and labor saving devices used in electric railway shops and garages.



Hand tool for the removal of mica slivers from commutator slots

Undercutting Railway Motor Commutator Mica

By P. A. Pontius
Renewal Parts Engineer
Westinghouse Electric & Manufacturing Company

MICA between commutator bars on the brush wearing surface of commutators should be undercut to insure good contact between the carbon brushes and copper bars. It is desirable that all mica and mica slivers be removed $\frac{3}{64}$ in. to $\frac{5}{64}$ in. below the wearing surface of the copper bars. An undercutting machine should be used which holds both the armature and undercutting saw in their proper relative positions. The accompanying illustration shows a hand tool for removing the remaining mica slivers after the undercutting operation.

The undercutting saws should be equal to or about 0.003 in. thicker than the thickness of the mica segments. If the bearings in which the arbor for the saw runs are in good condition and the arbor rigidly supported, a saw 0.003 in. thicker than the thickness of the mica should be used. With a shaky arbor and worn bearings the thickness of the saw should be equal to the thickness of the mica. However, the saw should remove a small amount of copper along with the mica. A saw with twenty teeth regardless of diameter has given the most satisfactory performance. The outside diameter of the saw should be $\frac{3}{4}$ in. to $1\frac{1}{4}$ in., considering that the larger the diameter the more rigid should be the support of the saw carrying arbor. The diameter should be small, otherwise the saw cuts into the commutator neck.

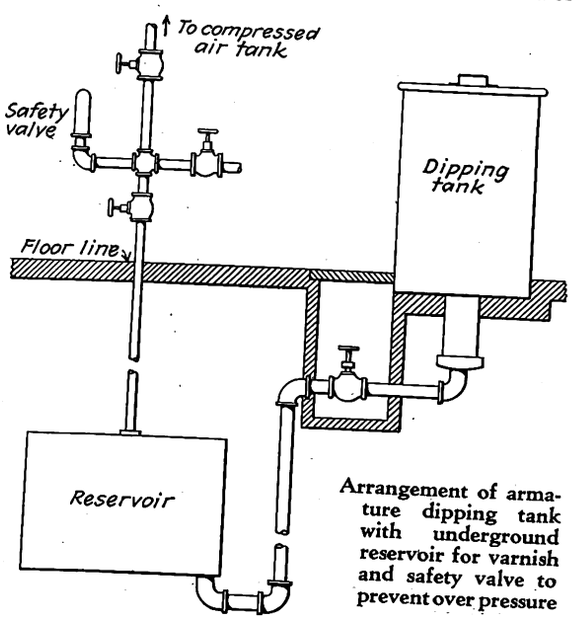
The best cutting speed is approximately 2,000 r.p.m. The saw should be made of high-speed steel. Carbon steel dulls quickly and does not produce a clean cut slot.

Armature Dipping Tank With Underground Reservoir*

By D. D. Wendel
Street Railway Engineer Alabama Power Company, Montgomery, Ala.

AT THE Montgomery carhouse of the Alabama Power Company an armature dipping tank with an underground reservoir has recently been designed and put into service.

This apparatus consists of a standard 55-gal. steel drum in the bottom of which is welded a short piece of 6-in. pipe. This is connected with a $1\frac{1}{2}$-in. pipe to the bottom of a similar tank buried several feet in the ground. The latter acts as a reservoir for the varnish which is brought to the dipping tank under air pressure. The section of 6-in. pipe acts as a well for the armature shaft. In the bottom of this well, a strainer is provided to keep foreign matter from entering the reservoir in the ground. A valve in the pipe line prevents evaporation, while a safety valve set to pop at 15 lb. prevents over-pressure. A vent valve releases air from the reservoir and allows the varnish to flow back after it has been used. Special precautions have been taken to insure that the air furnished to the reservoir is free from water and oil.



Arrangement of armature dipping tank with underground reservoir for varnish and safety valve to prevent over pressure

*Submitted in Electric Railway Journal *Prize Contest.*

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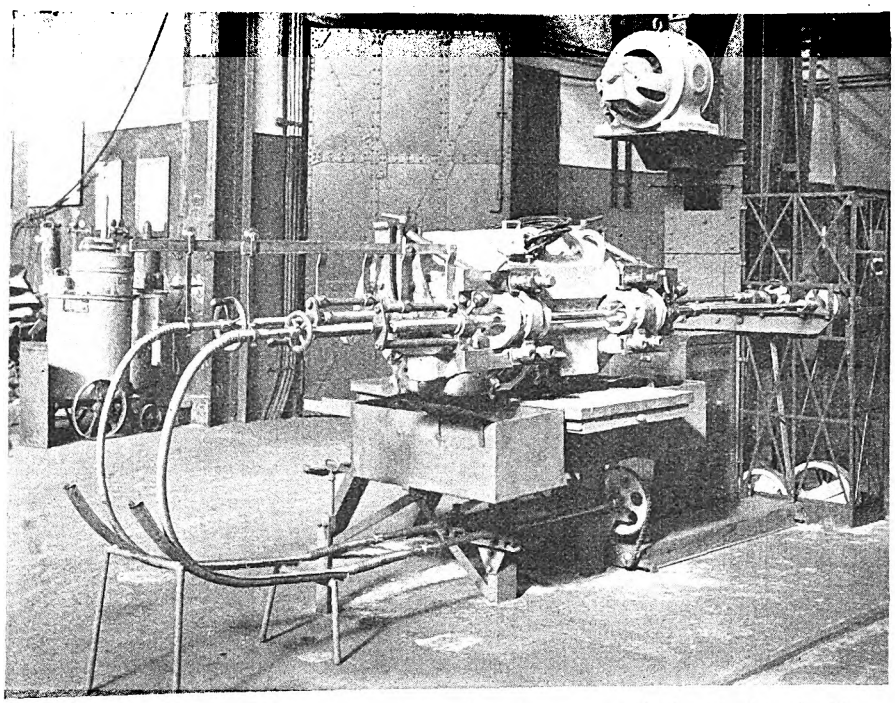


Simultaneous boring of motor and axle bearings is accomplished with this machine by the elevated railways in Hamburg, Germany

Boring Machine for Armature and Axle Bearings*

By A. Hansmann
Shop Foreman Hamburg Elevated Railway, Hamburg, Germany

A HANDY machine for boring armature and axle bearings simultaneously is in use at the main repair shop of the Hamburg Elevated Railway. All the motors on which this apparatus is used are of the same type. The boring tool has two definitely and unchangeably located arbors, one for the armature bearings and one for the axle bearings. These arbors are bolted against the machined surfaces of the motor cases and thus brought accurately in line.

Each of these two arbors carries two cutters that can be adjusted within .0004 in. shaft clearance. The arbors are driven from a jack shaft over extension couplings with universal ball joints. Mechanical connection with the driving motor is made by means of a clutch, operated remotely with a pull rope at the operator's stand. The feed of the cutters is automatic through a flexible shaft.

When these bearings were bored individually, the method formerly employed, their centers did not line-up, due to variations in the bearing bushing and inaccuracies of the set-up. To insure an accurate line-up so that both bearings fitted the shafts properly, subsequent filing and lapping were required. Too much play in the bearings resulted in a considerable loss of lubricating oil, and a reduction of the maximum life of such bearings to about 37,500 miles. With the present method of boring, a life of 75,000 to 93,750 miles is easily obtained. The savings resulted from this new method are primarily the 100 per cent longer life of the bearings, the reduced loss of oil, the small number of hot-boxes and the greater ease with which the two bearings are simultaneously bored.

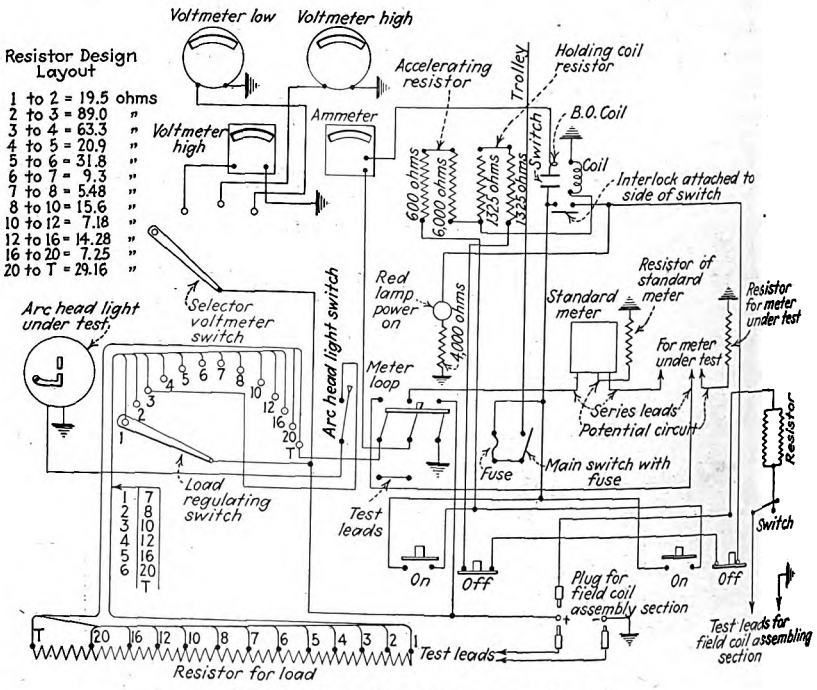
*Submitted in Electric Railway Journal Prize Contest.

Equipment Test Board Proves Time Saver*

By Arthur E. Clegg
Foreman Electrical Department San Diego Electric Railway, San Diego, Cal.

ELECTRICAL apparatus used on cars is tested on a special board in the shops of the San Diego Electric Railway. The right-hand side is devoted to testing Economy meters. An element removed from an Economy meter is used as a standard rotating meter. This has been placed in a glass case to keep out dirt and to maintain its accuracy. The resistor of the potential circuit of the standard meter is mounted on the back of the board. The meter to be tested, together with its element, is mounted next to the rotating standard meter. A rack is provided in the upper right-hand corner of the board on which elements are placed for cleaning and repairing.

By throwing the circuit switch to its upper position, which is marked "meter loop," and with the regulating load switch set for the desired load on the ammeter, the meter is connected in circuit. With the switch thrown to the down position, which is marked "test leads," connection is made to place the leads in circuit. Additional tests can be made by pulling out the test lead marked with a plus sign and inserting the test lead which goes to the motor frame field coil assembling section. Other tests are performed by the aid of the load-regulating and



Connections for equipment test board

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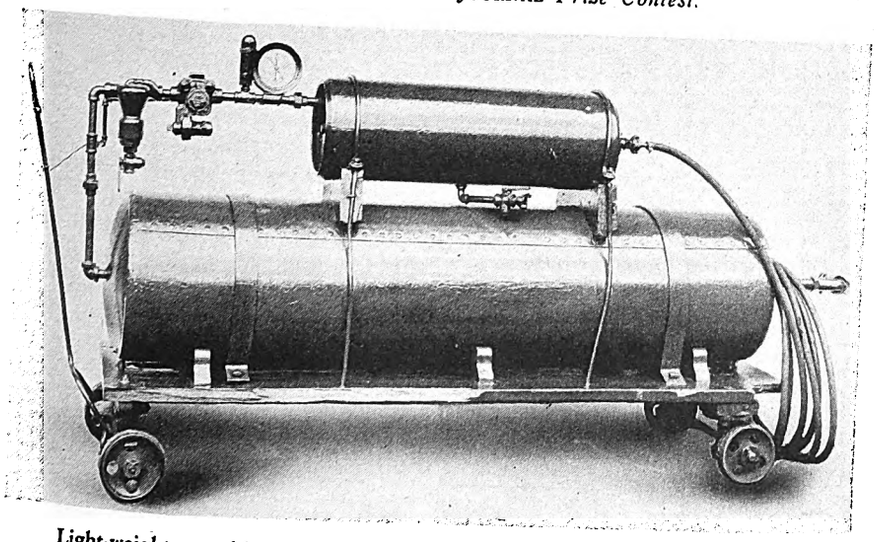
selector-voltmeter switches. Power is switched on or off the testing board by means of a push-button station located at the board and in the motor frame field coil assembling section. These push-buttons operate magnetic-type switches. It has been found convenient to use the trolley voltage without resistance at the test lead. By removing a stop marked T, the regulating load switch arm comes in contact with the trolley button and gives line voltage. Arc headlights are tested by setting the load-regulating switch to give the desired voltage at the arc and then by closing the arc headlight switch and switching power on and off by means of the push-button station. The testing board has proved a great time and labor saver as it enables testing operations to be performed quickly.

Auxiliary Tire Inflater

By Del A. Smith

General Manager Department of Street Railways, Detroit, Mich.

GARAGES of the Department of Street Railways in Detroit have long felt the need of a portable inflater which could be taken to any place whenever tires need to be inflated. To this end a truck was constructed on which was placed a 21-cu.ft. air tank built for a pressure of 300 lb. On top of this a smaller tank was placed designed for a pressure of 140 lb., and connected to the larger tank through a reducer valve. An air gage with two indicators showing the pressure in both tanks at all times was installed in the line. Air at 300 lb. pressure in the large tank is obtained from the adjacent carhouse, which carries high-pressure lines.



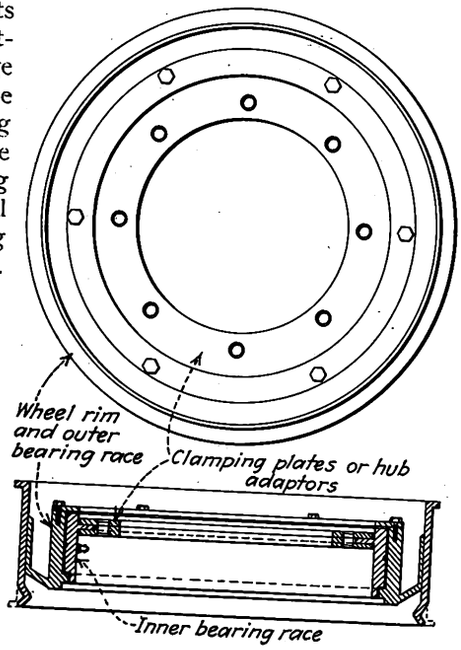
Light-weight portable tire inflater recently constructed by the Department of Street Railways in Detroit

Dummy Wheels for Towing in Disabled Buses*

By Hoy Stevens

Assistant Superintendent of Maintenance Cleveland Railway, Cleveland, Ohio

THE necessity of removing from the road quickly and economically a coach equipped with a semi-floating axle, which had suffered a differential failure, led to the development of dummy wheels by the Cleveland Railway. When such a failure occurs, any attempt to drag the vehicle often results in serious damage to the gears, bearings, the spider or even the housing itself. It is not always possible to lift the rear end of a bus, and for long hauls the so-called "towing dollies" are clumsy, and often useless. These considerations, coupled with a desire to get the coach off the road, and our practice of performing all repair work in the garage whenever possible, caused us to develop this spare set of wheels.



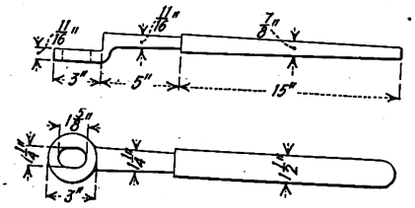
Dummy wheel used by the Cleveland Railway in towing disabled buses off the road

Essentially, these wheels are designed with integral bearings so that they can be bolted onto the hubs in place of the regular wheels. The service brakes are then locked and the coach towed in the customary manner. Of course, a spacing towbar must be used, because there are no brakes on the coach. When the front wheels are brake-equipped, the cylinders or cams must be disconnected. As may be seen from the illustration, the tire is mounted on a part of a standard wheel which has had the stud holes cut away and then welded to a large steel "bearing" ring which forms the outer race of the bearing. The inner bearing is a bronze casting, grooved for grease, and welded to a small flange. Various sets of adaptors are used to clamp on this flange and fasten it to the various hubs of different types of coaches.

*Submitted in the Electric Railway Journal *Prize Contest.*

Air Compressor Commutator Nut Wrench

LOSS of time, destruction of material and an increase in expense resulted in the shop of the Richmond Railways, Staten Island, N. Y., due to the practice of removing commutator nuts of Westinghouse D.H. 16 air compressors with improper tools.



This wrench has simplified the maintenance work of compressors

The wrench shown in the accompanying sketch was designed and constructed to eliminate this expense and simplify removal. The handle is made from $\frac{7}{8}$-in. x $1\frac{1}{2}$-in. stock, whereas the head stock is 3 in. x $\frac{11}{16}$ in. The overall length of the wrench is 23 in. The handle is provided with a $\frac{3}{4}$-in. offset and is $\frac{11}{16}$ in. thick and $1\frac{1}{4}$ in. wide for a distance of 5 in. from the head stock. The remaining 15 in. of the handle is $\frac{7}{8}$ in. thick x $1\frac{1}{2}$ in. wide. The head is designed with an oval slot $1\frac{1}{4}$ in. x $1\frac{5}{8}$ in.

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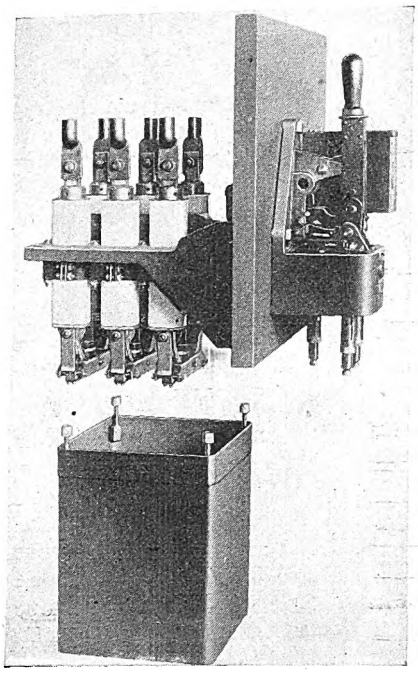
New Products

New Oil Switch

A NEW type of oil switch made in capacities from 200 to 2,000 amp., from 2,500 to 15,000 volts and with interrupting capacity from 20,000 to 40,000 kva. is announced by the Roller-Smith Company, New York City. The switches are made as two-pole and three-pole devices, automatic and non-automatic, single and double throw for switchboard, wall and cell mounting. They are also made for hand operation, normal and remote control, and electrical operation.

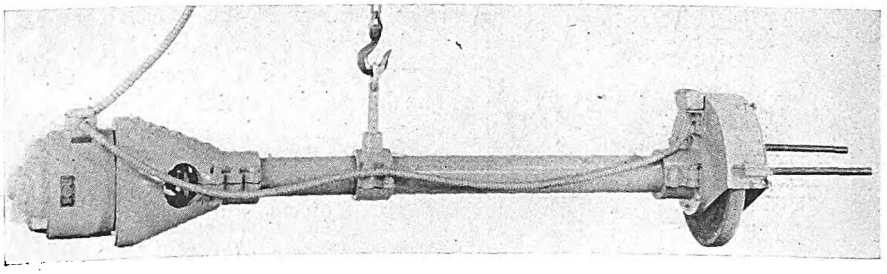
A few of the outstanding characteristics claimed for this new line of oil switches are, first, continuous laminated conductor from terminal to moving member; second, self-aligning contact of drawn copper gives a strong, highly conductive, light-moving, high-speed member; third, arcing tips are of large volume of copper and are designed especially to utilize electromagnetic stresses to increase contact pressures; fourth, the entire mechanism is completely inclosed and is the straight-line type; fifth, conductors are rigidly clamped in heavy wet process porcelain insulators; sixth, the frame is a heavy casting, internally ribbed and dome-shaped for strength; seventh, the heavy welded tank is supported on a frame by large short bolts; eighth, a double flange for the tank seat permits free venting between tank and frame, with great reduction in tendency to oil throw; ninth, the wooden contact rod is of specially treated material in one piece; tenth, the tank is lined with insulation material especially selected to resist the burning of the arc; eleventh, the volumes for oil and gas expansion are exceptionally large.



This new oil switch has a continuous laminated conductor

Heavy-Duty Swing Grinder

SIMPLICITY of design and ruggedness of construction are features of a new heavy-duty swing grinder recently put on this market by the Kinney Iron Works, Los Angeles, Cal. The motor is connected directly to the wheel through a flexible coupling and heavy shaft. Both ends of the shaft are mounted in heavy, dust-sealed ball bearings, while the motor also has ball bearings which are dust-proof. One of the important features of this new frame grinder is the absence of gears and the resultant wear. Another advantage is the continual observation of the work by the operator which is made possible by the position of the wheel which runs at right angles to the frame. The grinder is suspended by a sliding collar which permits a perfect balance as the wheel wears, and which facilitates suspension from any available hoist or chain block. Considerable flexibility is afforded by this coupling.

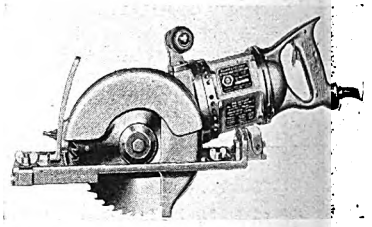


New swing grinder designed for heavy duty

Electric Hand Saw

ELECTRIC hand saws which will cross cut and rip lumber up to 3½ in. thickness were recently put on the market by Black & Decker Manufacturing Company. They will be sold in three sizes, 6-in., 8-in. and 10-in. — these sizes designating the diameter of the circular saw that each will accommodate. They can be used also with a special metal cutting saw for cutting light gage metal or with an abrasive disk for cutting slate, marble, tile, porcelain, etc.

The saw blades are inclosed in telescopic guards so that as the saw progresses in the work the guard automatically telescopes and when the cut is finished the guard snaps back, entirely covering the saw blade. The saw is arranged with an adjustable shoe which can be set to cut at any depth up to the capacity of the saw for cutting rabbets, etc. The shoe is adjustable also for cutting at any angle up to 45 deg. for mitering or for the jointing of long edges. It maintains the angle throughout the entire length of the cut, which is difficult, if not impossible, on a very long cut with an ordinary hand saw. The shoe is notched to make it easy to follow a pencil line on the work. These saws are provided with Universal motors, which will operate on direct or alternating current. They are shipped in substantial carrying cases as a convenience for men who take them out on the job.



Electric hand saw with telescopic guards

They are very light in weight and the "pistol grip and trigger switch" affords ease in handling and controlling. The saws are equipped with full ball-bearing with chrome nickel gears and shafts throughout. They are air cooled and will operate continuously without overheating. Gears

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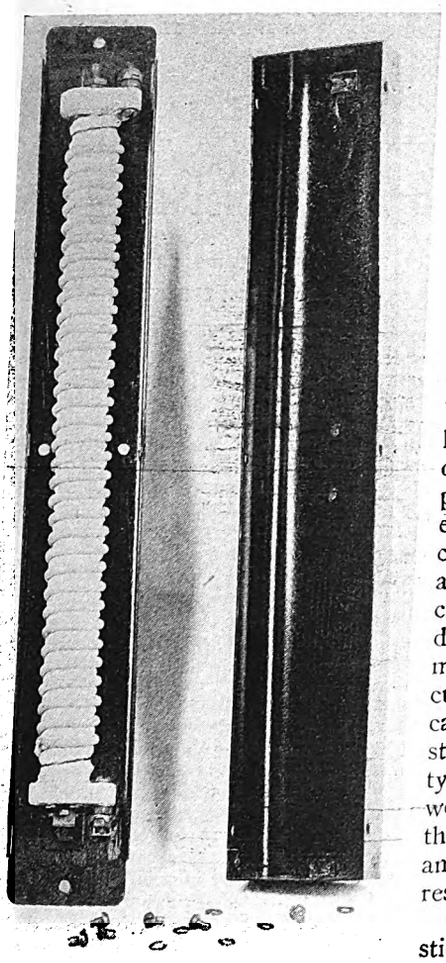
Products for the Railways' Use

run in grease in grease-tight compartment. Standard equipment consists of: one rip and one cross-cut saw; one adjustable saw fence; three-conductor cable with attachment plug (one wire for grounding); and substantial carrying case.

Sill Heater Prevents Ice Forming On Window



New electric window sill heater

ICE on windows is a serious menace to safe car operation and which often requires the motorman to stop his car and clean the window. To prevent this formation of ice, the Consolidated Car Heating Company, Albany, N. Y., has devised a new type electric heater. This apparatus is only 3⅞ in. wide, 2¼ in. high and 24 in. long. It is placed directly across the line voltage and rated at 300 watts.

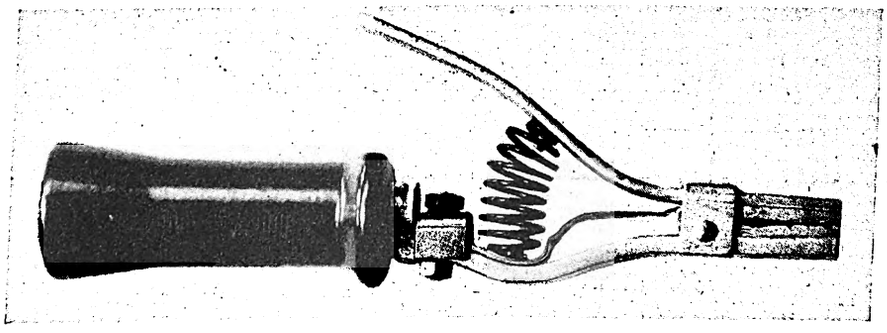
Powder for Cleaning Solution

FOR making a cleaning solution a powder with unusual qualities has been put on the market by the National Railway Appliances Company under the trade name of Soilax. In its original state, Soilax is a pink powder. In a proper solution with water it turns green. However, if too much powder is used, the solution will turn yellow. This feature prevents waste. The claim is made that 1 lb. of Soilax will do the work of 4 to 6 lb. of soap at a saving of 25 to 50 per cent in monthly cleaning costs. It is especially adapted for cleaning enameled or varnished surfaces, either inside or outside of street cars or buses.

Electrode Holder for Metallic Arc Welding

TO FACILITATE the operation of welding, a new electrode holder called model T has been developed by the Lincoln Electric Company, Cleveland, Ohio. The welding electrode is held firmly by a device consisting of a powerful clamp with an easy release to permit the rapid changing of electrodes. The grip is designed for easy holding and remains cool because the welding current is carried from the point of cable entry to the jaws by copper strips of low resistance. In the older types of holder, the high-amperage welding current was carried through the steel frame of the holder itself and uncomfortable heating frequently resulted under continuous service.

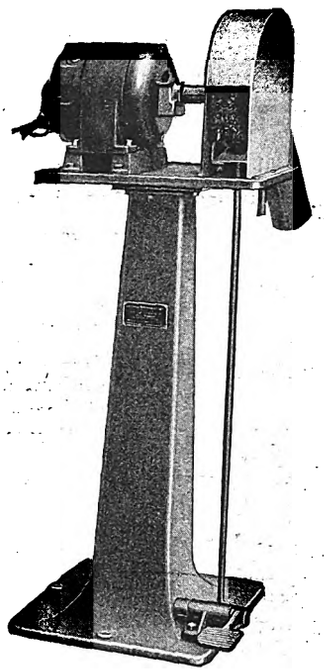
Copper tips on the jaws reduce the sticking of the electrode, resulting in quicker and easier change of electrodes and longer life for holders. The shape of the holding clamps has been altered to give greater compactness to permit working in closer corners. All metallic parts of the holders are coated with non-tarnishing plating.



This type of electrode holder has copper strips of low resistance which carry the current from the terminal to the copper

Machine for Removing Insulation From Wire

DESIGNED to reduce shop cost in removing insulation or skinning the leads of armature coils, the Type KP Peerless wire insulation remover is being placed on the market



This machine removes insulation from wires

by the Electric Service Supplies Company, Philadelphia, Pa. The machine has a special revolving brush, and by bringing the leads in contact with it, the insulation is removed thoroughly and effectively without damage to the copper wire. The revolving parts are guarded. Pressure is applied to force the wire into contact with the brush and is controlled through a foot-operated treadle.

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NEWS *of the Industry*

Writing of Chicago Ordinance Begun

The actual writing of a new railway ordinance for Chicago has been begun early by the City Council subcommittee to which the task has been assigned. According to present plans, the work will be completed by Sept. 1 and the ordinance will be submitted to the voters at the election on Nov. 5. If the ordinance is to go on the Nov. 5 ballot, it must be passed by the City Council not later than Sept. 24.

While the ordinance is being written the subcommittee charged with doing that work will hold a series of public hearings on subways in the hope of acquiring more information as to how much additional track space is needed for rapid transit through the central congested area. At the present time the Aldermen have no definite policy on subways.

Every subway plan except one makes provision for a tunnel in State Street, but there has been no decision as to where any bores will be located. The number of tracks to be provided also differs in each plan. To aid them in their work, the Aldermen are studying the subways in other American cities and in Europe.

Two-Cent Wage Advance in Toledo

Employees of the Community Traction Company, Toledo, Ohio, broke a deadlock of almost three months' duration on July 20, when they balloted three to two in favor of a compromise proposal submitted after they had demanded arbitration and had previously turned down a 2-cent wage increase with modified working conditions. Steps will be taken immediately to draft the plan into contract form and sign it. The new contract will be retroactive to June 1.

Trainmen, bus operators and car shop employees will receive a flat increase of 2 cents an hour making the scale 52 cents an hour for beginners in the first three months, 54 cents for succeeding nine months and 57 cents an hour for all employees with the company more than a year. Five cents additional is paid to one-man car and bus operators.

A new feature of the contract this year will be a premium of 1 cent an hour for any month during which the employee shall not have had any accidents which cost the company money chargeable to him.

Watchmen will receive $5 a month raise.

Regular employees will receive not less than two hours' pay for any call for extra work.

In case of split runs, when a man is called for three periods in a day, he shall receive not less than 10 hours' pay, and all workers shall receive not less than nine hours' pay for a day.

In the garage expert mechanics will receive 10 cents an hour increase. Here the working day is changed from a nine-hour to an eight-hour basis.

The compromise terms were arrived at in a conference between union officials and company representatives in the presence of Hugh D. Friel, conciliation commissioner of the Federal Department of Labor.

It was estimated that the changes would add more than $75,000 a year to costs.

High-Speed Service in Kansas City

Kansas City Public Service, Kansas City, Mo., has been busy putting into effect high-speed service on three of its main trunk lines by a limited stop system and making of the routes of these lines stop streets. The speed of cars under the new plan has been increased more than 20 per cent. Company officials are said to feel that if they are able to hold the limited stop plan intact they will have accomplished, on these lines, at least, something really worth while.

The company laid its plans for a stop program before the Public Service Commission. That body approved the proposal before it went into effect, subject to future jurisdiction and revision by the commission. Patrons in general appear to be well pleased with the increased speed and increased service. Such petitions as have been presented for the restoration of stops have in practically every case originated with the local corner grocer, the drug store and the picture show operator. The plan went into effect on June 16. Up to July 11 the company had made no changes nor had the commission ordered any.

$33,000,000 Detroit Rapid Transit Project

Subway for surface cars suggested so designed as to permit ultimate conversion into a train-operated rapid transit line

MAYOR LODGE of Detroit, Mich., has received a report which proposes the construction of short sections on three routes of the four-line rapid transit system that the Detroit Rapid Transit Commission considers will ultimately be required, and the building of a section of subway for the special use of street cars, but so designed that trains ultimately may use all of its mileage except the loops. The report was prepared pursuant to the direction of the Mayor to the Detroit Street Railway Commission and the Rapid Transit Commission given shortly after the election held on April 1, when the rapid transit project submitted jointly by these two commissions was defeated at the polls.

The new plan, prepared jointly by the two commissions, is proposed as a means to afford immediate relief to the traffic congestion existing in the downtown district. At the same time it would mark the beginning of a rapid transit program involving the least possible mileage. According to the report, the two commissions have kept constantly in mind the necessity of having each section of the underground so located and so designed as to permit of ultimate conversion into a train-operated rapid transit line. The total milage is 5.44 and involves an expenditure of $33,000,000.

The Rapid Transit Act and the City Charter provisions permit the initial construction of a rapid transit system to be financed through the Rapid Transit Commission by the use of (a) direct taxation plus faith and credit bonds, (b) mortgage bonds, (c) special assessment or any combination of these methods. On the other hand, the street railway charter contemplates that all construction costs ultimately shall be paid out of the earnings of the system. The right is not conferred to impose special assessments upon property that may be specially benefited by the construction of subways for street car or rapid transit train operation. Neither is there provision for raising any part of such costs by direct taxation upon the city at large.

The report points out the enormous benefits to property due to rapid transit lines as contrasted with surface transportation, for which reason the finance plans always have included special assessment for special benefit as an equitable and just provision. The electorate approved this method of financing by an overwhelming majority in 1924 and again in 1925. As to the present project the report states:

"Whether underground construction is initiated now or five years from now, or is started by the Rapid Transit Commission, the D.S.R. or some other body, the city should not fail to preserve its right to specially assess for special benefit. In our judgment there is no question of the status of the present proposal as a rapid transit project even though it may temporarily be operated by street cars."

While the use of street cars in the tubes

COMING MEETINGS

Aug. 15-16—Wisconsin Utilities Association, Transportation Section, Hotel Northland, Green Bay, Wis.

Aug. 27—National Association of Railroad and Utilities Commissioners, Glacier National Park, Mont.

***Sept. 28 - Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium.**

Oct. 23-24—Public Utilities Association of West Virginia, Wheeling, W. Va.

Nov. 6-7—Association of Electric Railway Equipment Men, Middle Atlantic States, Richmond, Va.

Nov. 21-22—Public Utilities Association of Virginia, annual meeting, Chamberlain-Vanderbilt Hotel, Old Point Comfort, Va.

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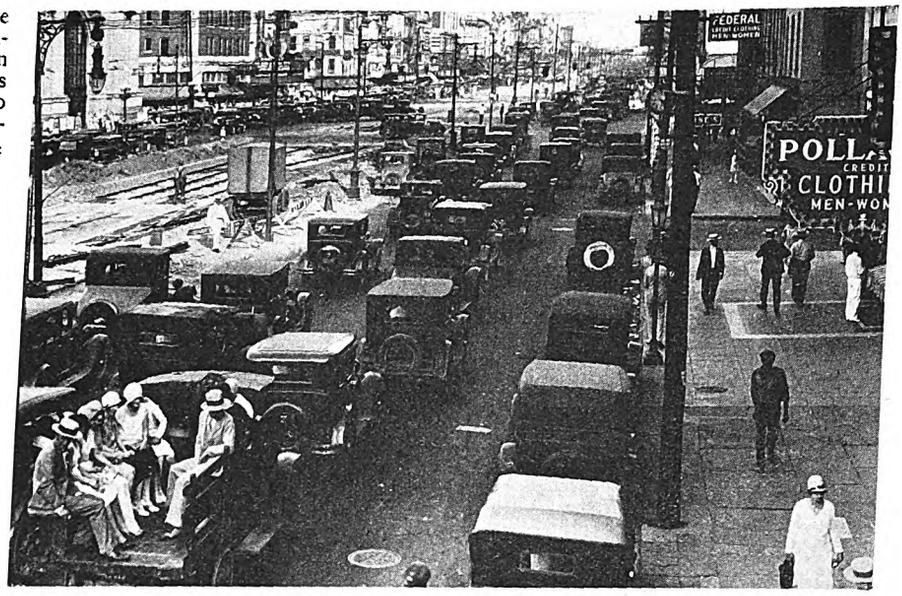
will not produce the full benefit to the downtown district, 83 per cent of the congesting surface car movement will be taken away. Accordingly the two commissions recommend division of the total cost into three equal parts, $11,000,000 each, one-third to the city at large, one-third to the locally benefited property, mainly in the central business district, and one-third to the car rider. While this division into three parts represents the recommendation of the two commissions, under the rapid transit act not more than 60 per cent of the estimated total cost may be raised by the first method. Accordingly the proposed financial plan involves the issue of faith and credit bonds to the extent of 60 per cent of the total, or $19,800,000, and the issue of mortgage bonds for the remaining $13,200,000. The faith and credit bonds and $2,200,000 of the mortgage bonds would be carried and retired by the contribution from the city at large and the locally benefited property.

Since the mortgage bonds can be secured only on the properties and revenues of the system, it is proposed that the revenues be secured by an inter-department operating contract whereby the D.S.R. pays a graduated rental to meet the interest and amortization of the $13,200,000 mortgage bonds, but for the full term of the contract will be equalized so that the car rider will finally have paid only the interest and amortization charges on his one-third share of $11,000,000. The plan outlined will accord completely with the intent of the Rapid Transit Act, states the report.

As to the merging of the Rapid Transit Commission and the Street Railway Commission, the report states that their legal powers are so widely distinct that it is not advisable. However, a Metropolitan Board is suggested which would have control of all transit matters in the region of Detroit to continue the work of the Rapid Transit Commission, and in which the Street Railway Commission would have representation.

SUMMARY OF DETROIT'S SUBWAY SUGGESTIONS

1. A line commencing at a portal at Woodbridge Street and running under Woodward Avenue to a portal at Temple Avenue. Three stations; length main line 1.16 miles. Estimated cost.....	$8,500,000
2. A line commencing at a portal on Michigan Avenue at Sixth Street and running under Michigan Avenue to Campus Martius to Monroe Avenue to Randolph Street to Gratiot Avenue and under Gratiot Avenue to a portal at Rivard Street. Four stations; length main line 1.55 miles. City Hall loop and connection to Fort Street, length 0.17 miles. Total, 1.72 miles. Estimated cost	9,700,000
3. A line commencing at a portal on Fort Street at Fifth Street and running under Fort Street to Cadillac Square to Randolph Street to Jefferson Avenue and under Jefferson Avenue to a portal at Hastings Street. Four stations; length main line 1.20 miles. Estimated cost	7,400,000
4. A line commencing at a portal on Grand River Avenue at Second Avenue and Elizabeth Street and running under Grand River West and Grand River East to Madison Avenue and under Madison Avenue to a temporary connection with the Vernor-Mack line at Gratiot Avenue and St. Antoine Street, with loop loading stations at Capitol Park and Library Park. Six stations; length main line 0.92 miles, loading loops 0.44 miles, total 1.36 miles. Estimated cost	7,400,000
Total estimated cost.....	$33,000,000
Total length all four lines, miles	5.44



What Happens When the Public Transportation Service Is Forced to Suspend

Twenty-two Main Lines Reopened

New Orleans company fast recruiting train force locally. Railway directors state company position. Comment by Labor Secretary Davis

SERVICE has been restored on the 22 main street car lines of the New Orleans Public Service Company and officials declare the situation so far as patronage is concerned is improving daily. The company also has stated that the employment of trainmen is progressing so satisfactorily that it will soon have its entire personnel made up again of local men.

The Commission Council made a last effort on Tuesday to bring about a settlement between the company and the strikers, but it proved futile. The Public Service, through A. B. Paterson, vice-president, Bernard McCloskey, and A. M. Lockett, directors of the company, definitely informed the Council that the directors had decided they would positively not negotiate with the union on a closed shop contract. The directors declared that they could not deal with an irresponsible labor organization. Officials of the union, augmented by international vice-president Fitzgerald, and Mr. Quinlan of Chicago, refused to make any concessions and what was considered as a last conference was brought to an end without accomplishing anything. The Council, however, announced that it would continue its efforts to bring about industrial peace in the city.

Jitneys are being permitted to operate during the period of the strike without any regulation; that is, the usual $5,000 surety bond for such operations is not being exacted.

Labor unions throughout the city have adopted resolutions requesting members not to ride the cars, and the public is being asked to support them.

Traffic regulations have been virtually shot to pieces as a result of the enormous number of machines on the streets.

The threatened general sympathetic strike of all union labor organizations in New Orleans was not called on Tuesday night. The meeting of delegates representing the various trades decided not to strike, but to help the car men financially. They voted to give the car men 5 per cent of their pay per month. As a result of the meeting union men, headed by leaders who arranged city-wide mass meetings, marched in a body to the City Hall on Wednesday and their spokesman questioned the Council regarding resolutions adopted by the mass meeting. One resolution provided that the city take over the railway. Acting Mayor Walmsley announced that the Council would take up the question of issuance of bonds with the Board of Liquidation. The Acting Mayor also announced that the Council would not interfere with the operation of the jitneys, declining, however, to pass an ordinance which would eliminate the $5,000 surety bond feature of the law.

The union had also requested that R. S. Hect, J. C. Butler, and J. D. O'Keefe, directors of the Public Service, who are also members of the board of liquidation, be requested to resign the latter offices. Acting Mayor Walmsley announced that under the Constitution the city banks are authorized to select the members for life. It is not a Council matter.

At the close of the meeting with the Commission Council on Tuesday officials of the union issued a statement expressing regret that the efforts of the Mayor and Council had been defeated. The union places the blame for continuation of the difficulty on the shoulders of the company. A statement by the men concludes:

"There is nothing for the men to do in this struggle but continue on until justice and fair play are acknowledged by the company."

After receiving word from the New Orleans Public Service Company that the differences between the management and the striking employees are fundamental and cannot be arbitrated, the Secretary of Labor stated on July 24 that there is nothing more that the Federal Government's Conciliation service can do for the time being at least.

Secretary Davis said that he would keep Conciliator Rodgers in New Orleans be-

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cause he believes that there is always the possibility that the company may change its mind. Conciliator Dines is in Washington at present preparing a report on the strike and it is stated that he will not be sent out again until additional orders are given by the Secretary. It was admitted by the Secretary that he had discussed the issue in the strike informally with Charles Rosen, attorney for the Public Service Company.

Asked to explain his conception of the differences between the company and the strikers, Secretary Davis said that the men claim they are seeking better wages while the company contends that it is seeking to preserve its right of discipline.

One-Man Cars on Buffalo Interurban Runs

One-man cars are to be operated on the Buffalo-Lockport and Lockport-Olcott interurban divisions of the International Railway, Buffalo, N. Y. If the experiment proves successful, the company will rebuild the Buffalo-Niagara Falls high-speed line interurban cars for one-man operation, thus placing its entire system on a one-man car basis. All local lines of the company in Niagara Falls, Lockport and Buffalo now are operated by one-man crews.

No Parking Recommended on Fifty New York Streets

The abolition of parking in lower Broadway and fifty other streets and alleys from 7 a. m. to 6 p. m., and the prohibition of parking altogether in 65 streets throughout the city was recommended to the Board of Estimate of New York City at its meeting on July 25 by the Citizen's Street Traffic Committee of the City of New York, Inc. The proposals are included in Part II of a report by the traffic committee's sub-committee on parking.

Broadway between Bowling Green and Twenty-fifth Street has been singled out among all the north and south thoroughfares of Manhattan as the one on which parking restrictions are most necessary, according to Chairman Banham, because of the regular all-day parking by business men.

Dates of Meetings Changed to Avoid Conflict

The date of the November meeting of the Association of Electric Railway Equipment Men, Middle Atlantic States, has been changed from Nov. 20-21, to Nov. 6-7, 1929, to avoid conflict with the meeting of the Virginia Public Utilities Association, which convenes at Old Point Comfort, Nov. 21-22.

Chicago "L" Hearing Put Over Until Sept. 15

When, on July 16, Congressman Frank Reid, special counsel for the city of Chicago, announced that the city had no further evidence to offer against the Chicago Rapid Transit Company's appeal for a 10-cent fare, Master in Chancery Roswell B. Mason continued the hearing until Sept. 15.

Congressman Reid contended that the Rapid Transit Company, during its nine months of presenting evidence, had failed to make a case. The company is asking the federal court to restrain the Illinois Commerce Commission from preventing the collection of the present 10-cent elevated fare in Chicago. The higher fare is being charged under the protection of a temporary injunction granted by the federal court.

The Rapid Transit company's recent evidence has centered about an attempt to show that its lines are worth at least $160,000,000 instead of the $60,000,000 valuation set by the city.

Prize for Traffic Solution Suggestions in Atlanta

To encourage public interest in the solution of this important public problem of traffic congestion, *Two Bells*, published by the Georgia Power Company, has announced the following contest:

"For the essay outlining the best and most practicable suggestions for solving Atlanta's traffic problems, a prize of $25; with a second prize of $15, a third prize of $10, and five prices of $5 each. Eight prizes, totaling $75, for writing out the thoughts you, no doubt, long have had in your mind about improving the traffic situation."

Everyone is eligible to compete with the exception of employees of the company and professional traffic experts and traffic engineers. The contest closes on Aug. 10.

Compromise on Substitution in Houston

The attempt of property owners on Fannin Street in Houston, Tex., to force the Houston Electric Company to remove street car tracks from that thoroughfare and substitute buses, has ended in a compromise.

The City Council has ordered contractors to proceed with widening and paving of the street, making no mention of the car tracks. As the paving will necessitate improvements to the track costing the company about $40,000, it is generally understood that no further effort will be made to secure removal of the tracks.

Jeff Alexander, general manager of the Houston Electric Company, agreed to operate express buses on Main Street—the next parallel street—"as an experiment."

The controversy began eighteen months ago when contracts were let for the paving and widening of Fannin Street. Residents demanded tracks be removed and that a bus service be instituted. Oscar Holcombe, then Mayor, secured the services of John A. Beeler, who suggested removal of the tracks through about one-third of their length on Fannin and rerouting of the South End loop back to the downtown district over McGowan, a cross street, to the Travis Street line. No action was taken and the Holcombe administration was defeated, the Fannin Street matter being one of the chief campaign issues.

Efforts of the Fannin Street group to have the City Council pass a resolution setting out that service on Fannin with street cars is inadequate, and instructing the company to furnish such service were unheeded by Council.

Fannin Street residents then asked the City Council to grant a franchise to an independent company to operate a two-way bus service on Fannin. This proposal was side-tracked when Mr. Alexander offered to establish a bus service on Main Street.

With the paving of Fannin, service by bus will be substituted for the shuttle line which serves Rice Institute on the south edge of the Southern city. This bus service will not run to the downtown section, but will connect with the street cars at the end of the loop.

Late News Briefs

Richmond, Va.—It is reputed here that the Virginian Railway may continue its plan of electrification to Charleston, W. Va., if the New York Central bridge is constructed at Deep Water. While no announcement was made by the Virginian and nothing came out at the hearing to indicate the plans of the Virginian and the New York Central, the feeling is that this is the general scheme.

Omaha, Neb.—The safety campaign which the Omaha & Council Bluffs Street Railway is conducting in connection with the purchasing of new uniforms by all the trainmen is proving highly successful. The company has agreed to pay the entire cost of the uniforms for all men who operate for six months without an accident costing the company more than $15. From July 1 to July 20, there was only one such accident—a new safety record.

Toledo, Ohio—The last of the changes in routing contemplated by the transit ordinance of July, 1928, in Toledo was put into effect by the Community Traction Company when the East Broadway bus feeder line connecting also with the Oak Street car line in a loop operation was put on its new route during the week ended July 20. It replaces a portion of car line on East Broadway. Cars in city service continue out Woodville Road beyond the corner of East Broadway and Woodville following the Lake Shore Electric and Toledo, Fostoria & Findlay interurban routes.

Worcester, Mass.—Because operators of the 35-cent flat rate taxicabs established in Worcester sometime ago have been charging various rates the license board of that city has ordered the tariff to be printed on cards and displayed conspicuously in the cabs. The defense of the cab companies was that some of the drivers took an unfair advantage of their passengers.

Indianapolis, Ind.—Rates for commuters on all electric and bus lines operated by the Terre Haute, Indianapolis & Eastern Traction Company will be reduced from 1.65 cents a mile to 1.25 cents.

Waterloo, Ia. — Frank McDonald, superintendent of stores and purchases for the Waterloo, Cedar Falls & Northern Railroad, is chairman of the convention committee for the Iowa Electric Railway Association, which will hold its annual convention here Nov. 7 and 8. Terminal electrification will be one of the principal topics at the meeting, but the outline of the program has not yet been completed.

Detroit, Mich. — The Council has called a public hearing on parking situation as a result of demands from Business Property Association, Washington Boulevard Association and Retail Merchants' Association that police be directed to enforce strictly parking regulations in downtown district and be provided with sufficient men and towing equipment to do so.

Louisville, Ky.—Direct through service between Indianapolis and Louisville was resumed by the Interstate Public Service Company recently when the new

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$3,500,000 Big Four bridge across the Ohio River was opened to interurban traffic. Passengers no longer need to transfer at Sellersburg as was necessary for a year while the bridge was under construction.

Richmond, Va.—School tickets will be issued for the bus service in the Ginter Park section of Richmond when the tracks on Chamberlayne Avenue, Laburnum Avenue and Brook Road have been removed and bus service installed, under a tentative agreement reached between the city and the Virginia Electric & Power Company. There is still a difference of 1 cent in the railway and the bus fares, the former being 7 cents and the latter 8 cents.

Hartford, Conn.—All persons, associations and corporations owning or operating taxicabs in Connecticut are now common carriers, subject to the jurisdiction of the Public Utilities Commission. A law to this effect has been signed by Governor Trumbull. Within 60 days, owners must have certificates from the commission in order to continue operation.

New York, N. Y.—The 25th anniversary of the Interborough Rapid Transit Company was celebrated on July 20. While the first train was not run for the public's convenience until October 27, 1904, July 20 was the day on which the first unit of the tunnel system was completed and instruction started for train crews. The first section completed extended from the Brooklyn Bridge to Grand Central Terminal.

Roanoke, Va.—A car of the Roanoke Railway & Electric Company painted according to an experimental color scheme has been placed on the lines for the criticisms and suggestions of the public. The car has an Abbott gray body with Cherokee gray trimming above the window posts. The border is trimmed in green. The company may make a change, if a color scheme satisfactory to the patrons and distinctive for Roanoke can be decided upon.

St. Louis, Mo.—The special committee of the Transportation Survey Commission headed by Erastus Wells, vice-chairman of the commission, has taken no action yet on the suggestion of Engineer Kelker made in May recommending the rerouting of thirteen railway lines, the discontinuance of six lines, the establishment of one new line and a reduction in the stops to an average of eight to a mile.

Chicago, Ill. — Plans for a circular street car subway in Grant Park connecting with the Roosevelt Road surface lines by a tunnel under Michigan Avenue to Wabash Avenue have been submitted to the City Council's committee on railway terminals by its engineer, Edward J. Noonan. The plans were drawn upon the instructions of the Aldermen to permit street cars to enter Grant Park without destroying the beauty of the park.

Indianapolis, Ind.—The State Supreme Court has reversed a decision in the Circuit Court, which would have forced the state highway commission to stand the expense of improving the right-of-way of the Terre Haute, Indianapolis & Eastern Traction Company in a public highway near Richmond. Litigation resulted from action of the commission in 1923 in paving approximately 1¼ miles of roadway in the National road, including the railway's right-of-way. The commission alleged that under the state law, the railway was required to improve the space between the rails and 18 in., on each side when the tracks are laid on the public highway.

Rockaway, N. Y.—Chairman John H. Delaney, of the New York Board of Transportation has assured a representative of the allied transit committee of the Rockaway section that plans for transit relief in that area would be made public "within a few months." Mr. Delaney's statement was taken to indicate that transit relief for the Rockaways would be embodied in the second "$600,000,000 subway building program," for which surveys are now being made. Residents of the Rockaways would like to see the branch of the Long Island Railway now serving their shore resorts made part of the city system.

London, Ont.—Employees of the London Street Railway decided on July 11 to accept the company's wage proposals for a two-cent-an-hour increase, effective on Sept. 1. The Ontario Railway and Municipal Board reported in favor of an increase more than seven months ago, but the company was unable to comply with the findings for reasons set forth at length in the ELECTRIC RAILWAY JOURNAL for April, page 555.

Cincinnati, Ohio—Sixty-eight formal meetings have been held with relation to the adoption of the four ordinances which, as finally passed permits the $41,000,000 Union Terminal project to be started to which reference was made in ELECTRIC RAILWAY JOURNAL NEWS for July 20. Not willing to incur any possible difficulties due to technicalities or typographical errors in so important a project as the terminal, it was finally decided to call a special session of the City Planning Commission to go over the printed ordinances. A special meeting of the City Council then followed, to receive the Planning Commission's final report. Favorable action by the Council was then taken on the adoption of the ordinances.

Toronto, Ont. — Additional motor-coach service to that at present in operation in conjunction with the radial railways has been suggested, should the radial service be abandoned.

St. Louis, Mo.—The last of the open bench coaches of the St. Louis Public Service Company were burned at the company's graveyard in St. Louis County recently. The "moonlight" cars were used until 1927 on the Creve Coeur Lake line between the end of the Delar-Olive Street line in University City and Creve Coeur Lake.

Pittsburgh, Pa.—A resolution has been presented to Council to authorize the Pittsburgh Railways temporarily to abandon one set of the double set of tracks on Water Street between Wood Street and Smithfield Street.

New York, N. Y.—President Menden of the Brooklyn-Manhattan Transit Corporation, and President Hedley of the Interborough Rapid Transit Company at a public hearing before the Transit Commission on July 10, said that enforcement of the commission's recent ruling against the "keying" of trains past danger signals and automatic tripper devices. would make impossible the "practical operation" of rapid transit lines. They admitted that literal compliance with the order of "keying by" would prevent collisions, but contended that the rule would seriously delay traffic. Chairman Fullen adjourned the hearing until a later date.

Joplin, Mo. — The Joplin-Pittsburg Railroad on July 15 applied to the Public Service Commission for authority to acquire, operate and maintain the tracks and right-of-way of the former Joplin & Pittsburg Railroad between Joplin, Mo., and Pittsburg, Kan. The company would operate as a common carrier of freight. It crosses the Missouri-Kansas line at a point 1½ miles northwest of Asbury, Mo.

Baltimore, Md.—The park tax paid to the city of Baltimore by the United Railways & Electric Company showed an increase of $7,000 for the second quarter of 1929 as compared with the corresponding period of 1928. The tax is 9 per cent of the money taken in for fares on most of the lines. The money is used to maintain the city parks. The tax for the second quarter was $277,000 as against $270,000 for the second quarter of 1928. Receipts of the United for April, May and June totaled $3,963,276 and the park tax was paid on $3,105,013, the remainder being receipts from lines not subject to the tax. The monthly receipts for the period were: April, $1,331,013; May, $1,365,530; June, $1,266,732.

Windsor, Ont.—An injunction to halt the projected transfer of the Windsor, Essex & Lake Shore Railway to the people of Windsor and eight other municipalities along its right-of-way is sought by a member of the East Sandwich Township Council. Consummation of the plan required the passage of enabling by-laws by the Councils of all communities interested. The East Sandwich Township Council did enact this legislation, but it is now asserted that business transacted at that session was unconstitutional.

Boston, Mass.—An early morning car is being operated to Elm Street on the Fellsway in Boston as a special service to night workers by the Boston Elevated Railway largely as an experiment. Early cars on other routes may be tried later if this trial is successful.

Ames, Ia.—The Fort Dodge, Des Moines & Southern Railroad has been permitted to discontinue its car line between the Iowa State College campus and the business section of Ames, Ia., until the opening of the school term in September. A bus line, also operated by the company, is furnishing service between the two sections of the city during the summer.

Toronto, Ont.—The question of salary and working conditions for employees of the Windsor railway is left open indefinitely as the result of a conference here on July 20 between representatives of the men and the Ontario Hydro-electric Commission, which operates the system for the local municipalities. At the close of the conference the only announcement was that another conference is to be held in "a month or so."

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Recent Bus Developments

Twenty-Five Cent De Luxe Service for Baltimore

Plans to operate a de luxe passenger bus service between the fashionable Roland Park section and the downtown area are being made by the United Railways & Electric Company, Baltimore. The application is now before the Maryland Public Service Commission.

The route to be covered will be about 6 miles and the fare will be 25 cents each way. Seven de luxe buses will be used to start the service, probably about Sept. 1. Each bus will carry nineteen passengers.

In establishing the service the United expects to eliminate much of the parking nuisance with which many of those living in Roland Park are forced to contend. The company promises to maintain a 10-minute headway in the morning and evening rush hours and 20-minute headway during the rest of the day.

Adrian Hughes, Jr., superintendent of the bus department of the United, conducted a thorough canvass of residents who would be served by the line. More than 1,000 persons were interviewed and many of them said they would patronize the line. Part of the Roland Park section is served by two car lines.

Buses on Idaho-Washington Run

The last electric railway system in Idaho will pass into history on Aug. 1 with the removal of the tracks on the interstate bridge between Lewiston in that state and Clarkston, Wash., completed in compliance with orders from the City Councils of both cities. Mark Means, secretary-treasurer of the Lewiston-Clarkston Transit Company, operating the street railway, has received a permit to operate a bus line.

New Chicago-Alton Service Approved

Holding that the request of the Chicago & Joliet Transportation Company, Alton Transportation Company, and Illinois Traction, Inc., filed in September, 1928, should not be approved the Illinois Commerce Commission on July 16 cancelled the certificate of convenience and necessity granted to the Alton Company and issued to the Tri-State Bus Company a certificate to operate motor coaches between Chicago and East St. Louis and intermediate points. The commission held that "by rendering a local transportation service that will transport passengers from intermediate points to 'all trains stop' stations," the bus service would "have a further tendency—to increase the amount of travel on the steam and interurban railroads."

It also held "that the existing steam and electric carriers cannot render service of the type, quality, kind and character so as to meet the demands of the traveling public and the people living on or near the proposed route," and, further "that by virtue of the difference charged in the per mile rate of fare, the bus traveling public, as counter-distinguished from the steam and electric public, is, in the great majority of instances, an entirely different class of the general traveling public."

Another Route Sought by County Transportation

The New York Public Service Commission was petitioned by the Port Chester-Glenville Bus Company and the County Transportation Company, Inc., on July 19 for authority to transfer to the latter its certificate of public necessity and convenience. The village authorities of Port Chester have approved the transfer. The County company now owns 60 buses and it will be able to assign buses and co-ordinate the various routes with the trains of the New York, Westchester & Boston Railway, to which the County company is allied, and provide increased facility of travel to the inhabitants of the territory covered. The commission will give a hearing later.

Alliance-Canton Service Still a Matter of Controversy

Claims that an effort is being made to wreck the Stark Electric Railroad were made by William Klinger, a member of the Ohio Public Utilities Commission, in his opinion opposing increased service between Alliance and Canton, Ohio, asked by the Salisbury Transportation Company. Stark Electric has opposed the Salisbury's request to run hourly service. At a hearing some months ago when the Salisbury company protested a request of the Stark Electric for increased service over a part of the Alliance-Canton route, it was charged that the bus line was being subsidized. Overriding Mr. Klinger's opposition, Roscoe C. McColloch, chairman of the commission, and Frank W. Geiger, granted the Salisbury company permission to follow a one-hour schedule. The two companies have battled before the Ohio Public Utilities Commission and the various courts of the state for months.

Supervision of New York Taxis Recommended

Taking up the perennial subject of taxicabs, the Citizens' Street Traffic Committee of New York suggests a new bureau to have charge not only of licenses but of regulation. The hope is expressed that by constant supervision, with adequate co-operation by the police, many of the existing inconveniences or abuses may be measurably abolished. It has been found, for example, that the stands where taxicabs are allowed to wait for fares are not so fully used as they should be. At special locations, also, there is evidence of favoritism and even of intimidation with respect to certain cab lines. The citizens' committee agrees with the Mayor that in New York there are too many taxicabs when they are not needed, and not nearly enough when they are. Whether this condition can be remedied by the proposed Board of Taxicab Control, says the New York *Times*, cannot be predicted in advance of actual trial.

Buses Between Allentown and Reading

Preparations are being made by the Allentown & Reading Traction Company to substitute bus lines for the interurban passenger routes. The trolley lines in Reading proper would be retained. The falling off of business between the two cities, and the need for a general realignment have brought about the change, particularly the fact that a fine highway connects both cities, affording excellent opportunity to serve passengers on the 35-mile run between the two Pennsylvania cities.

Baltimore, Md.—Permission granted by the Maryland Public Service Commission to the Baltimore Coach Company, a subsidiary of the United Railway & Electric Company, Baltimore, to operate passenger buses on the Registerstown road, was opposed by the Park Heights Civic Improvement Association, which has now been refused an opportunity to present additional testimony.

Alameda, Cal.—The Citizens' Transportation Committee has applied to the Railroad Commission for an order directing the Key System Transit Company to abandon its franchises and remove its railway tracks from the corner of Park Street and San José Avenue, along Park Street and over the Park Street bridge, and to operate bus service in lieu of the railway service over Park Street and thence by the most direct route to East 14th Street in Oakland.

Columbus, Ind.—Two new buses of the Interstate Public Service Company intended to supplant street cars running from Columbus, Ind., to Maple Grove and East Columbus, have been put into operation.

Rochester, N. Y.—Authority was asked of the Public Service Commission by the New York State Railways on July 22 to substitute buses for trolley cars on the Rochester & Sodus Bay division of its line. It is proposed to use Mack and White parlor car type buses seating 29 passengers as well as two five-ton freight trucks and one tractor with two trailers. Ordinary baggage will be carried on the buses. The town boards of Irondequoit and Penfield and village of Webster have agreed to the substitution.

Worcester, Mass.—No decision has been reached by officials of the Worcester Consolidated Street Railway on the course to be pursued to obtain a permit to operate buses in Millbury and Bramanville in place of railway service. The Worcester license commission has authorized the Consolidated to operate in Worcester, but the Selectmen of Millbury have refused to permit the company to operate in that town. Consolidated officials probably will ask for a conference with the Millbury selectmen in an effort to settle the difficulty.

Newark, N. J.—The largest chartered bus order ever placed with the Public Service Co-ordinated Transport is that of the Wright Aeronautical Corporation, for an excursion of 120 buses from Paterson to Lake Hopatcong, N. J., on Aug. 2. This exceeds by nine buses the largest previous order, which was for a recent excursion of the Prudential Insurance Company.

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Financial and Corporate

Earnings Improve in Baltimore

An increase in net over the corresponding month of 1928, after charging off the added amount for depreciation ordered by the Maryland Public Service Commission, is reported by the United Railways & Electric Company, Baltimore. It is the fourth consecutive month in which the company has shown increased net income. The increase in net for this June over the corresponding month of last year was $3,701, after setting up $67,794 more for depreciation than in June, 1928. Economies in management showed a saving of $57,766.92, or 6.70 per cent for June.

For the six months' period of 1929 passenger revenue increased $170,811, and economies in management saved $224,683, as compared with the first six months of last year. However, the increase in depreciation reserve amounted to $416,296 more in the first six months of this year than in the similar period of 1928, resulting in a net income so far this year of $195,687, as against $229,647.56 for the first six months of last year.

Insull Interests After Indiana Union Traction

Interests representing Samuel Insull are reported to be making final overtures to gain control of the Union Traction Company of Indiana. A bid of about $2,829,000 is said to have been made for properties of the company, now in receivership, against which more than $14,201,000 mortgage bonds are outstanding. It is understood that committees representing various bondholders' groups have been meeting the last few days in Philadelphia to sign an agreement with the Midland Utilities Investment Company, Insull holding corporation, for sale of the bondholders' rights on condition that 60 per cent of the outstanding securities be delivered.

Excellent Year in Toledo

The first twelve months of operation under the new transit plan at Toledo, Ohio, co-ordinating bus and railway service under direction of the Community Traction Company, and eliminating independent and competing lines, showed $3,900,274 revenue compared with $3,504,766 for the previous twelve months. This was a gain of 11.28 per cent, made during a period in which service was increased 16 per cent. Expenses increased only 5.20 per cent.

Some 52,596,378 passengers were carried, an increase of 5,016,859 over the previous year, or a gain of 10.54 per cent. Crosstown lines, operated for the first time by the company, carried 943,704 passengers. Special school buses carried 45,806 passengers in addition to those using regular lines.

The company is spending more than $100,000 a month now on its improvement program. This includes new tracks on all streets in which the city is laying new pavement.

The company has abandoned $1,500,000 of property since the Milner ordinance became effective and has increased its plant investment account $750,000 since 1921. It has outstanding $6,181,000 of first mortgage bonds and $1,226,000 of 7 per cent preferred stock. The city now owns $1,819,000, par value, of the railway's common stock.

During the last twelve months $160,504 was credited to the stabilizing fund.

The favorable showing of the company is one of the achievements claimed by Mayor W. T. Jackson in his campaign for re-election. Thus the city transportation system is injected into the city campaign for the first time in history to advertise its good record.

Holding Company Case at St. Louis Appealed

On July 19 the City of St. Louis and former Judge Henry S. Priest acting on behalf of certain minority stockholders of the St. Louis Public Service Company appealed to the Cole County Circuit Court from the ruling of the Public Service Commission on April 26, last, which authorized the City Utilities Company, a Delaware corporation, to acquire and control more than 10 per cent of the capital stock of the St. Louis Public Service Company. The city contested the holding company's application on the ground that it was not legally qualified to do business in Missouri and further that it was not adequately equipped to render the railway the financial and administrative assistance promised.

Review of Boston "L" Year

Careful economy made it possible for company to avoid deficit—Against further extensions at expense of car rider

FOR the year ended June 30, 1929, the Boston Elevated Railway was able to meet all operating expenses and fixed charges. No balance is available over and above the amount necessary to restore the reserve fund to the original amount of $1,000,000 as provided in the Public Control Act. At this time, therefore, no further payment can be made in reduction of the balance still due to the municipalities on the assessment made in 1919. Only through the most careful economy was the railway able to avoid a deficit. With respect to service rendered, the railway, during the last year, actually operated 65,000 more miles than in the previous year.

Receipts declined $697,127 for the year ended June 30, compared to last year. Partially offsetting this decrease in receipts was a reduction of $610,061 in operating expenses as compared with the actual operating expenses applying to the year ended June 30, 1928. From actual operations covering the year ended June 30, 1929, there was an excess of cost of service over receipts of $180,153 compared to an excess of receipts over cost of service of $82,811 from actual operations during the year ended June 30, 1928.

The deficit of $180,153 was met in part by a dividend of $150,000 from the Transit Mutual Insurance Company created in 1921 to carry the workmen's compensation insurance of the company. This dividend represents savings to the car riders through the operation of the Mutual Insurance Company. The balance was met by inventory and other profit and loss adjustments

Conspectus of Indexes for July, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	July 1929 7.76	June 1929 7.76	July 1928 7.64	July 1929 7.76	Jan. 1924 6.91
Electric Railway Materials* 1913 = 100	July 1929 147.5	June 1929 145.8	July 1928 141.8	March 1924 163.9	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	July 1929 230.9	June 1929 230.8	July 1928 229.2	July 1929 230.9	Jan. 1924 217.4
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	July 1929 199.0	June 1929 199.7	July 1928 203.3	March 1924 206.8	July 1929 199.0
Eng. News-Record Construction Cost (General) 1913 = 100	July 1929 204.8	June 1929 205.6	July 1928 206.6	March 1924 224.7	Nov. 1927 202.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	June 1929 96.4	May 1929 95.8	June 1928 97.6	Nov. 1925 104.5	April 1927 93.7
Bradstreet Wholesale Commodities 1913 = 9.21	July 1929 12.49	June 1929 12.46	July 1928 13.14	Dec. 1925 14.41	July 1924 12.23
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	June 1929 154.8	May 1929 153.3	June 1928 152.6	Nov. 1925 167.1	May 1924 141.0
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	June 1929 160.0	May 1929 159.4	June 1928 160.9	Nov. 1925 171.8	April 1929 159.3
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	June 1929 135.2	May 1929 136.9	June 1928 116.4	Feb. 1929 140.4	July 1924 73.4
Bank Clearings Outside N. Y. City 1926 = 100	June 1929 102.2	May 1929 102.5	June 1928 104.5	Feb. 1929 110.1	May 1924 84.4
Business Failures Number	June 1929 1477	May 1929 1733	June 1928 1639	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	64.22	44.90	46.16	122.95	23.13

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

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incidental to the closing of the year's accounts.

Attention is directed to the reduction this year of $610,061 in operating expenses, a sum lower than for any year since that ended June 30, 1923, when a lower wage scale was in effect than at present.

The decline of $697,000 in gross revenue is attributed by Edward Dana, general manager, to two factors: First, continuing and increasing depression in summer riding; and second, the increase in automobile riding, especially during the open winter last year. Neither factor is one over which the railway has control.

As evidence of the increased need of mass transportation, Mr. Dana points out that in spite of the decline in total passenger revenues, there has been a substantial increase in weekday traffic for the eight months of the year from October to May, inclusive. This average weekday traffic during the eight months period is more than 1,120,000 passengers under the present 10-cent and 6¼-cent fare, compared to 984,619 in 1920, the first year of the 10-cent fare, and 1,088,548 in 1917, the highest point of the 5-cent fare.

The additional rental of $30,000 a month on the portion of the Dorchester Rapid Transit Extension in use when rental began in October, 1928, added to the burdens to be overcome during the past year. The total rental charges on subway, tunnel and rapid transit lines increased by $291,116 this year as compared to last year. In conclusion Mr. Dana says:

"Since it is very evident that present revenues are barely sufficient to meet the present cost of service, it should be apparent that further rapid transit extensions at the expense of the car rider alone cannot be undertaken."

COMPARATIVE DIVISION OF RECEIPTS AND EXPENDITURES OF THE BOSTON ELEVATED RAILWAY FOR THE YEARS ENDED JUNE 30

	1928	1929
Total receipts	$35,009,933	$34,312,806
Operating Expenses		
Wages	16,826,418	16,295,105
Material, supplies and other items	3,155,788	3,064,407
Injuries and damages	1,191,690	1,210,168
Depreciation	3,814,336	2,847,900
Fuel (does not include gasoline for buses)	1,094,966	1,055,746
Total operating expenses	$25,083,391	$24,470,322
Taxes	1,793,128	1,605,086
Dividends (including rent of leased roads)	3,149,857	3,139,874
Subway and tunnel rents	2,269,193	2,560,315
Interest on B. E. bonds and notes	3,553,097	2,538,583
Miscellaneous items	78,448	85,771
Total cost of service	$34,927,121	$34,492,959
Loss or gain not including profit and loss items	82,811	*180,153*
Profit and loss delayed items	812,706	180,153
Total loss or gain including profit and loss items	$895,518	$00

Terms of Tentative Key Plan

The reorganization committee of the Key System Transit Company, Oakland, Cal., has promulgated a readjustment plan whereby it is proposed to reduce funded debt to $4,675,000 from $19,436,000.

Holders of the $1,175,000 of 5½ per cent equipment bonds will receive 50 per cent in cash and 50 per cent in new 6 per cent equipment trust certificates plus $200,855 interest in cash. Holders of the $8,862,000 general and refunding second mortgage bonds will receive preferred stock of two series conditioned on bond interest. Holders of the $2,500,000 collateral trust 6s will receive convertible preferred. All of this stock is to be issued on the basis of one share for each $100 par of bonds.

Holders of the present prior preferred will receive 1½ shares of new Class A common for each share of prior preferred held. Holders of the present preferred will receive two shares of Class C for each share held. Holders of the common will receive one share of Class C for each share held.

In order to obtain the funds to cancel the first mortgage, every exchange below the first mortgage is conditioned upon the compulsory subscription to one share of the new preferred at $25 a share for each $100 par value of existing securities. The new preferred carries $1.50 dividend.

The present second mortgage bondholders will be required to subscribe to only such portion as may not be met by securities junior to this mortgage up to the limit of one share for each $100 par held.

The plan will be effected by foreclosure of the first mortgage. It is stated that the foreclosure price will undoubtedly leave no values for any undeposited securities junior to the first mortgage and failure to subscribe will result in the cancellation of such junior equities. Option is extended to the first mortgage holders to receive in full equipment trust certificates instead of part cash. The committee says a substantial amount of bondholders have so elected in advance.

Depreciation Accounting Reply

The St. Louis Public Service Company, St. Louis, Mo., on July 22 filed with the Public Service Commission a reply to the recent complaint of City Counselor Muench demanding an accounting of an $8,369,931 depreciation reserve which the city alleged the company took over from Receiver Rolla Wells of the United Railway on Nov. 30, 1927. Stanley Clarke, president of the Public Service Company, said:

"The property was sold at foreclosure free from all liabilities other than those set forth in the decree of the United States District Court. Receiver Wells was charged with the obligation of paying off the matured indebtedness of the receiver and the insolvent company. As a matter of fact there was an insufficient amount to pay off such obligations.

"As a result no depreciation fund whatsoever was acquired by the company from the receiver. Since Dec. 1, 1927, when it acquired the properties, the company has been setting up a depreciation fund pursuant to the orders of the commission."

The reply states that the present depreciation reserve as set up by the company is $756,331.

Mr. Clarke characterized the complaint of Counselor Muench as unwarranted and designed to mislead the people.

The company further asks the commission to increase the annual depreciation allowance to 3¼ per cent of the depreciable value of its properties, raising this item from $800,000 to about $1,400,000 annually. To sustain its request for a greater depreciation reserve the company pointed out that the city is now engaged in an extensive street widening program which will require the railway to remove or replace many miles of tracks imposing a burden heavier than it had ever faced before.

Dividend Action Criticized

Action of the Philadelphia Rapid Transit Company in declaring a $1 extra dividend on common was characterized as "a challenge to the people of Philadelphia" by Harold Evans, former Public Service Commissioner. He questioned the propriety of taking $600,000 out of the company's surplus. Criticism also was directed at the board's action because the Philadelphia Rapid Transit has been asking an increase in fares. S. Davis Wilson, city controller, urged action by the taxpayers in the event the City Council, acting under an agreement of 1907, failed to disapprove of the expenditure.

Action Soon in Indiana Merger

The $70,000,000 utility merger case in Indiana now pending before the Public Service Commission has moved a step nearer hearing with the completion of field work of the auditors who have been studying the books of the companies involved. Howell Ellis, a member of the commission, says the next step will be preparation of exhibits showing facts pertinent to the merger case. These exhibits will be made from the audits. Meanwhile engineers of the commission are at work investigating the condition of the physical properties of the various utilities sought to be merged. This investigation will not be completed for several weeks.

Among the companies involved in the merger are: Car Trust Equipment Company, Indianapolis & Northwestern Traction Company, Indianapolis, Crawfordsville & Danville Electric Railway, Indianapolis, Martinsville Rapid Transit Company, Indianapolis Street Railway, Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute Traction & Light Company, and Terre Haute & Western Railway.

Chicago Railway's Principal

The Chicago Railways will begin paying off its $55,655,000 first mortgage bonds. On or about Aug. 1, the bondholders will receive about $5,565,000 as a 10 per cent payment on the bonds, which have been in default since Jan. 31, 1927, when the ordinances under which the Chicago Railways and the Chicago City Railway expired and the bonds matured.

This will be the first payment on the principal in the two and a half years the company has been in receivership. However, the semi-annual interest payments at the annual rate of 5 per cent have been kept up under order of Federal Judge Wilkerson, so that the bondholders will receive $1,390,000 additional as interest due on Aug. 1.

Albert W. Harris, chairman of the bondholders' protective committee, has appealed to holders who had not yet deposited their bonds with the committee to do so in view of the prospective reorganization.

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Personal Items

Charles Gordon, Managing Director

Engineer, executive and journalist selected to succeed Lucius S. Storrs in American Electric Railway Association Post

CHARLES GORDON, editor of ELECTRIC RAILWAY JOURNAL, has been named managing director of the American Electric Railway Association, a post he is to assume on Sept. 1 next. He was selected for appointment by a sub-committee of the Advisory Council of the association on July 9 and the appointment was confirmed by the executive committee on July 12, at which time J. H. Hanna, who presided in the absence of President Barnes, officially notified Mr. Gordon of the recommendation of the Advisory Council and the action of the executive committee. Mr. Gordon succeeds Lucius S. Storrs, now chairman of the executive committee of the United Railways & Electric Company, Baltimore.

It is agreed that no editor can be an influence who is lacking in positive opinions and has not the power of reiteration. Dana, Raymond, Godkin, and in more recent times Cobb, were all men that met this measure, on which James Ford Rhodes, the historian, lays great stress. It is the measure that Charles Gordon meets. He has positive opinions. He has reiterated them time and time again, but not for the mere sake of writing. He expressed himself in the JOURNAL because his mind was full of the things to which he turned his pen—visions of the local transportation industry in its relation to city planning, its bearing on the terminal situation in our fast growing cities and in its other broad economic aspects.

Mr. Gordon has been nationally active in transportation affairs for a long period, and as editor of the JOURNAL he has traveled widely and spoken in the interests of modernization of local transit service. He has advocated modernization of electric railway properties and co-ordinated rail and bus service under single managements. Ever since he left the service of the Chicago Railways in 1923 to become Western editor of ELECTRIC RAILWAY JOURNAL he has carried on militantly as journalist and editor in advocacy of those things he recognized as likely to be for the greatest good of the industry. Recognition of the high editorial standards achieved in this activity came with the award to the JOURNAL in 1928 of the first Associated Business Paper medal for outstanding service by a business paper to its industry. In fact, it is doubtful if any other man in the industry has devoted himself with greater zeal and enthusiasm than has Mr. Gordon to the task of rehabilitating the electric railway as an agency of transportation and restoring it to its proper place in public esteem.

All the various phases of street railway and bus operation have attracted and held his attention. He has advocated the use of the bus not only as a supplement to the street car but to provide a service of its own wherever circumstances would warrant. In all these larger activities he has not, however, lost sight of the importance of personnel work, sound financial policy, the economics of street traffic, and the details of operation, maintenance and construction. Valuable in his new post should be his ability to express himself clearly, forcefully and candidly as a speaker.

Charles Gordon

Mr. Gordon was graduated from the University of Illinois, railway electrical engineering department in 1912. His first position was with the Chicago Railways Company. There he was engaged in electrical and mechanical test work under John Z. Murphy, then chief engineer. When the Chicago Surface Lines was formed as an operating entity he remained with that company until 1917, when he entered the Army Air Service. On his discharge in April, 1919, he joined the sales force of the Vacuum Oil Company as a special engineer. The following year he was appointed equipment engineer of the Chicago Surface Lines. In this capacity he served under H. H. Adams, superintendent of equipment, and was responsible for many phases of the development of rolling stock and maintenance practice on a system operating some 4,000 surface cars engaged in the most difficult of city service. He organized an equipment engineering department which quickly became a strong factor in the improvement of equipment department practice. From the Chicago Surface Lines he went to ELECTRIC RAILWAY JOURNAL as Western editor in 1923.

As this very brief review indicates, Mr. Gordon is an engineer by profession, an executive by training and a journalist by predilection. He will take to the task of managing director the broad, intimate contact that his work as editor has given him with all phases of community transportation, a type of experience it would be difficult to duplicate. In his new post he should loom even larger than he has in the past as writer and editor, as an influence in shaping the policies of organized mass transportation agencies in meeting their responsibilities as public servants, and in anticipating the opportunities for expansion offered by the growing problem of moving people and commodities in modern communities.

D. E. Druen in New Post

D. E. Druen, in the service of the Kansas City Public Service Company, Kansas City, Mo., since June, 1920, succeeds to the position of superintendent of equipment, made vacant by the resignation of R. S. Neal, who goes to the Texas Company in a street railway engineering capacity. In assuming the position vacated by Mr. Neal, Mr. Druen becomes the head of the mechanical department. In addition to the work he takes over at the Tenth and Lister shops he will still retain his title as superintendent of the bus and garage department.

Mr. Druen has been at the head of a special engineering department, at the Tenth and Lister shops, organized to carry on a widespread work of research, planning and inspection. In addition to this work, he has also remained at the head of the bus and garage department. His connection with the Kansas City property, as indicated previously, dates from June, 1920, when he entered the service of the Board of Control of the Kansas City Railways assigned to research and planning work concerned with the rehabilitation of the power plant at Second and Grand.

When R. W. Bailey became head of the power department, Mr. Druen was appointed assistant superintendent of power. This was in January, 1921. During the interval between 1921 and 1927, when the plant passed to the Kansas City Power & Light Company, the old power house, under Mr. Bailey's direction and Mr. Druen's supervision, was brought up from a questionable state of usefulness to one of the highest in efficiency. The scope of this work included the installation of a complete steam plant. The system of handling coal and ash was entirely revolutionized. The power producing facilities were also rehabilitated and the plant commenced to repay in the shape of savings to its owners. With the passing of the power plant, Mr. Druen was appointed superintendent of the bus and garage department. Here another job of planning and organizing confronted him. Thence he went to the special engineering department.

Don E. Druen was graduated from the University of Wisconsin with the class of 1913 with the degree of C.E. Immediately upon graduation he was appointed assistant city engineer at Miles City, Montana. In 1917 he was appointed city manager of Glendive, Montana, a position he resigned in 1920 to enter the services of the Kansas City Railways.

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J. W. Welsh With Cleveland Railway

Executive secretary of American Electric Railway Association resigns to accept an executive position under President Alexander. To participate in work of co-ordinating surface and rapid transit operation

JAMES W. WELSH, executive secretary of the American Electric Railway Association since 1921, is to become engineering assistant to Joseph H. Alexander, president of the Cleveland Railway on Sept. 1. His appointment is the first major addition to the railway's executive staff since Metropolitan Utilities Inc., controlled by the Van Sweringens, took over the company.

As a specialist in engineering and traffic problems, Mr. Welsh is expected to devote much of his time to the problems which the railway will face in its great expansion period just ahead, when it must co-ordinate its surface and rapid transit lines and evolve policies of transportation to fit a changing situation. In this program Mr. Welsh will be called upon to assist in the development of a plan for the co-ordination of the company's present surface street car and bus lines and the rapid transit lines which the Van Sweringens will build to the east and west of the Public Square.

J. W. Welsh

As his first work at Cleveland Mr. Welsh will devote considerable time to a study of the railway's traffic problems, its co-ordination plan and particularly to transportation research. The traffic study will be of a dual nature, attempting to speed up traffic and eliminate congestion in now crowded districts, and to determine where traffic will originate in the future.

Since Mr. Alexander is an engineer, his contacts in the past naturally have been more with the engineering departments of the railway. He now expects to be able to devote more time to other departments and other problems, with Mr. Welsh giving his attention to engineering problems.

In tendering his resignation to the association Mr. Welsh said:

"I wish to express my regret in severing a relationship which has existed for eight years in my present office, and to record my high regard for the wide acquaintanceship throughout the industry, and the closer friendships among the officers and committee members which I appreciate more than I can tell you. I wish the ensuing management of the association a full measure of success, and I pledge my co-operation."

Mr. Welsh has been secretary of the association since 1921. Before that he was the association's special engineer. Until his appointment as engineer of the association, he was in Washington, D. C., associated with A. Merritt Taylor, manager of the passenger transportation of the Emergency Fleet Corporation of the United States Shipping Board. Mr. Welsh, who served on Mr. Taylor's staff, assisted in providing transportation facilities to the various shipyards on the Atlantic and the Pacific Coast as well as correcting existing shortcomings where they were present.

Previous to that Mr. Welsh was electrical engineer and traffic agent of the Pittsburgh (Pa.) Railways, with which he became associated in 1906 as assistant electrician. In 1910 he was made electrical engineer and in 1913 took charge of the traffic department. Some of his earlier electrical engineering experience was gained in the employ of the National Tube Company, Wheeling, W. Va., and also in the Westinghouse Electric & Manufacturing Company at East Pittsburgh.

Mr. Welsh was graduated from Wittenberg College in 1900, Harvard University in 1901, and Massachusetts Institute of Technology in 1903.

New South Wales Official on Tour

S. A. Maddocks is on a visit to the United States empowered by the New South Wales government to inquire into transportation administration and operation with a view to incorporating any methods he believes might be advantageously adopted by his home government, which has a traffic bill under consideration at the present time. He favors co-ordination of transportation so that the public might get the maximum benefit of each form. To illustrate his point, Mr. Maddocks mentioned Toronto, Philadelphia and Berlin as among the cities which have done most for co-ordination. He feels that the operation of the street cars and motor coach or bus systems under the one administration is infinitely wise. In New South Wales, he pointed out, the railways and tramways are government-owned, but the lack of co-ordination has led to an undesirable situation. Mr. Maddocks expressed admiration for the linked up transcontinental rail-air service.

A. L. Merritt Completes Twenty-Five Years as Superintendent

The twenty-fifth anniversary of Abraham Lincoln Merritt's connection with the Interborough Rapid Transit Company, New York, as general superintendent of the subway division was celebrated on July 20 when forty members of his staff surprised Mr. Merritt in his office. Mr. Merritt's well-wishers included some of the first corps of motormen, conductors and guards whom he had put to work in the original "Belmont Tube" in 1904. Mr. Merritt, in responding to the congratulations from his staff, described the first run made in the subway from City Hall to the Grand Central Terminal.

New Head of Columbus Property Has Had Varied Career

Benjamin W. Marr, who on July 1 was elected president of the Columbus Railway, Power & Light Company, of Columbus, Ohio, succeeding C. C. Slater, has had a varied business career. For a time he was a hardware merchant in Huntington, W. Va., and Catlettsburg, Ky. He later became vice-president and general manager of a company which manufactured hickory tool handles in Louisville, Ky. He is still a vice-president of the Gwinn Bros. Milling Company, Huntington, and was secretary of the Gwinn Milling Company, Columbus, for twenty-one years prior to last March, when he resigned to become chairman of the board of directors and chairman of the executive committee of the Columbus Railway, Power & Light Company. Prior to this he had been a director of the company for ten years.

C. C. Slater, retiring president, has been general manager, vice-president and president of the company. He was made president in 1928. During his régime the property was rehabilitated physically. He made one cut in light and power rates, placed new cars in operation, started bus service, inaugurated the skip stop system of car operation, raised the street car speed limit, rebuilt practically all the trackage and paved streets at a total cost of about $2,000,000.

B. W. Marr

Sir Felix Pole With Associated Electrical Industries

Surprise was caused in British railway and other engineering circles by the announcement in June that Sir Felix Pole had resigned as general manager of the Great Western Railway to become chairman of Associated Electrical Industries, Ltd. For the last eight years Sir Felix has been general manager of the Great Western Railway, a post which he has filled with great credit and distinction. He will still retain his connection with the railway as a consultant. Associated Electrical Industries, Ltd., of which he becomes chairman, is a holding company recently formed which controls the British Thomson-Houston Company, the Metropolitan Vickers Electric Company, the Metropolitan-Vickers Electrical Export Company, the Edison-Swan Electric Company and Ferguson Pailin. All these are names of importance in the world of manufacture of electric machinery and appliances, traction and other.

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D. W. Pontius Heads Pacific Electric

Other changes in personnel include appointment of A. T. Mercier as vice-president and general manager of that company and F. L. Annable to the presidency of the San Diego & Arizona Railroad

HIGH and well-deserved honors were bestowed with the election of D. W. Pontius, formerly vice-president and general manager of the Pacific Electric Railway in Southern California, to the presidency of that property on July 1. He succeeds Paul Shoup, formerly president of both the Southern Pacific (Pacific System) and Pacific Electric Railway.

Advanced to the position formerly held by Mr. Pontius is A. T. Mercier. He leaves the post of president and general manager of the San Diego & Arizona Railroad, while the vacancy created by Mr. Mercier's advancement will be assumed by F. L. Annable, previously general superintendent of the Pacific Electric, who now becomes president of the San Diego & Arizona property.

Mr. Pontius made his start in 1891 as clerk in the roadmaster's office of the Pennsylvania Railroad in Ohio at $30 a month. Step by step he has advanced in his chosen field, having served successively as operator, agent district freight and passenger agent, traffic manager, general manager, and vice-president and general manager, serving during his railroad career with the Pennsylvania Railroad; Chicago-Great Western Railway; Northern Pacific; Union Pacific; San Diego & Arizona Railroad; Southern Pacific, and Pacific Electric Railway.

During the World War he was sent to San Diego as general manager of the San Diego & Arizona Railroad, which was under construction at that time. When this project was completed he returned to the Pacific Electric Railway as vice-president and general manager, a post he has filled until the resignation of Paul Shoup.

In addition to his efficient management of the world's largest electric interurban railway system, Mr. Pontius has for the past several years been active in civic affairs. He is president of the Los Angeles City Health Commission, executive vice-president of California's Mission Play, treasurer and member of executive committee of the Los Angeles Traffic Commission, and director of the United States National Bank.

One of Mr. Pontius' hobbies has been the promotion of social and group activities among employees of the company. Among his many accomplishments in this regard are the development of a $120,000 employees' mountain resort in the San Bernardino Mountains, and the erection of a $450,000 club building for the Pacific Electric employees, now being completed by the railway under his direction.

Mr. Mercier a Former Traffic Man

As vice-president and general manager, Mr. Mercier's addition to the executive forces of the Pacific Electric Railway brings to that property a man of many creditable achievements, both as an engineer in construction work and railroad operation. Mr. Mercier is a graduate of Rugby Academy, a preparatory school for entering Tulane University, in which institution he completed a course in civil engineering. He began his railroad career in 1904 with the Southern Pacific as traffic man, continuing until 1906 as roadmaster and assistant gang foreman at Los Angeles.

During 1906 and 1907 he was assistant engineer in charge of reconstruction work in the Colorado River District, following which he was engineer in charge of steel construction for the Southern Pacific in Southern California. From 1908 until 1917 he was assistant division engineer and later division engineer of several operating divisions of the Southern Pacific. In February, 1917, he was appointed assistant superintendent of the Shasta Division. In September, 1918, he was made superintendent of the Portland Division, where he remained until his appointment as general manager of the San Diego & Arizona Railroad. With the death of J. D. Spreckles about a year ago, Mr. Mercier succeeded to the presidency of the San Diego & Arizona Railroad, having held the office of president and general manager until his appointment as vice-president and general manager of the Pacific Electric Railway early last month.

Mr. Annable began his railroad career with the Atchison, Topeka & Santa Fé Railway (Coast Lines) at San Bernardino in 1893. He was later transferred to Los Angeles and then to Winslow, Ariz., with the same company. From 1904 to 1910 he held the position of chief clerk to the superintendent of the Los Angeles & Salt Lake Railroad in Los Angeles. For two years he was superintendent of the Arizona & Swansea Railroad at Swansea, Ariz. In 1911 he went to the Pacific Electric Railway as assistant superintendent. Later he was advanced to division superintendent, having served in that capacity during successive years on each of the Pacific Electric's three divisions. In 1913 he was made general superintendent, a position he filled capably until he was made president of the San Diego & Arizona Railroad.

Top, D. W. Pontius. Lower left, A. T. Mercier. Lower right, F. L. Annable

R. S. Neal With The Texas Company

R. S. Neal has resigned as superintendent of equipment of the Kansas City Public Service Company, Kansas City, Mo., to become associated with The Texas Company as electric railway engineer. He will work out of Chicago, Ill. through Ohio, Indiana, Illinois, Missouri, Kentucky, and part of Michigan.

On March 16, 1918, Mr. Neal joined the Kansas City Power & Light Company in the way and structures department. He was transferred to the board of control on July 16, 1918, as assistant engineer for the installation of the Westinghouse stokers in the Missouri River Power Station at Second and Grand. He resigned on May 19, 1919, to go with the Burrell Engineering Company as mechanical engineer in charge of machinery layout. For a short period he was also assistant engineer of the Witte Engine Works. He returned to the Kansas City Railways on Nov. 12, 1920, to take charge of the engineering work for the mechanical department, organizing the original engineering department, which included designing work, making up of specifications, shop work, planning, and general drafting. This position he held until April 1, 1922, when he was appointed assistant superintendent of equipment in charge of the mechanical department. A few years later he was appointed superintendent of equipment, in charge of the maintenance of all equipment for the Kansas City Public Service Company, including the mechanical work at both the shops and divisions. The extensive car rehabilitation program during 1927-1928 was handled under Mr. Neal's administration.

Changes in Interurban Coach

An effort further to co-ordinate general management of the Mid-West Motor Coach Company and the Shore Line Motor Coach Company has resulted in the appointment of J. C. Johnson, general manager of the Shore Line Motor Coach Company, as general manager of both organizations. F. E. Snyder, manager of the Gary office of the Mid-West Motor Coach Company, will retain this position and take up the additional duties of assistant general manager of the Shore Line Company. Henry P. Bruner, Chicago, vice-president of the Mid-West Motor Coach Company, says the two bus lines will continue to operate as separate organizations, without any alteration in policy. No further changes in the management are contemplated.

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R. H. Horton in Philadelphia Progress Movement

R. Harland Horton has resigned as assistant vice-president of operations of Mitten Management to take up his duties as executive director of the Philadelphia progress movement, the purpose of which is "to bring greater progress and prosperity to the city of Philadelphia."

Mr. Horton's immediate task will be to make a complete survey of all of the industrial advantages of Philadelphia; to collect and organize all of the important facts concerning the city, culturally, institutionally, geographically and socially, and to set forth how desirable a city Philadelphia is in which to live, to work and to play. An important part of Mr. Horton's responsibilities will be to make the three-year campaign now about to get under way beneficial to the city as a whole, to make it enhance the prestige of the city's present industries and to make it bring new, worthwhile profitable industries to Philadelphia.

Mr. Horton was born in Olean, N. Y., on Aug. 30, 1889. He received his technical education at the Carnegie Institute of Technology. He worked as a rodman for the Pennsylvania Railroad and later had practical experience in the shops of the Carnegie Steel Company. He came to Philadelphia in 1910 to work with a nationally known firm of consulting engineers in the investigation of the Philadelphia Rapid Transit Company for the Pennsylvania State Railroad Commission.

In 1912 he was engaged on further work of P. R. T. investigation and a plan for rehabilitation of the company. When this work was complete he remained in Philadelphia as traffic engineer for P. R. T. and in this capacity made studies of the city's high-speed transportation development with special relation to the Frankford Elevated, and of the company's intangibles in valuation proceedings. In 1921 he visited the principal cities of the United States to study each city's resources, its industries and its transit problems and methods. The following year he spent three months in Europe on a similar study. Upon his return he became vice-president of the International Railway, Buffalo, under Mitten Management, and held this post until 1925, when he returned to Philadelphia to set up the organization of the Philadelphia Rural Transit Company, operating buses. In 1926 he was made vice-president of the P.R.T. Air Service. In the summer of that year he took part in the conference of air-mail operators with Secretary of Commerce Hoover and subsequently was director of the Air Transport Survey, upon completion of which he returned to Mitten Management as assistant vice-president of operations.

Dean Kimball a McGraw-Hill Director

Prof. Dexter S. Kimball, dean of the College of Engineering of Cornell University, has been elected a member of the board of directors of the McGraw-Hill Publishing Company, publisher of the ELECTRIC RAILWAY JOURNAL. Dean Kimball has long been a leader in the field of engineering education and an active contributor to the scientific and engineering press. He became a member of the faculty of Cornell as assistant professor of machine design in Sibley College in 1898 and served until 1901. He again joined the Sibley teaching staff in 1904. From July to October, 1918, he was acting president of Sibley. In 1921, he became dean of the College of Engineering. Professor Kimball is a member of the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education and the author of several books.

Harold G. Morris in New Providence Post

The board of directors of the United Electric Railways, Providence, R. I., at its meeting on July 18 appointed Harold G. Morris assistant general manager. In announcing the appointment First Vice-President and General Manager Williams said:

"Mr. Morris is one of the outstanding figures in the modernized transportation industry. He is a man of tremendous energy with great ability for organization. Through his appointment the company should benefit greatly as it has in the past

Harold G. Morris

through his associations with it over these years. It greatly pleases me to make the announcement."

Mr. Morris previously held the position of assistant to the general manager. He has been with the United Electric Railways and its predecessors since Aug. 16, 1917. All of this time he has been in the executive offices of the company. At first he was stenographer in the office of A. E. Potter, president, and was later appointed clerk for the receivers of the Rhode Island Company on March 4, 1919, the duties in connection with this office he assumed in addition to the clerical position he held at the time.

In July, 1921, Mr. Morris was promoted to chief clerk and held that position until Feb. 1, 1929. With the appointment of Alonzo R. Williams to the position of general manager, Mr. Morris again was promoted, this time to the office of assistant to the general manager and assigned to Mr. Williams' staff.

On Aug. 1, 1928, Mr. Williams was elected to the position of first vice-president and general manager and thereupon Mr. Morris' scope of activities became greatly enlarged. He is thirty years of age.

Edward Jacobs Succeeds Captain Hearn at Shreveport

Edward Jacobs has been elected president of the Shreveport Railways, Shreveport, La., succeeding Capt. H. B. Hearn, who has become vice-president of the City Savings Bank Trust Company, Shreveport. He became a member of the staff of the company in 1918. He was elected secretary-treasurer in 1919 and vice-president in 1926.

Duties Reassigned on Indianapolis & Southeastern

W. A. Kirkpatrick, for six years freight agent at Rushville, has been made general freight and passenger agent of the Indianapolis & Southeastern Railroad. J. E. Ray, Indianapolis, who has been superintendent of transportation for the last year, will become head of the traffic department with the title of director of traffic and transportation. J. A. Rothermel and W. A. Patton, both of Indianapolis, formerly in train service, will become division traffic representatives in the reorganization of the traffic department. They will co-operate on both divisions of the railroad to give better freight and passenger service. L. E. Watkins, who has been division traffic representative, at Connersville, Ind., has resigned.

Temporary Appointments at Toronto

Toronto's Council has sustained the Board of Control's recommendation for the appointment of George Wilson, commissioner of finance, and George H. Ross, former commissioner of finance, as members of the Toronto Transportation Commission, in charge of the municipal railway and bus lines, for the balance of the respective terms of the late P. W. Ellis and George Wright, resigned.

C. W. Gifford, general superintendent of the Gary Railways, Gary, Ind., for the last four years, will assume charge of the Des Moines Railway, Des Moines, Ia., on Aug. 1. Before going to Gary, Mr. Gifford was connected with railway systems in the East, among them the Bay State Street Railway, and the Eastern Massachusetts, and the Brockton & Plymouth Street Railway. Under his supervision the operation of one-man cars has been extended over the Gary lines, and considerable additions have been made through incorporation of the Hobart and Valparaiso lines as part of the Gary system. A successor to Mr. Gifford at Gary has not yet been appointed.

Edward P. Warner, formerly assistant secretary of the Navy for Aeronautics, recently elected president of the Society of Automotive Engineers and formerly professor of aeronautical engineering in the Massachusetts Institute of Technology, has been appointed editor of *Aviation*. Appointment of the former assistant Navy secretary to head the oldest weekly in America devoted to aviation is the latest development to follow recent acquisition of the publication by the McGraw-Hill organization. Mr. Warner, in addition to his duties as editor, will serve as aviation advisor to the company's 26 engineering, industrial and business publications.

Gerard Swope, president of the General Electric Company, has been elected a director of the National City Bank, New York. The election marks the first occasion on which he has associated himself as a director in any enterprise outside the electric and power field and marks also the resumption of an active association between himself and Charles E. Mitchell, chairman of the bank, the

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ground work of which was laid more than 30 years ago, when both were in the employ of the Western Electric Company.

Neil Currie, Jr., managing engineer of the motor department of the Pittsfield works of the General Electric Company for the past five years, has been named manager of the Philadelphia works of the company. Robert V. Good, section superintendent in the Schenectady works, has been named assistant to the manager at Philadelphia.

Charles E. Moore, Jr., since Sept. 1, 1926, junior assistant utilities engineer of the Maryland Public Service Commission, has resigned, effective on Aug. 10, to accept a position as planning engineer with the Western Electric Company.

Major R. J. Lockwood, assistant general manager of the St. Louis Public Service Company, was elected president of the Midwest Electric Railway Association at the closing session of the three-day meeting at the Chase Hotel, St. Louis, Mo., on June 15.

J. H. Shepherd, engineer and manager of the Dunfermline & District Tramways Company, has been appointed chairman for the ensuing year of the Scottish Tramways & Transport Association. L. Mackinnon, general manager of the Glasgow Corporation Tramways, has been appointed vice-chairman.

Obituary

John J. Russell

John J. Russell, supervisor of maintenance of way for the Lehigh Valley Transit Company, Allentown, Pa., is dead. Mr. Russell was born in Friendship, N. Y., 70 years ago. As civil engineer for the Erie Railroad he supervised the building of much trackage. He also helped to build the large yards at Salamanca, N. Y., for that company. He also had a part in double-tracking the Erie from Buffalo to Pittsburgh, and assisted in the construction of the Pennsylvania station, in New York City. He next worked with the Interborough Rapid Transit Company in superintending the construction of tracks. He went to Allentown in 1912 to supervise the maintenance of the Philadelphia division for the Lehigh Valley Transit Company. He was advanced until he exercised supervision over all but the Easton division of the Lehigh Valley.

Samuel M. Perry

Samuel M. Perry, vice-president of the Denver Tramway, Denver, Colo., died on July 21. Mr. Perry was born in Knoxville, Ill., 80 years ago. He went to Colorado in 1887 and in 1890 built an electric railway to Aurora. This line was later merged with the Denver Tramway, Mr. Perry becoming vice-president, a post he held at the time of his death. In 1902 when the Denver & Salt Lake Railroad was built, Mr. Perry became financially interested in the line and opened the Moffat Coal Company at Oak Creek on the railroad. He was also president of the Moffat Coal Company from its inception until he died. He was an enthusiastic sportsman.

John E. Davis

John E. Davis, trainmaster of the South Side Division, Chicago Rapid Transit Company, died in Chicago on June 27, at the age of 67.

Mr. Davis joined the South Side "L" on July 15, 1892, only a few weeks after this first unit of the present Rapid Transit Lines was placed in service. His first duties were as fireman on one of the steam "dinkey" engines then furnishing motive power for elevated trains on what was popularly called the "Alley." Shortly after he was promoted to engineer.

When the power was changed from steam to electricity in 1893, Mr. Davis likewise changed his title from "engineer" to "motorman." He rose through the various stages of promotion until his appointment as trainmaster in 1926.

George T. Chaffee, pioneer electric railway owner, manufacturer and banker, died on July 15 in Rutland, Vt. Mr. Chaffee entered the railway business in 1891 as owner of the Rutland Street Railway, then a horse car line. He was instrumental in its change to electricity in 1894, and was prominent in the industry for a number of years. Mr. Chaffee was connected with the F. Chaffee & Sons lumber dealers, and was a part owner of the Patch Wegner Company, machinery manufacturers, and a director of the Glens Falls Machine Company. He had been president of the Rutland Trust Company since 1904, and a director of the Killington National Bank since 1883. He was formerly State Senator.

John M. Sweeney, president of division 308, Amalgamated Association, Chicago, is dead. Mr. Sweeney was born at Belvidere, Ill., on July 3, 1870. He entered the employ of the Chicago Rapid Transit Company on July 13, 1917, as trainman on the south side division. His rise in union circles was rapid, culminating in his election as head of division 308.

Louis E. Bean, chairman of the Oregon Public Service Commission, died in Salem, Ore., on July 6, following a heart attack. For nearly three years Mr. Bean had served as a member of the commission and during the last two years had been its chairman.

James G. Murdock, son of the late Samuel T. Murdock, pioneer in interurban and power development in Indiana, died recently in Indianapolis. Mr. Murdock was born in Lafayette thirty-six years ago. He attended Wabash College and Yale University. He assisted in his father's business enterprises until the latter's death some months ago.

Book Reviews

Arc Welding

Lincoln Prize Papers Submitted to the American Society of Mechanical Engineers. Edited by Edward P. Hulse. Published 1929, by McGraw-Hill Book Company, New York City. Cloth, 6x9 in., 421 pages. Price $5.

Last year prizes aggregating $17,500 were awarded for the best three papers disclosing advancement in the art of electric arc welding. While these were financed by the Lincoln Electric Company, the contest was sponsored by the American Society of Mechanical Engineers and the awards were made by a disinterested committee of eight prominent engineers. This book, composed of the three prize papers, of two receiving honorable mention and two others of the 77 submitted, is ample evidence that the incentive was adequate. It is easily the most important contribution yet made to the literature of arc welding.

"Arc-Welding—Its Fundamentals and Economics," brought the first prize of $10,000 to James W. Owens. It reflects the author's extensive experience as director of welding for the Newport News Shipbuilding & Drydock Company, but he finds ample space in the 180 pages of his paper for the fundamental treatment of arc welding in general. The attention given to definitions, nomenclature, standards and specifications, and the author's definitely practical viewpoint throughout, add much to the value of the paper.

"Fundamental Principles of Arc Welding," for which Prof. H. Dustin of Brussels, Belgium, received second prize of $5,000, proceeds from systematic analysis and tests of the elementary welds to an experimental study of joints for structural work. His conclusions are general in their application.

Commander H. E. Rossell of the U. S. Naval Academy, who won third prize of $2,500 with his paper "Electric Welding of Ships' Bulkheads and Similar Plated Structures," makes a distinct contribution to the science and art of naval architecture. Incidentally he adds definitely to structural knowledge in general.

It is not generally realized that newly developed types of expansion joints make welding as applicable to the unpaved tracks of steam railways and interurban electric roads as to the paved tracks of street railways. The field for welded rail joints is therefore very large. In his paper on the "Theory and Application of the Base Plate Arc Welded Rail Joint," Frank B. Walker, chief engineer Eastern Massachusetts Street Railway, outlines extensive tests of rail joints in laboratory and field and gives designs and cost figures for commercial applications.

"Stable Arc Welding on Long-Distance Pipe Lines," by B. K. Smith, president of the Big Three Welding & Equipment Company, is mainly a brief history (with costs) of the laying of 45 miles of arc-welded pipe line for natural gas.

"Arc Welding as applied to Constructive Work at the Philadelphia Navy Yard" describes the construction of a steel pressure-resisting boiler test room and experiments on the welding of T bars to armor plate. The authors are M. M. Kennedy and F. H. Wieland of the Philadelphia Navy Yard.

In "Arc Welding of Duplicate Structures," W. G. Hines describes methods used in the publication of interchangeable arc-welded truck-switch frames.

Undoubtedly these papers, particularly the three prize papers, add much to our practical knowledge of the rapidly developing art of arc welding.

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Industry Market and Trade News

Increased Activity in Car Buying

ESTIMATES made early in the year in the Annual Statistical issue of this paper to the effect that 1929 would be marked by heavier purchases of rolling stock than have been made for several years past have been confirmed within the past 30 days by authorizations which should lead to the placing of orders for more than 650 new cars by properties in this country and Canada.

As the result of the recent merger of the Brooklyn City Railroad with surface lines of the Brooklyn-Manhattan Transit Corporation into a new organization to be known as the Brooklyn & Queens Transit Corporation, the immediate purchase of 100 new cars has been authorized. While complete specifications are not available at this time it is announced that the new cars will be provided with high acceleration motors, special brakes, and other modern equipment, to insure the safety and comfort of the passengers as well as to maintain high speed operation under present day traffic conditions. They will be of the front entrance, center exit type, with seats for 50 passengers and equipped for one-man operation. It is estimated that the new cars will cost in excess of $15,000 each.

The approaching completion of the new subway system being developed under the direction of the Board of Transportation of the City of New York has led the authorities to ask for the submission by manufacturers of sealed proposals for the construction and delivery of 300 steel passenger cars. Bids must be in the hands of the Board at its office, 49 Lafayette Street, New York City, not later than August 20. For more than a year engineers of the board, aided by experts in car construction and design, have been studying the problem, with the result that the new cars will be faster and more commodious than any now in use in the city.

Preliminary specifications call for cars 60 ft. 6 in. in length, 10 ft. wide and 12 ft. high, with four double doors on each side. While the seating arrangement will be similar to that of the present B.-M. T. cars an attempt will be made to achieve greater passenger comfort by allowing more knee room. Each car will seat 60 passengers.

Authority has been granted by the Cleveland City Council to the Cleveland Railway to purchase 100 new street cars at an estimated cost of $1,800,000. The company had requested permission to retire 254 cars of an older type, replacing them with new equipment, but the Council would only consider the retirement of 100 at this time. It is understood that the cars will be of the single end, double truck, one-man, two-man, Peter Witt type, similar to the 50 cars ordered in 1928 from the G. C. Kuhlman Car Company. The cars previously supplied are 53 ft. 6½ in. in length, weigh 44,800 lb., and seat 55 passengers. Bodies are of semi-steel construction, with arch roofs, and doors at both center and end.

Following experimental operation extending over a period of several weeks with one of the small type of Brill standardized car, the Lynchburg Traction & Light Company, Lynchburg, Va., has placed an order with that company for twenty double-end, double-truck units. The new cars, which are ordered for city service, will be equipped with four motors, and will have an over-all length of 43 ft. 3 in., and will seat 50 passengers. Of more than usual significance is the fact that the cars are being purchased in accordance with builders' specifications.

With the appointment of two additional members on the board of the Toronto Transportation Commission, raising that body to its full quota, there would appear to be removed the last obstacle to the placing of an order for 55 motor cars and 55 trail cars for that property, recommendations for which have been pending for several months. Specifications have been agreed upon and bids have been submitted by several Canadian manufacturers of car bodies and supplies, consequently prompt action can follow any proper authorization from the commission.

According to preliminary specifications each motor car and trailer will form a two-car train, the motor cars to be provided with four motors each and the trailers with two. By the provision of auxiliary switching control it will be possible to move the trail cars around the carhouses under their own power. In general the cars will resemble the Peter Witt cars now being operated by the commission, with the exception that the new cars will be 50 ft. in length over all, with seats for 56 passengers, as compared with an over-all length of 52 ft. and a seating capacity of 60 passengers in the present standard equipment. The new trailers will seat 52 passengers each, the same as the present trailers. Cost of the new rolling stock and its equipment is expected to total in excess of $1,500,000.

Another Canadian order conditional upon the adjustment of certain franchise legislation, which now appears to have been satisfactorily disposed of, is that of the British Columbia Electric Railway, Vancouver, B. C., for fifteen cars of the one-man two-man front entrance, center exit type, similar to certain cars recently ordered for Cleveland and Toronto. Total cost of the new cars will exceed $300,000.

Lehigh Valley Considering Electrification

Engineering surveys recently have been made of a 75-mile section of the Lehigh Valley Railroad, extending from Mauch Chunk to Wilkes-Barre, with the view of its possible electrification. The estimated cost of the project is placed at between $7,000,000 and $10,000,000. The section under consideration runs through mountain territory, and the management believes that electrification would permit the movement of heavier trains at greater speed than is now possible with steam. It is thought that the maintenance cost of electric locomotives would be considerably below that of steam equipment. The relative advantages of direct and alternating current are under consideration, as well as the question of voltage. Lehigh Valley officials are also making a close study to determine whether the use of more powerful steam locomotives would compensate for the advantages promised by electrification.

Recent Bus Orders Numerous

Electric railways continued to be the dominant factor in the bus field during the past month by placing numerous orders for new automotive equipment. While there were no exceptionally large purchases the orders were widely representative and the aggregate was considerable. By the purchase of nine 40-passenger Twin Coaches, the Boston Elevated Railway increased its fleet of these vehicles to 35. Other purchasers of Twin Coaches were the Savannah Electric Company, The Burlington Rapid Transit Company, Burlington, Vt., and the Milwaukee Electric Railway & Light Company, each of which has bought five. The Capital Traction Company, Washington, D. C., and the Philadelphia & West Chester Railway have ordered eleven and three units respectively. The New Orleans Public Service, Inc., has placed an order with the Twin Coach Corporation for one 42-passenger trackless trolley, to be equipped with 50-hp. motors. An order for eleven trackless trolleys has also been placed with the Twin Coach Corporation by the Utah Light & Traction Company, of Salt Lake City.

The American Car & Foundry Motors Company reports the delivery of two 29-passenger parlor coaches to the Southern Michigan Transportation Company, of Jackson, Mich., three 29-passenger full headroom parlor coaches to the Motor Transit Corporation, Chicago, Ill., and an order of five 27-passenger and three 21-passenger parlor coaches to the Baltimore Coach Company, all electric railway subsidiaries.

The Indianapolis & Southeastern Railroad, of Indianapolis, Ind., has purchased four 22-passenger parlor observation cars from the Studebaker Corporation. Other Studebaker sales reported include seven 21-passenger buses of the de luxe street car type to the Eastern Massachusetts Street Railway, Boston, Mass., two 21-passenger street car type buses to the Fitchburg & Leominster Street Railway, Fitchburg, Mass., and one 21-passenger street car type bus to the Austin Street Railway, Austin, Tex.

Mack-International Motor Truck Corporation reports the sale of eighteen model AB four cylinder chassis to the Rochester Railways Co-ordinated Bus Lines, Rochester, N. Y., four six-cylinder model BK chassis to the Rochester Interurban Bus Company, and one six-cylinder model BK chassis to the Syracuse Railways Co-ordinated Bus Lines, Syracuse, N. Y. The three companies are all affiliated with the New York State Railways. Two six-cylinder model BK buses have also been delivered to the Boston, Worcester & New York Street Railway, Framingham, Mass.

Recent deliveries of the General Motors Truck Company include twenty-five type

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Z-29 city service buses to the Department of Street Railways, City of Detroit, ten type W city service coaches to the Illinois Power & Light Corporation, six for Quincy and four for Galesburg, and two type Z-39 coaches to Coast Cities Railways, of Asbury Park, N. J. London Street Railway, of London, Ontario, has received five type W city service buses. Fifth Avenue Coach Company, of New York City, has taken delivery of eleven yellow coaches—five of the type W observation type, five type W's and one Z-240.

In addition to an order of eighteen Mack buses recorded above the Rochester Railways Co-ordinated Bus Lines, Rochester, N. Y., has also received ten White model 54-A six-cylinder buses. Other deliveries by the White Company include three model 50-B buses to the Alabama Power Company, Birmingham, Ala., fourteen model 54 buses to United Electric Railways of Providence, and six model 54 buses to the Penn-Ohio System, Youngstown, Ohio.

New Gas-Electric Bus by St. Louis Car Company

Tests have recently been completed by the St. Louis Car Company on a new type of gas-electric bus on which its engineering staff has been working for more than two years. The new vehicle will seat 40 passengers.

The gas-electric power unit is located in the rear end. It consists of a six-cylinder gasoline engine direct connected to a d.c. generator. The power is used in four 30-hp. motors, one geared to each of the rear wheels.

The tests show that the bus will attain a maximum speed of 45 m.p.h. From a standstill it will accelerate to a speed of 20 m.p.h. in eleven seconds. Dynamic braking is used, being controlled by a pedal, the rate of braking depending on the distance the pedal is depressed.

The doors are interlocked with the control, so that the bus cannot move unless all doors are closed. They are opened by push-button control, with a treadle for the exit door at the center of the vehicle. The main control has a dead-man safety feature which unlocks the doors and sets the dynamic brakes and automatically reduces the speed to not more than 2.5 m.p.h. on a steep down grade.

The bus is low hung, the floor being 26 in. from the ground and the step 13 in. The wheelbase is 210 in. The over-all dimensions of the bus are: length, 31 ft. 4 in.; width, 8 ft., and height, 8 ft. 11 in.

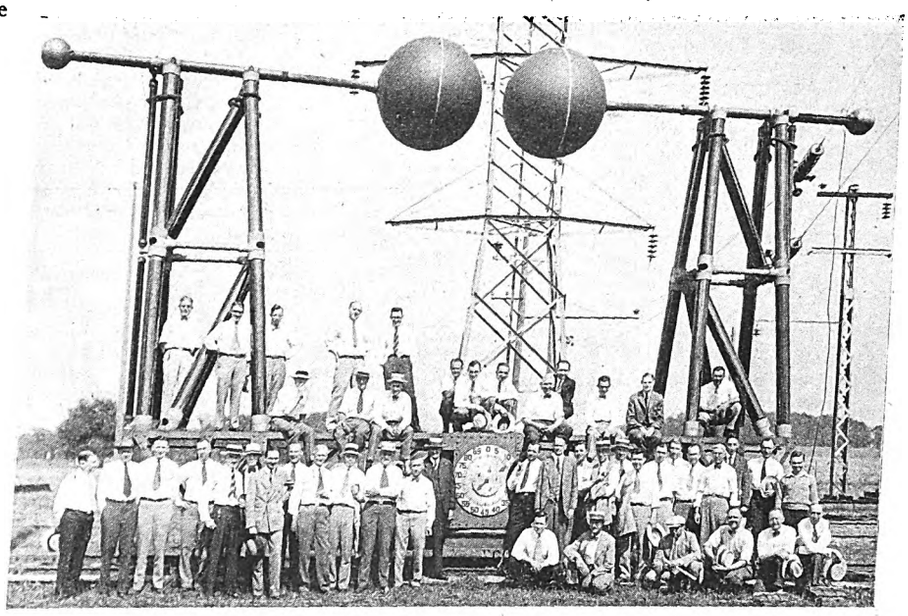
The bus was on display at the convention of the Electric Railway Association of Equipment Men, Southern Properties, being held at Lexington, Ky., on July 24-26. Following this it is planned to exhibit it at Louisville, Indianapolis and Terre Haute.

Brill Brings Out a Trolley Bus

A trolley bus, developed by the J. G. Brill Company, made its initial appearance at the recent convention of the Mid-West Electric Railway Association held in St. Louis. Through the use of aluminum alloy in body and fixtures the weight of the unit is kept down to approximately 14,500 lb. The side windows are fitted with single sash, with counterbalance spring. Circulating passenger load is accomplished by the provision of a rear exit door, pneumatically operated under control of the driver. Included in the equipment are four-wheel positive acting internal expanding air brakes, an emergency disk parking brake, pneumatic windshield wipers, cam and lever type steering mechanism designed expressly for balloon tires, two G. E. 35-hp. high speed motors, and PCM foot control. Seating capacity is provided for 30 passengers. Claims made for the new unit include economical power consumption, quick and smooth acceleration, noise reduction, flexibility in traffic and exceptional riding comfort.

Ohio Brass Entertains Electrification Engineers

Electrical engineers of many of the leading steam railroads that have electrified divisions or are contemplating electrification were the guests of the Ohio Brass Company at its Barberton plant on July 11 and 12. The two-day session was devoted to a study of problems of high-tension insulator design and catenary overhead construction, with special reference to insulation.



Steam railroad electrification men inspect high-tension laboratory of Ohio Brass Company at Barberton

The party inspected the insulator plant and saw the various manufacturing processes in the making of electrical porcelain. The indoor laboratory was then visited and a number of breakdown tests witnessed. The equipment includes a 750,000-volt transformer with a capacity of 750 kva. The transformer is excited by a special sine wave generator which is attached to the transformer case and is driven by a motor through an insulated shaft.

In the afternoon, tests were made at the outdoor laboratory, which is equipped with a set of similar generators that will deliver 3,000,000 volts at 25 or 60 cycles. Tests were made at normal frequency, as well as impulse tests using steep wave fronts, simulating lightning. Equipment for photographing the discharge in daylight was demonstrated.

In the evening and on Friday morning a discussion was held on means of obtaining reliability in catenary and transmission insulation. Various types of insulation were discussed and some were demonstrated at the evening session. Further tests in the indoor and outdoor laboratories were made on Friday afternoon.

Gear Inspection Standardized

The proposed American recommended practice "Inspection of Gears" has been completed by one of the sub-committees of the sectional committee on the standardization of gears. Copies of this proposed standard are now being widely distributed for criticism and comment. It is in tentative form for discussion, and criticisms should be mailed to C. B. LePage, assistant secretary American Society of Mechanical Engineers, 29 West 39th Street, New York, N. Y.

This proposed practice covering the inspection of worms, hobs and cutters was developed by sub-committee No. 9, consisting of 31 men representing manufacturers, consumers and general interests, in conjunction with a committee of the American Gear Manufacturers' Association. As here presented, it is a composite of several sections on the subject as developed and approved as "Recommended Practice" of the A.G.M.A.

Bender Body Increases Capacity

Through additions to and rearrangement of the present plant the Bender Body Company, Cleveland, Ohio, plans a 30 per cent greater production of Bender bodies in the near future.

Work is already under way on a new building to serve for final assembly purposes. This structure is 163 ft. x 100 ft., of brick and steel with walls chiefly of glass, also monitor glass roof, assuring a maximum daylight.

A 150 ft. x 80 ft., addition to the eastern end of the present building will be used for the paint shop. It will contain the latest type spray booths and other modern developments.

Wagner Electric Corporation, St. Louis, Mo., announces the addition of W. H. Kretz to its transformer sales division. Mr. Kretz will travel the Southwest. He was formerly with the Public Service Company of Oklahoma and more recently has been Texas district representative for the Jeffry De Witt Insulator Company.

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New Cars of Montreal Tramways

Details of 106 new cars recently completed for the Montreal Tramways, Montreal, Canada, by the Canadian Car & Foundry Company, announcement of which was made in the July issue of ELECTRIC RAILWAY JOURNAL, are now available. The order consisted of 60 single-end two-man cars, seating 42 passengers; 40 single-end one-man cars, seating 40 passengers, and six double-end one-man cars seating 40 passengers, all provided with P.A.Y.E. features and all designed for city service.

The 60 two-man cars have an over-all length of 46 ft. 2 in., with bolster centers spaced 22 ft. 7 in., and length over the body posts of 31 ft. 4 in. The weight of the car body is 16,000 lb., trucks, 10,000 lb., and equipment, 9,900 lb. The 40 one-man cars and the six double-end cars have somewhat smaller dimensions, being 41 ft. 2 in. in length over all, with a length of body of 26 ft. 4 in., and with bolster centers spaced 17 ft. 7 in. The double-end cars are slightly heavier, with a total weight of 38,100 lb., as compared with 35,250 lb. for the 40-seat single-end cars. All three are of semi-steel construction with arch roofs. All have an over-all width of 8 ft. 5 in., and height, rail to trolley base, of 11 ft., and are provided with trucks with 5-ft. 4-in. wheelbase. Detailed equipment specifications, which are substantially the same for all three types, are as follows:

Air brakes	Canadian Westinghouse Company, straight air with full safety features
Armature bearings	Plain, bronze
Axles	A.E.R.E.A. E-2, with 3¼x7 in. journals
Car signal system	Faraday, 600 volt
Compressors	Canadian Westinghouse Company, D.H. 16
Conduit	Standard metal
Control	K-35 XB and Westinghouse Company type 806-J line switch
Couplers	Montreal Tramways, standard cast steel
Curtain fixtures	National Lock Washer Company
Curtain material	Pantasote
Destination signs	Keystone & M. T. Co.
Door mechanism	National Pneumatic Company
Doors	Folding
Fare boxes	Cleveland Fare Box Company
Finish	Enamel
Floor covering	Wood slats, with Kass safety treads
Gears and pinions	Nuttall, grade B. P.
Glass	Plate, 21 oz., double thick
Hand brakes	Peacock staffless
Hand holds	Rigid wood rail on aluminum brackets
Heat insulating material	Three-ply Salamander
Heaters	Canadian General Electric Company, Calrod with Railway Utility thermostatic control
Headlining	⅛ in. Agasote
Interior trim	Cherry
Journal bearings	Plain bronze, babbitt lined
Journal boxes	Cast iron, Montreal Tramways, standard
Lamp fixtures	Electric Service Supplies, compensating safety dome fixture
Motors	Four Westinghouse 510-A2, inside hung
Painting scheme, M. T. Co. standard green and cream	
Roof type	Arch
Roof material	Wood and canvas
Safety car devices	Door and power interlock dead man handle
Sash fixtures	Robt. Mitchell Co. Montreal
Seats	Ottawa Car Mfg. Company and Canadian Car & Foundry Company
Seat spacing	30 in.
Seating material	Rattan
Slack adjusters	American Brake Company, Type E
Steps	Irving Subway Company, folding
Step treads	"Saf-Kar"
Trolley catchers	Keystone
Trolley base	U. S. 20-A
Trolley wheels	Canadian Ideal Company
Trucks, Canadian Car & Foundry Company, F-790	
Ventilators	Railway Utility Company
Wheels	Cast iron, 26 in. diameter
Wheelguards or fenders	H.B.

Montreal Tramways has also placed an order for 25 two-car trains, each unit of which will be almost identical in construction with the standard single-end two-man cars described above, with the exception of the additional reinforcing made necessary to support the couplers. Full details of these cars are not available at this time, as motor equipments have not been determined.

Copperweld Steel Company, Glassport, Pa., announces the establishment of a northeastern district under the management of George F. Bain. The northeastern district includes all of the New England states and all of New York State north of Westchester and Rockland Counties. Mr. Bain's headquarters will be at 30 Church Street, New York City. Paul Van Wagner is now district manager for Greater New York City and for New Jersey, Pennsylvania and West Virginia.

F. L. Markham Advanced by Brill Company

F. L. Markham, identified with the Brill organization for 25 years, has been appointed sales manager of the American Car Company, St. Louis. In this capacity he succeeds the late Wirt L. Haymond. Mr. Markham started his career as a car salesman on July 15, 1904. On that date he joined the sales force of The J. G. Brill Company and was assigned to the Southern territory,

F. L. Markham

comprising nine states. Later he organized the Railway Supply & Equipment Company, with headquarters in Atlanta, Ga., which organization handled the sale of Brill cars, trucks, seats, etc., until September, 1918, when Mr. Markham joined the sales department of the American Car Company, the Brill associate plant in St. Louis. His recent appointment, therefore, is the culmination of eleven years of active service with the sales force of the American Car Company, of which he now becomes sales manager.

Johns-Manville Corporation, New York, has issued a 24-page illustrated circular entitled "Celite for Concrete." Celite, a product recently added to the company's line, is a specially prepared grade of diatomaceous silica which is said to improve the workability of concrete mixture, and at the same time to afford a maximum of water-tightness.

Lincoln Electric Company, Cleveland, Ohio, manufacturers of motors and arc welders, announces the appointment of B. W. Brown as district sales representative with headquarters at Milwaukee, Wis. G. O. Forseth, formerly sales representative at Detroit, has been promoted to sales representative at Minneapolis.

L. G. Avery, manager of the sales promotion department of the White Company since 1926, has been promoted to the managership of the Detroit district. Walter A. Maynard, White Company transportation engineer, has been appointed sales promotion manager. Mr. Avery goes to Detroit with seventeen years experience in automotive merchandising. Mr. Maynard has covered the country in the study of bus transportation and as manager of vocational sales promotion. He joined White in 1923. In the development of vocational sales he has become an authority on bus transportation and on warehousing and distributing operations.

ELECTRIC RAILWAY MATERIAL PRICES—JULY, 1929

Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.
Lead, cents per lb.	6.75
Nickel, cents per lb., ingot	35.
Zinc, cents per lb.	7.15
Tin, Straits, cents per lb.	47.375
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	62.00
General service	45.00

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.17
Somerset mine run, f.o.b. mines, net ton	1.82
Pittsburgh mine run, Pittsburgh, net ton	1.00
Franklin, Ill., screenings, Chicago	1.75
Central, Ill., screenings, Chicago	1.25
Kansas crushed mine run, Kansas City	2.50

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅝ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.95
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.70
Sheet iron (24 gage), cents per lb	2.90
Sheet iron, galvanized (24 gage), cents per lb	3.60
Galvanized barbed wire, cents per lb.	3.35
Galvanized wire, ordinary, cents per lb.	3.15

Waste—New York

Waste, wool, cents per lb.	13.
Waste, cotton (100 lb. bale), cents per lb.:	
White	12.5
Colored	9.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	12.9
White lead in oil (100 lb. keg), cents per lb.	13.2
Turpentine (bbl. lots), per gal.	$0.57
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.85
Weatherproof wire base, cents per lb.	20.875

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ½-in., carload lots, N. Y., per cu.yd., delivered	3.25
Cement, Chicago consumers' net prices, without bags, f.o.b.	2.05
Gravel, ¾-in., cu.yd., delivered	3.25
Sand, cu.yd., delivered	2.00

Old Metals—New York and Chicago

Heavy copper, cents per lb	14.375
Light copper, cents per lb.	12.375
Heavy yellow brass, cents per lb.	8.125
Zinc, old scrap, cents per lb.	3.15
Lead, cents per lb. (heavy)	4.75
Steel car axles, Chicago, net ton	$16.75
Cast iron car wheels, Chicago, gross ton	14.25
Rails (short), Chicago, gross ton	18.25
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.75

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 73 New York, September, 1929 *Number 18*

An Advantage that Should Not Be Lost

IN THE forefront among the serious civic problems in America today is that of traffic congestion. Everyone suffers from it to some extent. Estimates of its dollars-and-cents cost run into figures that are almost incredible. Certainly the local transportation companies have been among the sufferers from this cause, but it has not been altogether an unmixed evil for them and the solution of the problem may not turn out to be an unmixed blessing. Although congestion has caused a serious reduction in operating speeds it also has diverted a certain amount of traffic from the private automobile to the public transportation vehicle. The passenger in the street car or bus has no parking worries and happily he is free from the nervous strain of driving in traffic. Numerous operating companies have emphasized these advantages in their advertising and undoubtedly many people, recognizing the truth of the argument, are now using their automobiles less than they did formerly.

Elimination of automobile parking is undoubtedly the most promising means of relieving traffic congestion. But if such measures were to be adopted tomorrow it is a question whether the patronage occasioned by congestion would be retained by the public transportation companies, or whether these patrons would go back to their automobiles, although it involved the extra cost of using a garage instead of free parking space in the street.

Even though there might appear to be some reason to believe that the business would be lost, that is not a reason why the transportation company should oppose measures designed to relieve congestion. Such an attitude would be exceedingly short-sighted. Selfish opposition will get nowhere. Means of relieving traffic congestion will be found; in fact, some of them already are available. They await only a sufficiently aroused public opinion to insure their adoption, whether or not the transportation companies like them.

Other and better means exist for retaining the traffic that has been brought to the transportation companies by congestion. Chief among these is improvement in service. Circumstances beyond the companies' control have given them this patronage, but their keeping it will depend on their own efforts. It cannot be done with dirty old cars running at irregular intervals over bumpy track. If, on the other hand, the company is prepared to meet the public with modern equipment run on frequent headways at a speed comparable with the demands of the public today, it is likely that not only will the present business be retained, but that even more riders can be secured.

EFFECTIVE Sept. 1 Charles Gordon, editor of ELECTRIC RAILWAY JOURNAL since 1926, becomes managing director of the American Electric Railway Association. Throughout the period of his editorship of the JOURNAL his wide experience and untiring energy have contributed greatly to the progress of the local transportation industry in this country. The publishers of this paper feel keen regret at his leaving the post of editor and congratulate the association upon securing so capable a leader. The broad constructive policies initiated by Mr. Gordon will be continued in the future activities of the JOURNAL. After Sept. 1 responsibility for the editorial direction of the paper will be in the hands of John A. Miller, Jr., managing editor, who has been a member of the staff for seven years, following a similar period spent in actual electric railway operation.

MALCOLM MUIR,
President, McGraw-Hill Publishing Company, Inc.

Advertising Used in a New Way

NEWSPAPER advertising has been utilized for a variety of purposes by electric railways, but seldom has it been used in an endeavor to influence public sentiment regarding damage claims. Neglect of this subject in paid advertising probably has been due to the difficulty of presenting the facts in the brief space available in advertising columns, and to the danger of antagonizing the legal profession and the judiciary. Hazarding the possibility of unfavorable reactions which might outweigh the benefits to be derived, the Georgia Power Company recently issued a series of seven full-page advertisements frankly telling the facts of the situation. The story of the campaign is told in detail elsewhere in this issue.

Carrying the story boldly to the public, the undertaking has already been remarkably effective. Company officials sense an awakening standard of justice among those presenting and awarding claims, and company employees report increased understanding and appreciation of the service being rendered by the railway. The reaction to the advertisements has been almost wholly favorable. A large measure of the success of the series doubtless was due to reiteration that "This company will pay any just claim against it voluntarily." It asked the "same justice you would accord an individual—no more."

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Changing Habits Create a Difficult Transportation Problem

MORE or less typical of the problem facing the electric railways everywhere is the situation at Boston. For some years past the total volume of riding has been declining slowly, as it has in many other cities. This has been due to the loss of off-peak business, which has suffered a marked reduction. On the other hand, rush-hour riding has been increasing steadily. Thereby an extremely difficult problem has been created.

Because the annual report of the Boston Elevated Railway is made as of June 30 the situation is prominently in the public eye just now. For the year recently closed there was a decline of $697,000 in gross revenue. This is attributed principally to the decrease in riding on Sundays and holidays and during the summer season, when more people than formerly are going away on vacations. As a typical instance of the trend of traffic, the month of June may be cited. A year ago the revenue of the Elevated system for June exceeded the cost of service by $179,791, but in the similar month of the present year the cost of service exceeded the revenue by $32,188. Some loss in revenue is attributable also to the open winter last year, which encouraged the use of automobiles.

Over neither of these factors has the management any control. Over the factors which it does control, however, the figures contained in the report speak eloquently. Expenses were reduced by $610,062—an achievement made without any apparent bad effect on the personnel or on the character of service rendered. Actually, this year, from operations there was an excess in cost of service over receipts of $180,153. This deficit was offset in part by a dividend of $150,700 from the Transit Mutual Insurance Company, created in 1921 to carry the workmen's compensation insurance of the Elevated. The rest of the deficit was counterbalanced by inventory and other profit and loss adjustments. In short, for the year ended June 30, 1929, the company was able to meet all operating expenses and fixed charges, but with no balance over and above the amounts necessary to restore the reserve fund to the original figure of $1,000,000, as provided in the public control act of 1918.

That is the situation. No effort has been made to conceal it behind a screen of complicated figures. Rather, the matter has been held before the employees and the public in the frankest manner. Under public control the trustees are directed to operate the road on the basis of service at cost, fixing fares to meet the needs of the situation. An easy way to meet the problem would be to follow this arrangement to the letter, but that the management never has done. Instead of ignoring costs, constant attention has been paid to keeping them down to a minimum. Service has not been impaired but, as in a recent instance, both the public and the management have agreed to forego service that would tend to increase costs unnecessarily. At the same time special thought has been devoted to securing new business. The latest move in this direction is a newspaper advertising campaign, with the idea of inducing more people to park their automobiles at points along the rapid transit line and use the Elevated to get downtown. How this will affect the situation cannot yet be determined.

All in all, the situation at Boston is a difficult one. The vital character of the service rendered by the Elevated is shown by the increasing rush-hour traffic. This, however, only adds to the complexity of the problem with which the management is faced. Eventually, however, the financial question will have to be solved on a basis that will preserve the transportation facilities of this great metropolitan area and permit their expansion to meet the needs of the many growing communities served.

New Evidence of Broader Thinking on Co-ordination

MORE and more are leaders in transportation becoming aware of the need for fully co-ordinating all transportation facilities within a city. Additional evidence of the expansion of this idea to include proper physical connection between through railroad and community local transportation facilities is furnished by the plans of the new $40,000,000 Cincinnati Union Terminal, made public only recently. The terminal is so designed that street cars, buses and taxicabs will all pass through the building. These vehicles will enter a north wing, discharge passengers on separate platforms under shelter, and then go underneath the main building to a south wing, where they will pick up outgoing passengers, also under shelter. The plan will allow the complete segregation, not only of incoming and outgoing passengers, but also of those using the three classes of local service. Since seven steam railroads are co-operating in the construction of this terminal, the completed project will tie in almost every transportation facility of the city. It is indeed a significant move and another forward step in the advancement of complete co-ordination.

An even greater degree of co-ordination may perhaps be achieved in Cleveland, now that the Cleveland Railway has combined with the Van Sweringen interests. The plans for the new union terminal include co-ordination of the rapid transit lines and the steam railroads, as well as local street cars and buses. It is not unlikely that some agreement will be reached between the Van Sweringens and the electric interurban lines in the city to use the terminal also. Moreover, a taxicab stand has been built into the station, so that it appears that every facility will be co-ordinated.

Further evidence of the extension of the idea to include proper physical connections between the railroad and community transportation facilities is furnished by the recent revival of the Hudson River Bridge project, connecting New Jersey with New York City at 59th Street, and including a great passenger terminal on Manhattan Island. The most significant features, from the viewpoint of community transportation, are the subway freight line to extend to lower Manhattan and the underground connecting link to join this new terminal with those already built, as well as with the Hudson & Manhattan Tubes, the Ninth Avenue Elevated, Eighth Avenue Subway, Seventh Avenue Subway, Broadway Subway, Sixth Avenue Elevated, Lexington Avenue Subway and the lines to Queens. In addition the underground loop would connect six north and south street car lines, three crosstown lines, the Fifth Avenue Coach lines and most of the intercity bus terminals. In short, the system would make all of the railroad terminals accessible to people reaching the city on any rapid transit line, and conversely, would aid arriving passengers at the terminals to get to their destination. The project reveals a broad vision on the part of those who conceived it and represents an attitude toward the problem which must, of necessity, guide the planning of all great terminal

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projects. Plans of this sort naturally involve many intricate physical and economic problems, but none of these is impossible of solution when the authorities realize the importance and fundamental soundness of co-ordination.

Standardization That Is Dynamic

NATIONAL industrial standardization has been advanced greatly during the past year by the work of the American Standards Association. Building on the work of its predecessor, the American Engineering Standards Committee, the new association has so broadened the scope and improved the procedure that its first year of existence has marked a distinct step forward. As at present constituted, it is a federation of 40 national technical societies, trade associations and governmental bodies. The purpose is to bring together manufacturers, distributors, consumers, technical specialists and any others directly concerned with a particular standardization project. After being assured that a preponderance of these interests wish to have a national standard, the association brings about the organization of a technical committee composed of official delegates of all important bodies directly interested to formulate the standard. Finally, when such a committee has prepared the standard and given it substantially unanimous approval, and when the American Standards Association is definitely assured that the standard represents a real national consensus, it is made an "American standard."

Numerous branches of the federal government are participating actively in the work of the A.S.A. Six executive departments are member bodies. The Bureau of Standards was reorganized in 1927, with an assistant director in charge of the commercial standards group. This group comprises the division of simplified practice, the division of specifications and a new commercial standards unit. The last-named has for its objects the promulgation of commercial standards prepared by industry and the promotion of the use of such standards. The bureau and the A.S.A. are co-operating to prevent overlap and conflict. While the details of the arrangement between the two organizations have not been completed, it is understood that the Bureau of Standards, with the approval of a proponent group, will submit tentative standards to the A.S.A. for approval as American standards, provided there is sufficiently wide acceptance by the various industrial and technical groups concerned.

Although it is chance that places the American Electric Railway Association at the head of the alphabetical list of member bodies, it is no chance that makes it one of the leaders in the movement. The association has been one of the leaders in the new association, as it was in the predecessor organization. The association is represented on the technical committees determining no less than 50 different standards, and is sponsor of thirteen of these. It has representation in many of the activities of the A.S.A. The work of standardization thus accomplished had already proved of great benefit to the electric railway industry, even before the reorganization of this standards work. With the added prestige of the new association and the impetus that has been given to standardization and simplification by the Department of Commerce, the advantage will be more and more apparent. In this connection the slogan of the American Standards Association is significant: "Standardization is dynamic, not static. It means, not to stand still, but to move forward together."

Give the Pedestrian a Chance

PROBLEMS of the pedestrian seldom are given the prominence they deserve in the study of metropolitan traffic problems. While the most attention ordinarily is paid to the automobile, and the street car receives some consideration, those who use the sidewalks—and, what is more important to traffic movement, the crosswalks—are allowed to shift for themselves. But no matter what is done in the way of traffic movement, the pedestrian remains a very necessary consideration. Ultimately every rider in a vehicle, public or private, must get out and walk if he is to do no more than pass through the business district. Hence facilities and protection for the pedestrian are equally as important to the rider as to the person who continually walks in the business district.

In Philadelphia the recent traffic survey, which forms the subject of an article in the JOURNAL this month, showed that of all persons crossing the street intersections those afoot outnumbered those in vehicles two to one. In fact, this survey showed that first consideration must be given the pedestrian if real traffic relief is to be obtained. With adoption of any of the various plans for elimination of parking, persons must leave their automobiles still farther from their destination than they do at present, and the ratio of walkers to riders will be even greater.

The principal source of difficulty in handling pedestrians in traffic is due to interferences. While at a few intersections the available time is insufficient to permit both vehicles and walkers to go straight across, most of these situations can be cared for by special treatment. But where many vehicles make turns—and it matters little to those crossing the street whether they are right-hand or left-hand—there is bound to be the problem of movement and a hazard to life and limb that must receive the most serious thought. If the pedestrian waits for the "go" signal, as most authorities would have him do, he is likely to be confronted with what seems to be an endless stream of vehicles making turns, so that as like as not before he has had the opportunity to cross the street the signal has changed against him. Naturally he is tempted to jay-walk, and either attempts to cross against the light or to go to the middle of the block. In fact, many persons claim that it is safer to cross the street away from the intersections, solely on account of the interference caused by vehicle turns. The longer the traffic cycle the more this problem is accentuated.

Turning movements are made at one point or another by practically all vehicles. The real problem is to restrict the turns or if necessary prohibit them where they cause the greatest delay to pedestrians, and to provide vehicle routes that will result in the least interference to traffic. It requires careful analysis, and naturally there may be disagreement as to the locations at which turns should be eliminated.

An entirely different plan for the protection of pedestrians suggested in the same report advocates the construction of underground passages, either as crossings of the most congested intersections or as continuous thoroughfares. While the construction of such facilities ordinarily is expensive, the cost often is only nominal in connection with the building of subways. Sometimes it even is cheaper to leave an open gallery above a subway than to put in a back fill. Where this is possible sidewalks should be provided. Their construction in many places may well be justified.

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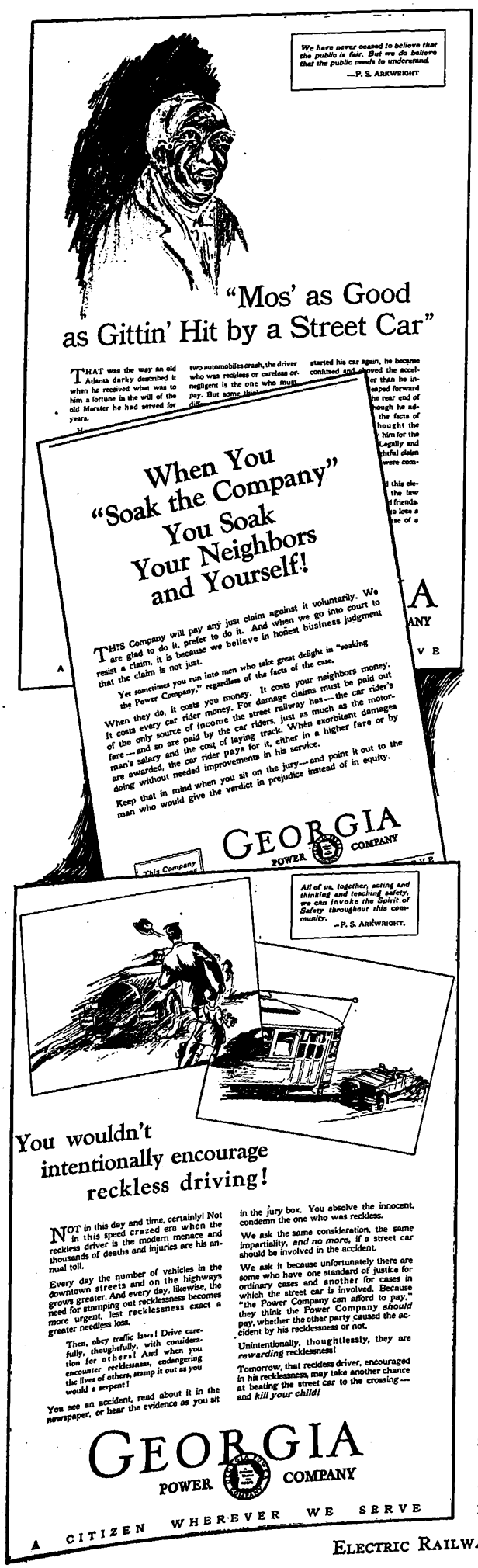
Advertising to

Good results have been obtained by Georgia Power Company from a series of advertisements designed to show the unfairness of the "double standard" of justice which allows ordinarily conscientious people to expect excessive damages from utility interests



STREET RAILWAYS long ago learned that it pays to advertise, but even with practical proof that newspaper advertising will help sell rides, improve operating conditions and build better public understanding, the damage and claim problem is one which has received scant attention in advertising. Occasional advertisements have been published by various companies but rarely has the problem been gone into as thoroughly as in a series of newspaper advertisements used by the Georgia Power Company. The advertisements, seven in number and ranging in size from 30 to 60 in. of newspaper space, were published in daily and weekly papers in Atlanta, Macon, Augusta, Athens and Rome, Ga., where the company operates street railways, and in several other towns served by the company's interurban lines. In addition, reprints of the advertisements were mailed to a number of citizens of the various communities, and each of the advertisements was reprinted in "Two Bells," the company's publication distributed on its street cars.

Contrasts Supervision of Motormen and Auto Drivers

The first of the advertisements was built around the trainman himself and showed that he is entitled to the benefit of a doubt in any street car-auto collision, simply because he has every reason for being habitually careful, by contrast with automobile drivers who are "supervised and controlled by no one, seldom disciplined for their errors, often responsible only to themselves, and not always sober." The advertisement further stated, "The trainman cannot be careless, reckless, negligent, indifferent to the rights of others, and keep his job. The automobile driver may be all of these things, and continue driving his car through crowded streets for years."

In the second advertisement, the obvious fact was pointed out that street cars can't leave their tracks and dodge around obstacles in their path. The public was asked to remember "in ordinary fairness" that the other party, autoist or pedestrian, had to place himself on the street car's tracks before the collision could occur. The public's attention was called to the fact that frequently accidents are prevented because "street cars can and do stop quickly to save some reckless or careless person in their path from injury or death," but asked fair consideration of the accident which could not be avoided.

In another advertisement figures were used to answer any charges that the company really was to blame for the increase in automobile-street car collisions. The figures showed that

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from 1910 through 1928, accidents in this one classification increased 1,176 per cent, while the total of all other accidents was decreased 41 per cent, in the face of a greater number of car-miles traveled and passengers carried. "This trainman of yours can, and does, operate his street car safely! When you sit in judgment on him—in the jury box or as you read about an accident in the newspaper—don't you think he is entitled to the benefit of the doubt?" the advertisement asked.

Another advertisement pointed out that the jury member who decides the case in prejudice rather than on the facts, is "soaking his neighbors and himself" as well as the company, and that street railway budgets and family budgets are much alike. When an excessive jury verdict is awarded, it inevitably takes away money which otherwise might be spent in improving the service. Another made clear that the company is responsible legally only for its negligence. This advertisement was built around an old darky who remarked when he received a legacy from his Old Marster that it was "Mos' as good as gittin' hit by a street car."

Throughout the series the idea was reiterated that: "This company will pay any just claim against it voluntarily." A signed statement by P. S. Arkwright, president of the company, appeared in one of the advertisements as follows: "This company will not wrong anyone intentionally. If by chance it commits a wrong, it will right it voluntarily." When necessary to submit disputed claims to the courts, the company asked "the same justice and fairness you would accord an individual, and no more."

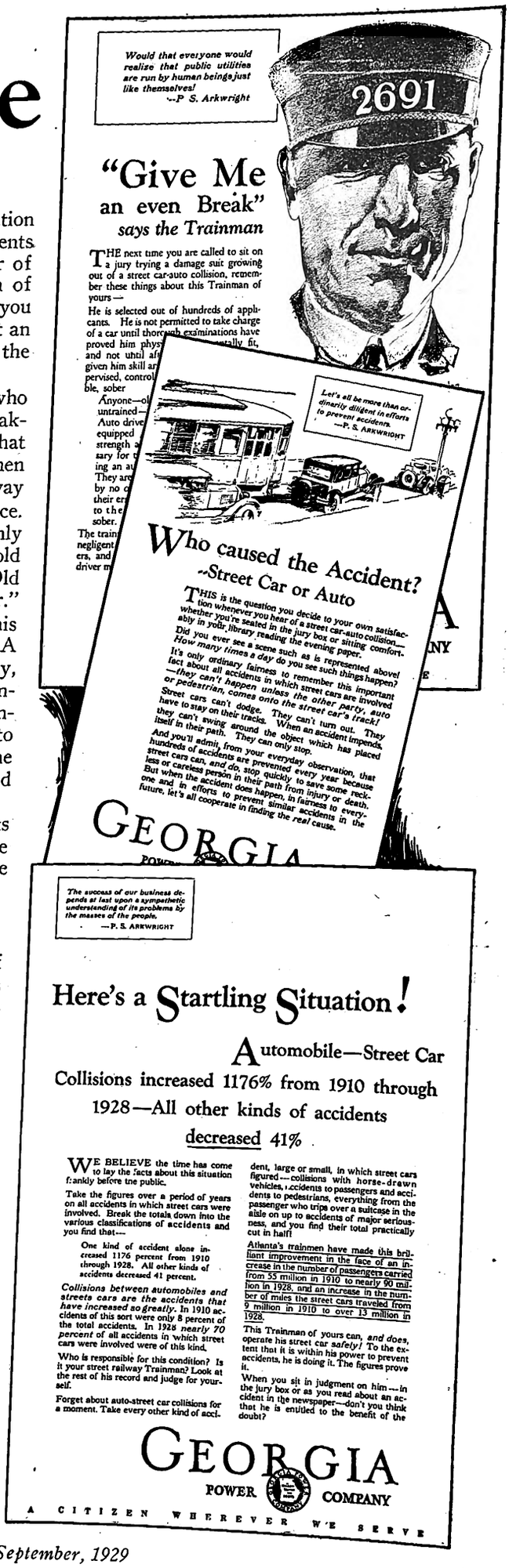
Much good has been accomplished by these advertisements by bringing about a better understanding of the problem on the part of the public and an improved spirit of fairness toward the company.

Improved Spirit of Fairness Established

The direct effect of the advertising on jury verdicts is, of course, not definitely traceable, and immediate results of this sort were not expected. The purpose was to establish a basis of mutual understanding out of which an improved standing in the courts would logically flow, and officials of the company are of the opinion that this has been accomplished.

Widespread discussion and comment was caused by the advertisements. It was almost invariably favorable. Several civic clubs and similar groups took up the advertisements for discussion, and letters and other comment indicated that a large number of persons had gained a new understanding of the situation. Several officials of steam railroads and of other large corporations with a similar problem stated that the company had done a service for all of them in publishing the advertisements. Unfavorable comment was almost exclusively from "damage suit lawyers," some of whom protested to the company against continuing the series and threatened reprisals which never came.

One of the most interesting effects was that on the company's platform men who warmly approved of the series and stated that it made it easier for them to obtain the co-operation of the public in safe operation, and also easier to obtain the names of witnesses when accidents occurred. They felt that the company was "backing them up" and making their work easier by educating the public that the trainman wasn't always to blame when an accident occurred.



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Before laying track, the sub-grade should be well drained and thoroughly compacted

Small Details Important

Careful attention to the matter of details necessary in track design, construction and maintenance. Inspection and follow-up system assures proper execution of work

WHILE there are many factors entering into the design, construction and maintenance of a track structure, there is one extremely important factor which has been given too little attention. That factor is the importance of proper care and attention in the matter of details. This holds for every part of the track maintenance and construction organization and is not limited to any one phase. A design may be all that could be desired, but its success may be nullified by failure to give the proper attention to details in its construction, and, through the same neglect, the life of a repair job may be materially shortened. Particularly with track in paved streets, lack of attention to seemingly unimportant details is responsible for subsequent expensive maintenance costs, and this is true also in lesser degree to open track construction.

Design—In the design, there are several questions to be considered. Is the general design the best for your conditions that your available funds can provide? Does it lend itself readily to repairs when these finally become necessary? Does it provide a maximum of salvage value when the time for major reconstruction arrives? Does it provide a structure that will postpone the period of general maintenance expense for the longest time? Have you covered your materials with adequate specifications which will insure you the best of their kind for the money? If these questions can be answered to your entire satisfaction, the problem of design is taken care of, but to answer them truthfully involves a knowledge, not only of what you are doing yourself but what others are doing as well under similar conditions, and it will often be found that a page can be taken out of the other fellow's book to advantage.

Sub-grade—Assuming that the design has been taken care of satisfactorily, the next item is construction, and since the sub-grade is at the bottom of all track, it will be given first consideration. The sub-grade varies materially in its nature in different localities and frequently changes in a given stretch of track. Two things are essential with respect to sub-grade before track is constructed upon it: First, it should be well drained. Water is probably the worst enemy of the track main-

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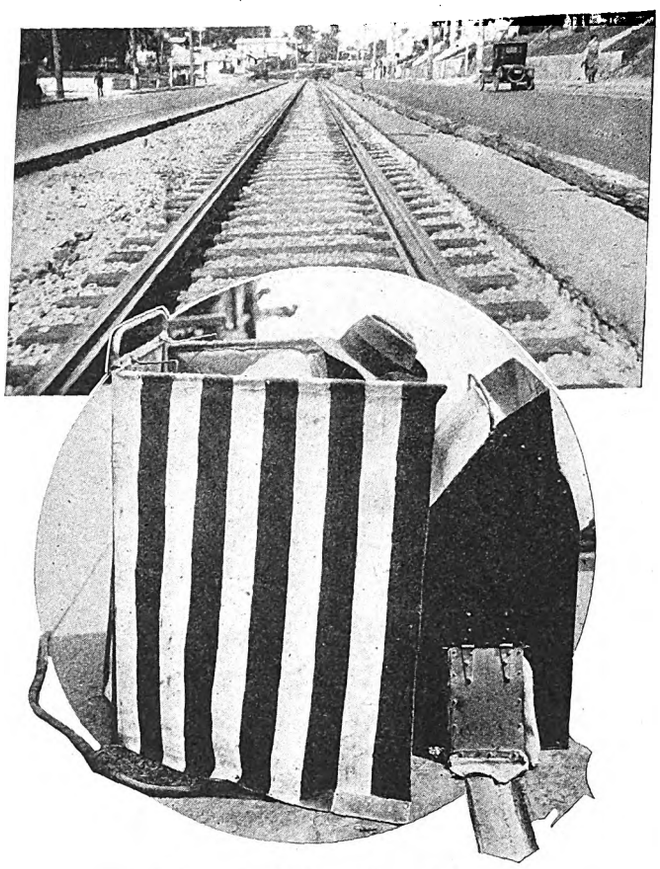
tenance organization. Second, the subgrade should be thoroughly compacted before the track is laid. Poorly compacted subsoil causes many track troubles, and the importance of thoroughly rolling the sub-grade, taking out all unsatisfactory material and replacing with material that will pack solidly, cannot be over emphasized. Of course, where subsoil conditions are of a poor character, the remedy lies in a design which will enable the entire structure to act as a unit in distributing the load over the base. This, however, generally means an increase in construction costs which would, under normal conditions, not be justified. While subsoil drains are not very effective for a protracted period in some soils, they are sometimes absolutely essential if the track structure is expected to last for any extensive period. It is often a case of choosing between two evils.

Ballast—Whether the track structure is built with wood ties on ballast or with either wood or steel ties encased in concrete, the attention to details still holds good. If stone, slag or gravel ballast is used, the main body should be rolled thoroughly before track laying is started, if possible to do so, leaving only about two inches under the tie for tamping purposes. The ballast itself should be well graded in size, so as to form, when rolled, the densest base consistent with good drainage. In no case should the ballast below the bottom of the tie be disturbed once the tamping has been completed. If the supporting base is concrete, then it is important that the proper proportioning of the aggregate be determined for the stone and sand actually used, and



Top view—The ballast should be well graded inside, so as to form, when rolled, the densest space consistent with good drainage. In circle—Since it is important to have rail joints properly welded, care should be taken in training the welders

n Trackwork

By

HOWARD H. GEORGE

Superintendent of Way Cleveland Railway
Cleveland, Ohio

that the water-cement ratio be accurately determined and maintained. It is also important that the mixing be thorough and uniform, and that checks be made on strength, to see that design assumptions in this respect are being met. If reinforcement is provided for in the base, it is necessary to see that it is properly placed and not disturbed during the placing of the concrete, and last, care should be taken in the placing of the concrete to see that there is no undue segregation of the aggregate. Where the supporting base and pavement base are integral, too much emphasis cannot be placed upon the necessity for careful inspection of the tamping of the concrete around ties, under rails and under any bearing plates for which the design provides.

Joint Assembly—Where wood ties and stone ballast are used, the next step is joining the rails and fastening them to the ties. These operations may seem comparatively easy of accomplishment, but they both offer ample opportunities for subsequent trouble. It is generally recognized that the subsequent life of an electrically seam-welded rail joint is largely dependent upon the degree to which the gap between the rail ends is closed at the time the joint is first made. No matter how well a welding job may be done, a joint is certain to show early signs of cupping if the rail ends do not butt tightly together. This can be demonstrated by making a saw cut partly through the head of an unbroken rail at right angles to the gage, operating cars over it and observing the result. The conditions thus represented are those which would exist in a joint otherwise perfect, both electrically and mechanically.

Bolting Plates—In the assembling of joint plates care should be taken to see that both plates and rail are cleaned of all scale and rust, and that they are bolted up tightly and uniformly, to obtain the maximum wedging action in gripping the rails. Blows with a sledge are necessary to help this operation, but trackmen should never be permitted to strike a plate along its flanges in such a way as to mutilate that portion of the plate to which the seam weld is to be made. Heat-treated bolts should preferably be used on all rail joints, because their high elastic limit and ultimate strength permit them to develop a much higher pressure on the plates without stretching. Whether the bolts should be left in after the welding has been completed or not may be considered as optional if the welding operation has been properly done. However, they are the best possible insurance to cover the possibility of defective welding, and their value after removal, as compared with their value in the joint, is not sufficient to justify the expense of removal. It is even desirable to spot-weld all nuts as the final welding operation.

Preparing Seam for Welding—Of equal importance to the removal of scale and rust from the fishing

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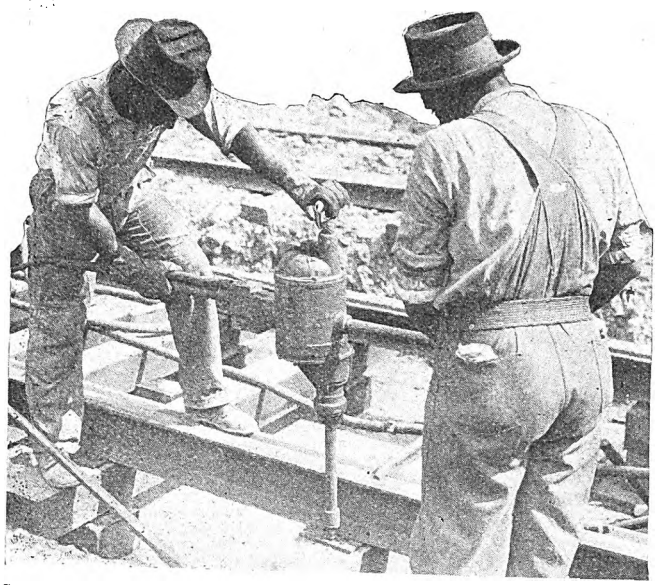


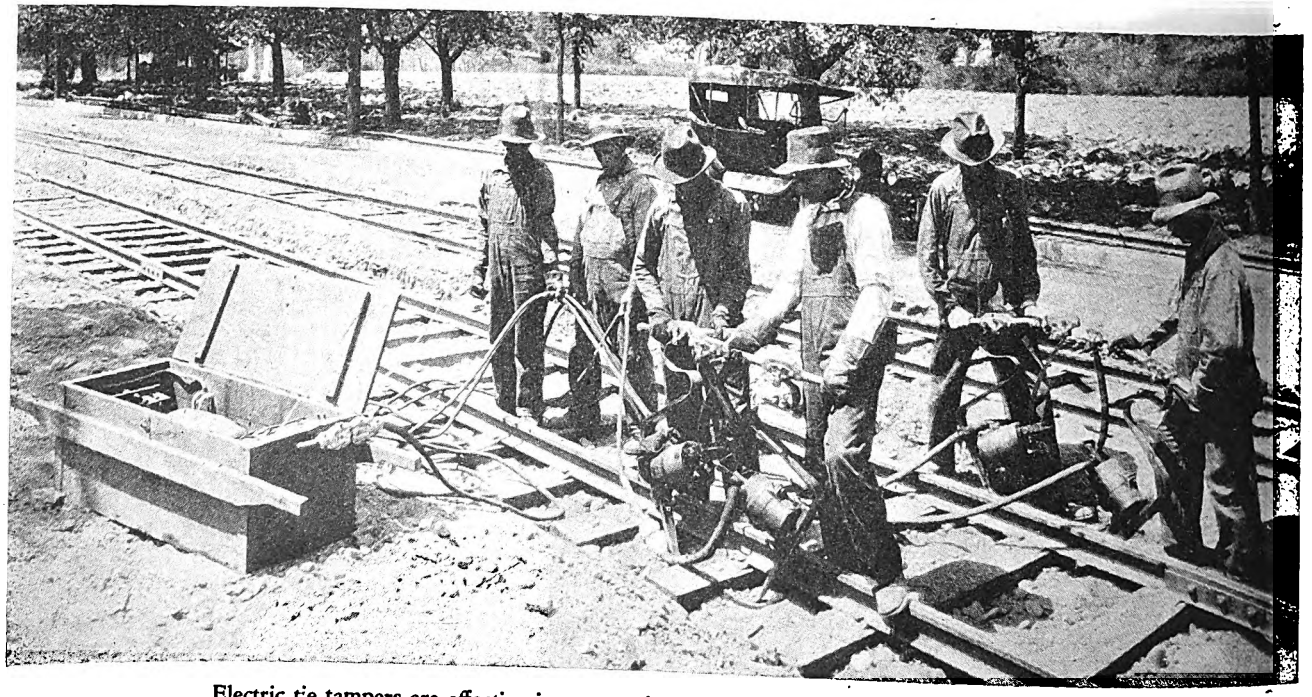
Screw spikes and clips used with a tie plate offer a decided advantage over the ordinary cut spike as a rail fastening device

surfaces of the rail and joint plates is the removal of all oil, grease, scale and rust from the surfaces to which the weld is to be applied. While it may be possible to obtain fairly satisfactory results by the use of a wire brush, there is only one practical way of insuring clean metal to weld on and that is by using a sand blast. This method is quick, inexpensive and thorough, and, if done just ahead of the welding crew, leaves the metal surfaces in perfect condition for welding.

Chemical Consideration—Recent experiments and tests on the seam welded type of joint have demonstrated the necessity of having a fairly ductile metal in the seam weld. The ordinary girder rail contains about 0.85 carbon, which is fairly high when weldability is considered. The destructive forces at work on a rail joint are largely of a vibratory character, and the number of repetitions is quite high. It is essential, to develop these stresses and to distribute them from the rail to the plate, that the seam metal be fairly ductile. This means that a very low carbon rod must be used, preferably not over 0.05 carbon. If the seam weld metal is to be kept low in carbon, it is also necessary that a relatively low carbon steel be used in the joint plates, preferably from 0.20 to 0.30 carbon. The reason for this is that, under the action of the electric arc, the tendency is to draw down into the weld seam metal, carbon from the high carbon rail steel, and, if the joint plates also are relatively high in carbon, some would also be drawn into the seam metal. With a low carbon rod and a reasonably low carbon steel plate, the seam has a fairly low carbon metal of relatively high ductility which is better able to withstand the vibration stresses to which it is subject in service than would the comparatively brittle seam which would result from the use of a higher carbon plate and welding rod.

Weld Plate Design—If it is expected to secure a sufficient amount of weld-seam strength to develop the joint plate and rail strength, the joint plate must have a place to apply the weld. This should be so planned as to prevent wear from car-wheel flanges or other outside sources. It should be such that it affords the easiest possible welding conditions for the operator. Welding conditions in the field are much less favorable than are those which prevail in a shop, and the welders should not be aggravated by introducing into the plate design some feature which a little thought and study would correct.

Training Welders—The proper training of welding operators and the frequent inspection and checking of their work by the engineer is very important. Almost every welder endeavors to follow the instructions given to him to the best of his ability, and to produce the best work he is capable of. If he is continuing with a practice that is fundamentally wrong, it can usually be attributed to lack of proper instructions or to inadequate inspection of his work by those directly responsible for such matters; but, whether poor results are attributable to faulty design or to poor workmanship can be determined with a reasonable degree of accuracy if an honest investigation and analysis of all the facts is made.



Electric tie tampers are effective in compacting the ballast material thoroughly under the ties

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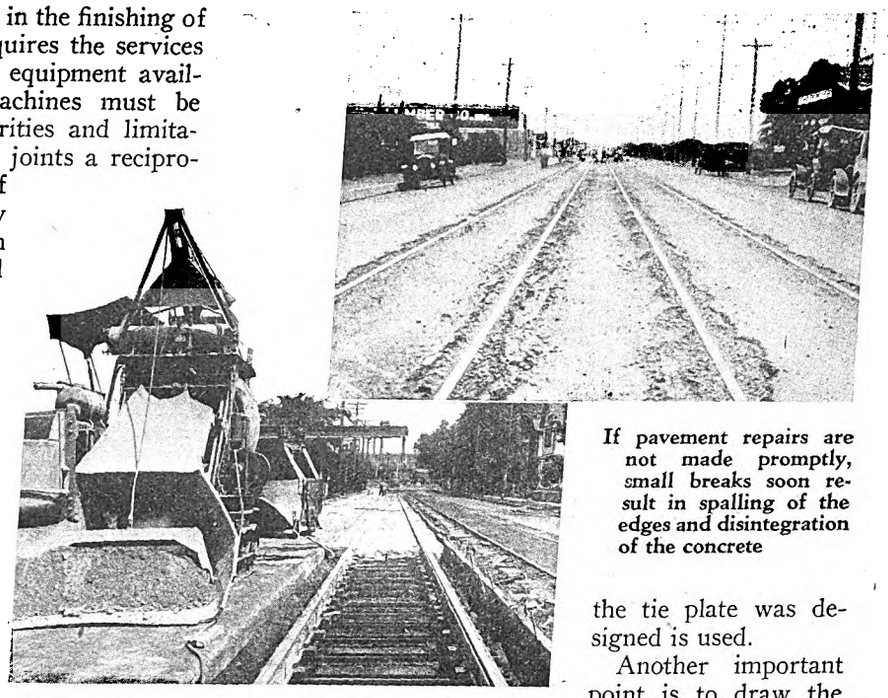
Grinding Joints—The final operation in the finishing of every rail joint is the grinding. It requires the services of carefully trained men and the best equipment available, and the men operating the machines must be thoroughly familiar with their peculiarities and limitations. With the ordinary seam-welded joints a reciprocating or so-called "scrubbing" type of grinder is best, as these joints generally require comparatively little grinding. In any event, this type of grinder should always be used to finish the grinding, the rotary grinder being used only for the rough grinding. The important thing, however, is that no joint, whether welded or not, should ever be put into service without grinding, and, if for any reason this is not found practicable, then the grinding should follow the joint installation within the shortest possible time. The grinding should be carefully checked with a steel straight-edge at frequent intervals during the period of the operation to see that too much metal is not being removed. It also is desirable that an attempt be made in grinding the rail head to retain as far as possible the original contour, as the grinding of a flat surface at the joint, where the remainder of the rail-head contour is a curve, will necessarily introduce different wheel to rail contacts at these points, and consequently change the rail-wear characteristics.

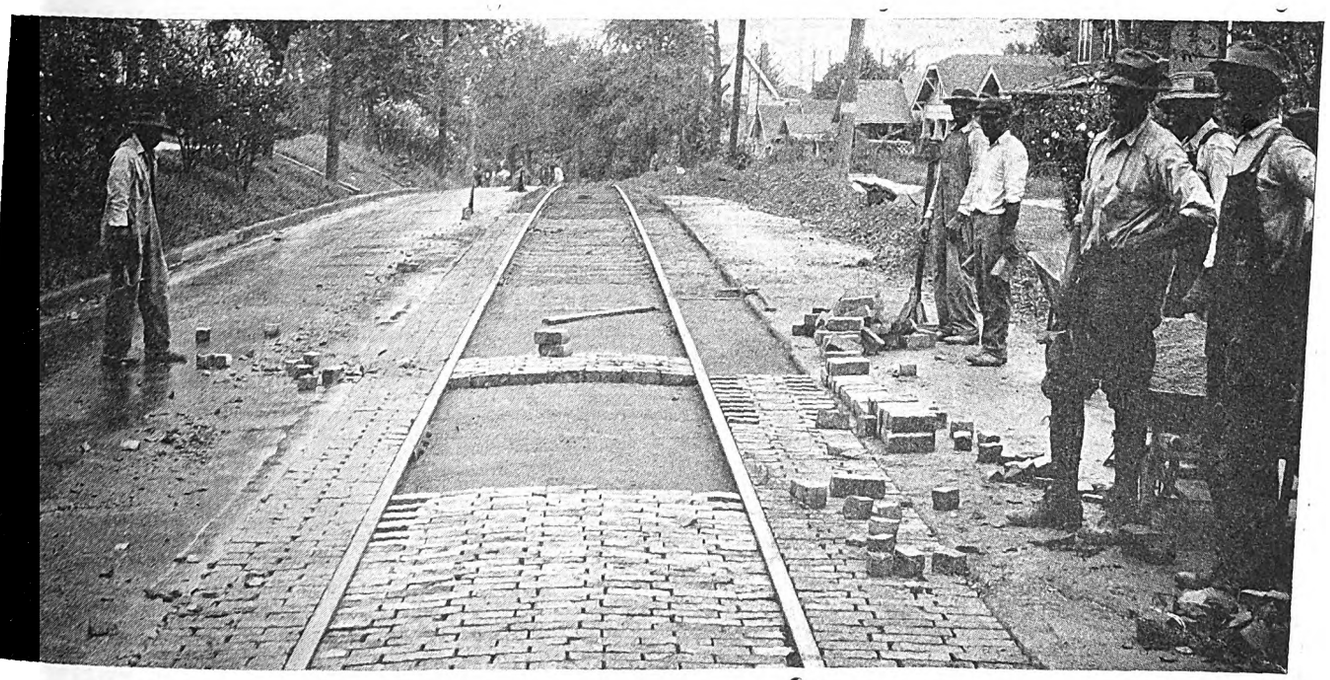


Track, all lined and surfaced, and receiving a concrete base

If pavement repairs are not made promptly, small breaks soon result in spalling of the edges and disintegration of the concrete

Rail and Tie Fastenings—Wood has a fairly definite, known crushing strength, and, in the design of the track structure, it is necessary that the unit loading on the wood tie be kept well within the allowable limit if rail cutting is to be prevented. This means that adequate tie plates must be used. It is for this reason that once a tie-plate size has been determined, a company should, as far as possible, use the one kind of timber in its ties, or at least take the precaution to see that no timber of lower crushing strength than that for which the tie plate was designed is used.

Another important point is to draw the rail base, tie plate and tie as tightly together as possible. It is not practical to draw the three units of the assembly so tightly together with the ordinary cut track spike that there will be no further compression under car loading, even with a sawed tie and flat tie plate, and this initial compression is exclusive of the effect which is commonly known as rail cutting. This is of equal importance in fastening rails to any form of steel tie. The fact is that no rolled surface is a plane surface, and when two rolled shapes are in contact with each other, the contact is not purely a uniform surface contact but a series of point contacts. Also, if fairly large area plates constitute the tie member to which the rail is fastened, where the thickness of the member is relatively small as compared with its surface area, the



Though a sand cushion is necessary in a block pavement to take up the inequalities in the blocks and to distribute the load uniformly over the base, it need not be very deep

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surface is likely to be warped, and the probability of securing a uniform contact between the rail base and plate is practically nil. For this reason, where wood ties are used, it is highly inadvisable that a tie plate with a ribbed base be used, and, for the same reason, a sawn tie offers many advantages over a hewn tie which has not had the rail or tie plate seat adzed. If the top surface of the tie were planed, the conditions in this respect would be still further improved. This is also the reason why the screw spike and clip used with a tie plate offer such a decided advantage over the ordinary cut spike as a rail fastening device. Whatever the details of the design may be, every precaution should be taken to make sure that the fastening used has been drawn up as tightly as its practical limitations will permit.

Tamping—It is a well known fact that too much tamping is as bad as too little. In other words, it is easily possible to raise the entire track above grade by too much tamping. Also, the effective tamping of one tie may easily be spoiled by too much tamping on the adjacent tie. Then, too, it is quite possible to tamp a tie too much in the center, resulting in what is commonly known as a center-bound tie, which will be liable to rock under car loading and cause serious damage to both track and pavement surface.

When cupping appears, the rail should be ground immediately; otherwise, the depressions develop into deeper ones and cause much damage

Regarding mechanical versus hand tamping methods, it is sufficient to say that the former offers so many advantages over the latter method that there should be no question in anyone's mind as to which is the better. Mechanical tamping permits the ballast material to be compacted thoroughly under the tie, the two tamping tools working directly opposite each other under the tie, and also offers the only solution to the problem of thoroughly tamping ballast under ties in many of the more complicated special trackwork layouts where it is necessary to interlace ties at many points and where the interlacing comes at points requiring the most efficient consolidation of the ballast under the ties. Mechanical tamping also is effective where the space between the ties available for hand tamping is very limited. Whether track is tamped by hand or by mechanical tampers, all ties should be checked carefully before proceeding with the concreting, to find those which are not seated firmly on a well-tamped bed. An experienced track man can spot all such ties easily by tapping them with a bar or sledge, a hollow sound indicating a tie that is not properly tamped.

Tierods—While there is a difference in opinion among street railway engineers regarding the necessity for tierods, it must be conceded that, as track becomes older, there is an increasing tendency toward the development of wide gage. The tie rod is the best insurance against the premature appearance of wide gage, and the results obtained more than justify the slight expense involved. This conclusion is based on experience with track built under otherwise practically identical conditions, some of which were built with tie rod and some with tie plates but no tie rods.

Pavement—With the track lined and surfaced, and the concrete pavement base installed, there remains only the surface pavement to be considered. If this is some form of block pavement, either granite, vitrified brick or wood, a cushion is required, although a few companies make it a practice to bed their paving blocks, particularly granite, directly in the fresh concrete base. This is not very general practice, however. The purpose of a cushion is to take up the inequalities in the depth of the individual blocks, to provide a medium for bedding them uniformly over their entire area and to distribute the load uniformly over the concrete base. Therefore, any greater depth of cushion than is necessary to accomplish these purposes only increases the weakness of this part of the structure, which, incidentally, is probably one of the weakest links in the pavement chain. It is the place where the water goes first when it finds its way through the pavement surface, and it is where the heaving action of freezing and thawing causes the most damage to the pavement surface.

In laying the blocks care should be taken to make sure that all the blocks on a course are reasonably close to the same width. A good paver will do this without any attention on the part of the engineer, but some pavers will not give this the attention it deserves. It is also important that joints in opposite courses be well staggered. As to the width of joints, there is, again, a difference of opinion among engineers. Some feel that these should be wide, but the general practice seems to be to keep them to the minimum consistent with the requirements for installing the filling material. With the wider joints the advantage offered in the way of getting more thorough penetration of the grout or asphalt mastic is largely offset by the difficulties encountered in keeping the blocks in position and maintaining the general surface when ramming the blocks. But whether the joints are wide or close, the ramming of the blocks should be carefully and thoroughly done, and should not be permitted to proceed close enough to the point where the blocks are being laid to disturb them. The ramming locates all improperly imbedded stone, and seats each block firmly on the cushion. If it is slighted, the result is sure to show up in early pavement failures as soon as it is subjected to heavy vehicular traffic.

Since water finds its way to the track sub-structure through openings in the surface pavement, it is essential that the best possible job be done in filling the joints between the blocks with whatever material is being used.

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This point cannot be emphasized too strongly. Every joint should be filled and traffic kept off until the filler has set sufficiently to eliminate the possibility of damage. This means going over the grouting more than once; it means adequate protection until it has set, and also proper curing until its full strength has been developed. It is one of the details, however, attention to which means so much, and which will pay such large returns in decreased pavement maintenance expense as compared with its cost.

Maintenance Requires Care Also

The same attention to details should be given to maintenance as has been urged for both design and construction. Whatever is worth doing at all is worth doing well. If a joint fails and requires repairs, insist that the same care be taken on the repair job as was required when the joint was first installed. Broken rails or joints with poor electrical conductivity only aggravate electrolytic troubles and should not, knowingly, be permitted to remain without attention. Where pavement repairs become necessary, do not permit any slipshod methods that would not have been tolerated in the initial installation. A slight cup in the rail head soon develops into a much deeper one and, if not taken care of promptly, may not only cause serious damage to the adjoining pavement but may even cause actual breakage of the joint plate and the substructure as well. Small holes in the pavement can be repaired at a small expense, whereas, if they are neglected the damage soon spreads over a large area, and is often not confined to the pavement alone but affects other parts of the track structure. Cracks that may develop in concrete pavement will, if not promptly filled in with a good asphaltic mastic, soon result in bad spalling of the edges of the track and rapid disintegration of the adjoining concrete, requiring more extensive repair.

Inspection and Follow-Up in the Field

There should be in every track organization an inspection and follow-up service, to see that the proper attention is being paid to every detail of the work. This does not mean that a man must be detailed for every job, but it does mean that there should be someone whose duty it is to visit at frequent intervals all the work under way, and to see that the work is being properly done. It is certain that the reason why some track of a given type will last so much longer than other track of the same design under practically identical service conditions is because in one case care was taken to see that every detail was adhered to as closely as practicable, while, in the other case, the execution of the work was left entirely in the hands of the track foreman.

Fatigue in Concrete

An Element to Be Taken Into Account in Design

By

D. D. EWING

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Concrete, like steel, loses strength when it is subjected to repeated stresses, particularly when they are reversed. Stresses which may be repeated indefinitely may be less than half the laboratory strength

DOES the inanimate and apparently unyielding concrete that carries the myriads of feet that tread city pavements and the unending procession of wheels that roll along city streets ever become tired? If so, how is it affected by fatigue? Does it profit physically from the surcease from labor which comes when the work of men for the day is over? It is the object of this brief article to summarize experimental knowledge which bears upon these queries.

One does not ordinarily select concrete as a material for a spring, shaft or other moving part of a machine or structure. It might seem at first thought that the effect of repeated stresses on concrete would have little practical significance. On the other hand, concrete is becoming one of the most common of the paving and bridge materials. As such it must carry moving loads which, in their passage, cause a cycle of stress variation that ranges from some minimum to some maximum value. In street railway track work the important stress range would seem to be from zero to a maximum and the reversal of stresses from tension to compression would seem to be the unusual rather than the usual condition. As a pole material it might be subjected to completely reversed stresses.

How do such stresses affect the performance of concrete as a structural material? As with metals our most fruitful source of information is in the recorded researches dealing with the subject.

The test data and literature pertaining to concrete fatigue are not nearly so voluminous and so complete as they are with respect to fatigue in steel.

For one thing, the test specimens must be of considerable size so as to nullify the effect of small voids and large pieces of aggregate. This means that the specimens cannot be tested in small high-speed machines such as

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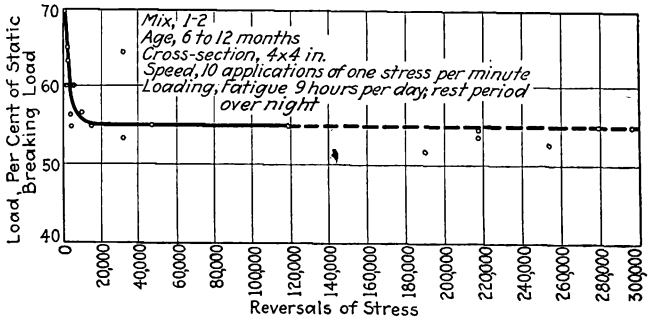
are used in the fatigue testing of metals. The properties of concrete are affected by age, moisture and other conditions which make the fatigue testing of concrete a rather tedious and expensive matter.

One of the pioneer investigators in this field, J. L. Van Ornum, has reported tests before the American Society of Civil Engineers on several occasions (see Transactions of the A.S.C.E., p. 443, 1903 and p. 294, 1907). His tests show that for a stress range from zero to a maximum, the endurance limit—that is, the stress which may be repeated many times without rupture—of ordinary concrete is about 50 per cent of the ultimate compressive strength as determined in the ordinary so-called "static strength" test. He also made some tests on the strength



Tests on concrete beams show effects of fatigue

The beams were made with a 1:2 mix and were 6 to 12 months old at the time of test. The cross-section was 4x4 in. The speed of testing was ten applications of one stress per minute. The loading was carried out for nine hours per day with rest periods over night.

of the bond between concrete and steel. These tests showed that the average static bond strength of plain square $\frac{5}{8}$-in. steel reinforcing rods was 150 lb. per square inch and that under repeated loads this strength was reduced to 125 lb. per square inch, a reduction of 17 per cent or an endurance ratio of 0.83.

A study of the work of other experiments leads to the conclusion that the safe probable endurance limit for bond strength is about 60 per cent of the bond strength as determined by the static test. Several observers also have noted that the modulus of elasticity of concrete decreases under repetitive loadings, the decrease being relatively rapid during the first few hundred cycles and reaching a constant value after several thousand cycles.

Failures Increase Rapidly With Stress

The Illinois Highway Department has conducted a number of fatigue tests on concrete (Transactions of the A.S.C.E., 1924, p. 1196). In the course of these tests beams of 1:2 mortar, 1:2:3½ and 1:3:5 concrete were tested under loads which caused the stress to vary through a range from zero to a maximum. These tests indicate that where the stresses were below 50 per cent of the ultimate strength, as determined by the static test, the stress could be repeated an indefinite number of times without failure, whereas a stress of 60 per cent caused failure in about 30,000 repetitions, and a stress of 70 per cent caused failure after approximately 5,000 repetitions. The operating tests on the Bates, Ill., test road showed that the concrete paving laid on it failed when the loads caused stresses in excess of 50 per cent of the flexural strength of the paving. Experiments made at Purdue University by W. K. Hatt (Proceedings, Highway Research Board, National Research Council, December, 1924) on small beams show that the endurance limit of well-aged dry concrete for stresses which were completely reversed lies between 50 and 55 per cent of the ultimate strength. For wet concrete the endurance ratio was 37 per cent and the ultimate strength was 11 per cent lower than that of the dry concrete.

The accompanying graph sets forth the data for some of the tests on these beams. These figures are of interest to the track engineer, as wet subsoil under the track will apparently decrease materially the fatigue strength of the concrete. Also in the winter and spring, when the entire roadway is wet, the strength of the structure is considerably reduced, particularly with regard to its ability to stand up under the impacts resulting from dirt on the rails, low joints, flat wheels, etc.

It may be argued that the strength of track concrete is of no importance because the mass of material employed is so great that all unit stresses are low, even under modern vehicular and car traffic. In general this is true, but in going about over the country inspecting track one notices many points at which some local condition has caused stress concentration which, often repeated, finally produced failure.

Briefly summarized the present knowledge of the effect of repeated loads on concrete is:

1. The endurance limit of ordinary concrete is about 50 per cent of its ultimate strength as determined by the so-called static strength test.
2. When the load is such as to cause failure the deformation of the concrete continually increases until finally cracks appear and later complete rupture occurs.
3. If the applied load is less than the endurance limit the deformation approaches a constant value or decreases, thus indicating that the specimen will not fail.
4. Concrete, like steel, withstands somewhat greater repeated stresses if the test specimens are permitted to rest for definite periods. The rest period seems to be more important to concrete than it does to steel.
5. The endurance limit in concrete sometimes can be determined by as few as 20,000 cycles of stress.
6. Fatigue tests on concrete are more difficult to make than similar tests on steel, because much larger test specimens must be used and the frequency of stress repetition must be relatively low.
7. Laboratory fatigue tests in general differ from service conditions because the frequency of stress repetition is higher and the rest periods much shorter.
8. By loading test specimens under the endurance limit and later building up the load by small increments, the endurance limit can be slightly increased.
9. Wet concrete has a lower endurance limit than dry concrete.
10. Fatigue strength seems to increase with the richness of the mixture.
11. The endurance limit of reinforced concrete is higher than that of plain concrete.
12. Concrete specimens should be several months old before subjecting them to fatigue tests, in order that the test data be not vitiated by the natural gain in strength of the concrete.

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Electric Railway Journal Daily

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New Equipment

Discussed at Meeting of Southern Maintenance Men

Semi-annual meeting of Electric Railway Association of Equipment Men, Southern Properties, held at Lexington, Ky., Well Attended

CHIEF interest at the semi-annual meeting of the Electric Railway Association of Equipment Men, Southern Properties, held at Lexington, Ky., July 24-26, centered on the subject of new equipment. The attendance was unusually large, more than 200 equipment men being present from the Southern and Middle Western states. Two extremely interesting papers were presented by railway men, and several others by manufacturers' representatives.

Re-equipment of the Kentucky Traction & Terminal Company's system with light-weight cars was the subject of a paper by F. W. Bacon, vice-president International Utilities Corporation, New York. Due to the inability of Mr. Bacon to be present at the meeting, his paper was presented by J. P. Pope, vice-president Kentucky Traction & Terminal Company, who elaborated on many of the important parts. Mr. Bacon's paper was published in the August issue of ELECTRIC RAILWAY JOURNAL.

R. H. Sjöberg, engineering department General Electric Company, discussed "Speed, with Comfort and Safety." Recent developments in the electrical equipment of street cars were outlined, specifically with relation to higher speed and better braking facility. E. M. O'Connor, label service department Underwriters' Laboratories, presented a paper on "The Inspection and Labeling of Electric Cars by Underwriters' Laboratories." He spoke of the advantages to the manufacturers of having their street car equipment inspected by Underwriters' Laboratories before making delivery to railway operators. This not only gives the operator the assurance that his equipment comes up to predetermined safety standards, but also safeguards the riding public from hazards incidental to inferior construction or assembling methods.

RECENT EQUIPMENT DEVELOPMENTS

On the afternoon of Wednesday, July 24, a paper was read by A. J. Manson, manager traction sales department Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., on "Recent Developments in Railway Equipment." He told of the great strides made in the recent years in the development of electric equipment, especially in connection with street railway operation. It was pointed out that the demand for high speed in railway service is now greater than some years ago, due to the effect of automobile competition. Various high-speed and light-weight construction requirements which must influence the manufacturer were discussed in detail by Mr. Manson. The next paper on the program was presented by Mr. McCune of the Westinghouse Air Brake Company, Pittsburgh, Pa., on the subject "Development in Modern Power Brake and Rapid Acceleration." This paper caused lively discussion. Members present used this occasion to obtain information as to the probable future development of the various types of brakes now in use on electric railway equipment. "New Developments in Carbon Brush Application" was the subject of a paper read by J. V. Dobson, chief engineer Stackpole Carbon Company. The characteristics of brushes were outlined in detail by Mr. Dobson, who explained the advantages and disadvantages of hard carbon and soft carbon brushes and their influence on current collection and wear on the commutator.

MAINTAINING ROLLING STOCK

An interesting paper presented by W. H. McAloney, superintendent of equipment Georgia Power Company, Atlanta, Ga., set forth the various difficulties encountered in keeping the rolling stock in first-class condition, at the same time keeping the maintenance cost down to a minimum. An abstract is published on the following page. The last paper on the program was read by T. J. Kauffeld, sales engineer De Laval Separator Company, who discussed "Reclaiming Lubricating Oils by the De Laval System." He told of the benefits which can be obtained if used oil is reclaimed by a special oil-separating equipment, enabling the operator to use oil several times instead of having to dispose of it after it has been used once only. The same procedure can be applied to waste, which can be cleaned thoroughly and be used over several times at a great saving in cost to the operator.

After all papers were read, the meeting was thrown open to discussion of a questionnaire which had been submitted previously by members of the association. The number of questions listed was 73, and it became impossible to finish the entire questionnaire. For this reason, only the most important questions were discussed before the meeting adjourned at 5 o'clock on July 25. In the evening the members gathered at a banquet at the Lafayette Hotel, with E. L. Carr, superintendent of equipment of the Kentucky Traction & Terminal Company, acting as toastmaster.

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The last session, held on Friday morning, July 26, was adjourned at 10:30, after which an inspection trip was made over the properties of the Kentucky Traction & Terminal Company. Much interest was shown in a device which lifts a car body from the trucks, lowers it and tips it over to enable repair men to work on the under side of the car while they are standing on the floor in normal position. A demonstration was given of the new magnetic track brake used by the Lexington company, and various comparative tests were made with air brake and air-magnetic brake application.

The next meeting of the Electric Railway Association of Equipment Men, Southern Properties, will be held in Birmingham, Ala., Jan. 27-29, inclusive, where it will be decided whether the semi-annual meetings will continue or only one meeting a year will be held.

Organization Cuts Maintenance Costs

By

W. H. McALONEY
Superintendent of Equipment
Georgia Power Company
Atlanta, Ga.

ASSUMING that the stitch-in-time theory is correct for maintenance of electric railway equipment, to carry on that idea or any other worthwhile plan, it is necessary to have organization. Organize to the full extent so that the business in hand will stand. Of great value is personal contact, from the department head down along the line with each supervisor or foreman. It is of the utmost importance that we keep close to each man and get into working harmony with him. Another requirement is co-operation. It is difficult to get anywhere unless plans and methods are healthy and recognized as best practices under the circumstances, and unless we have united effort.

Education is now being recognized as an important factor. Individual study, or forming group classes for study, can be put across through our personal contact work, and to whatever extent systematic study can be advanced, in that proportion the quality of our work will improve. Better knowledge of their work and of their relation to other departments of a company will inspire men to give the best that is in them. Efficiency of personnel will doubtless be considered next essential, but if we have organization, personal contact, co-operation and education, then work will bring automatically the efficiency of which we hear so much of late.

In maintenance and inspection we spend about $2 in labor for $1 in material. Good fits, hardened surfaces, lubrication and close attention, with limit gages for getting maximum life, will help make the $1 go farther. We should keep in touch with improved machines and methods. The line breaker is a good demonstration of the value of spending money to save money. Likewise, modern babbitt equipment and dipping and baking machinery with temperature control has been an improvement and a decided factor in reduced costs.

One of the most important things in connection with maintenance of equipment is the matter of inspection. Unless the equipment is given a rigid and definite inspection at proper intervals and necessary adjustments made, failures in service are sure to result and frequent replacements will be necessary because parts will become badly worn before having served their normal usefulness. This is bound to increase the cost of maintenance. The cost of inspection and making minor adjustments is small as compared with the total cost of labor and material in making replacements.

The campaign on noise reduction has caused us to realize the importance of a high standard of maintenance. Loose brakeshoes, gear cases, pins and bushings in brake rigging not only cause excessive noise, but result in higher costs. Special attention should be given to prevent loose bearings in axle caps and too much end play in axle collars, as this causes wear in axle caps and results in shorter life of gears, pinions and gear cases. The caps can be numbered the same as the motor in order to keep caps with the same motor to avoid pinching when renewing axle bearings. Axle collars can be of a type that extends over the flange of the axle bearing, thus increasing the life of both bearings and axles.

Armature Maintenance Improved

The method of banding armatures has been improved with the new type tension regulator which is attached to the banding lathe. This enables the tension to be easily varied on core bands and the end bands. One of the factors in lower maintenance cost is dipping and baking of armatures, but the method of banding is a most important factor. Our present practice is to remove the bands and put a filler of some good heat-resisting material, such as treated duck, under the band so that the tension of the band would be on the coil and at the same time would be on the iron core to keep the band from becoming loose when the armature coil insulation started to shrink. Dipping and baking the armature will fill up the cracks and crevices with a thin film of varnish, which has a tendency to keep moisture from getting into the windings but is not sufficient to overcome vibration. The insulation used in the armature slots should be of a good grade with heat resisting and low shrinkage qualities, such as treated fish paper, which is also a factor in overcoming vibration.

We like to discuss our successes but hide the details of our errors. There is more to be learned from one clean, honest mistake, as a rule, than from a dozen successes. Be on the lookout for new ideas. Don't be afraid. What was considered the best method a year ago may be obsolete today. Yet it must be recognized that uniform methods, practices and parts are big factors in holding down costs.

Making the Work Easier

The place where we work should be comfortable, well lighted, properly heated, should have good drinking water, plenty of room—and then profit is in order. Make work easier, cut down the number of back-breaking operations.

If we looked over some cars it is possible that we would find apparatus which could be discarded. For example: On a certain type of truck, we have just recently discovered that the release spring (two to the truck, four to the car) was in a good functioning location but almost impossible to get at to keep it functioning. We are now considering placing the release spring on the top rod, one end fastened to the car-body, two to the car.

A manufacturer's representative once said that the greatest concern he had about his competitor was "that they kept him from sleeping in the daytime." On economy and performance our Southern Equipment Men's Association has been a big factor in gaining departmental co-operation and effective work on the several properties.

It is difficult to leave the subject of economy without calling attention again to the oft-repeated importance of the foreman. He is the key man. The foreman and his men—that is teamwork, and teamwork is vitally necessary. It takes a "Heap of livin' to make a home," and it takes a heap of time and experience to know all the kinks in the trade. With experienced men and a good leader foreman who is interested in our kind of work, the maximum of economy may be looked for.

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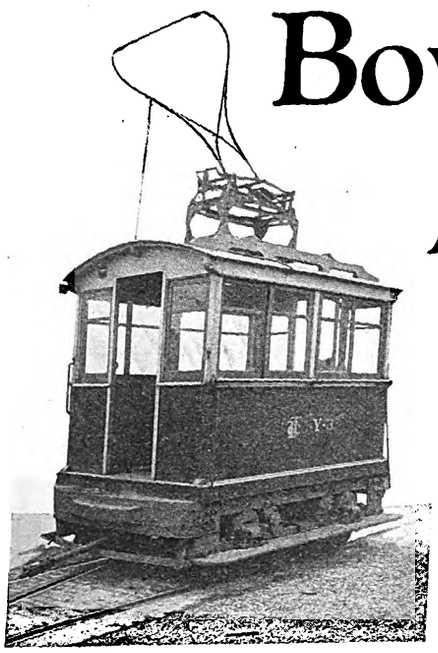
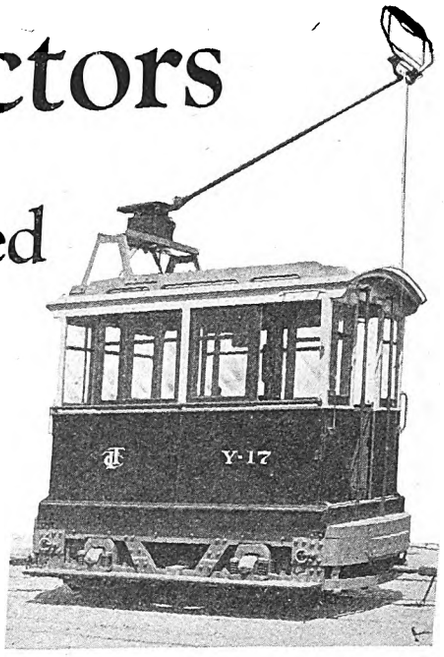
Bow Collectors Are Developed Successfully in Toronto



Original type of bow collector used for five years on Toronto shunters



Later type of collector used for the past year with satisfactory results

After five years' experience in car yards a number of cars on the important Yonge Street line have been equipped with a new type of sliding collector developed by the staff. If successful it may be adopted for the entire system

REALIZING that there is room for improvement in the overhead trolley wheel method of current collection, the Toronto Transportation Commission, five years ago, commenced to experiment with bow type sliding current collectors and, as a preliminary experiment, all the yard shunters were equipped with the reversing type of bow collector, as shown in one of the illustrations. This type of collector has given fairly satisfactory results in this particular service, but the rolled aluminum collector section, with its grease groove and comparatively narrow width, was found to wear too rapidly and so did not warrant any further extension to general service operation. About a year ago a shunter, No. Y-17, was equipped with the sliding plate type of collector as shown in another illustration. The performance of this type of collector, with regard to stability and wear of the plate, was so satisfactory that it was decided to rearrange the overhead on one of the shorter and lighter traveled routes to permit testing of the plate collector in actual service. As a result of these preliminary tests, a number of cars have been equipped with the new device and placed in regular service on the Yonge Street route, which handles the heaviest traffic in the system.

The bow collector used in Toronto is fitted with a special design of sliding plate. This is shown in the illustration of the car. This plate differs from conventional types in that the contact surface proper is mounted on an axle and is free to rotate. It is held in the normal position, with contact surface horizontal, by means of a counterweight of iron tubing, which is of such shape that, in the unlikely event of the plate striking an obstruction and tilting over, it cannot be caught in the overhead. It is, therefore, possible to use a wide plate giving a large area of contact as, irrespective of the angle taken by the bow itself, the plate for its entire width is always in contact with the trolley wire. The plate itself has a total length of 39 in. and is channel section, made of 14 U.S. gage sheet steel. In the center is a parallel section 24 in. long by $4\frac{3}{8}$ in. wide, and it is tapered toward each end to 1 in. wide. In relation to the horizontal it has a slight camber, the difference in height between the center and ends being about 1 in. In the wearing surface are two grease grooves running the full length of the parallel center section of the plate. The bow, constructed of steel tubing, is mounted on a non-swiveling base of such design that the upward pressure on the trolley wire is kept constant, irrespective of trolley wire height. In Toronto this varies from 13 ft. 6 in. at subways to 22 ft. 6 in. at railroad grade crossings.

The bow is mounted on the car in such a position that the plate itself is located directly over the king pin of the rear truck at an elevation of 18 ft. This insures that the device will describe an arc along the center line of the curve when turning at an intersection, and permits the alignment of the trolley wire to follow the center line of the track curves throughout. The mounting of the bow in this position means the minimum of alteration in the present location of the trolley wire, eliminating one of the problems during the period of transition. So far as the tangent wires are concerned, it is essential that the trolley wire be staggered on either side of the center line to a maximum of 6 in. at every fourth span in order to spread the wear on the surface of the plate.

The T.T.C. is proposing to operate these collectors under the standard trolley wire construction after making a few changes on some fixtures, such as inverting pull-offs, clearing all obstructions below the under side of the trolley wire and changing the curve dressing at intersections. The section insulators must be of the single beam type so that there is no projection below the bottom of the trolley wire. All overhead frogs in Toronto are suspended on a special device clamped over the frog pan so that no insulators project below the level of the trolley wire. The trolley frogs can be run over in their present locations. It has been necessary to fill in the clearance

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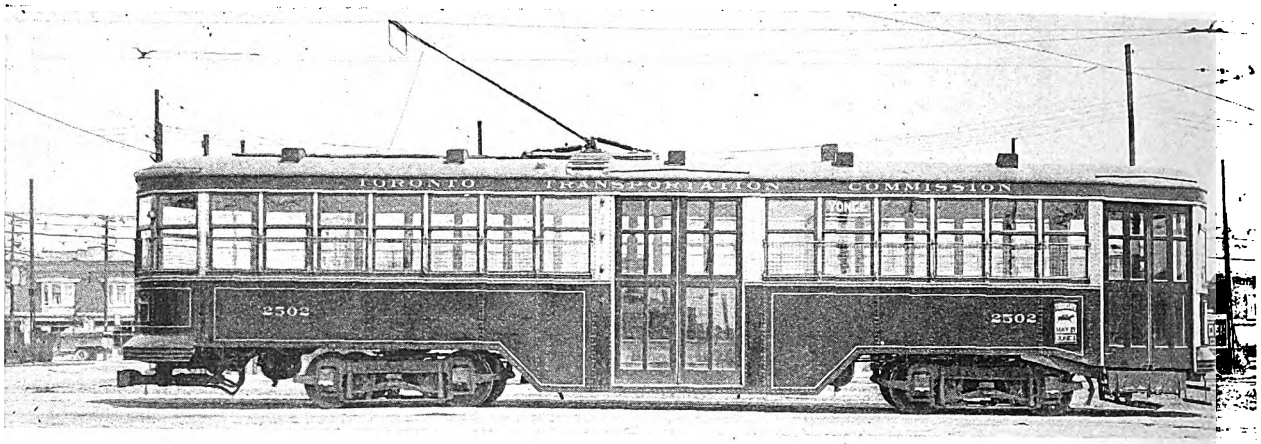
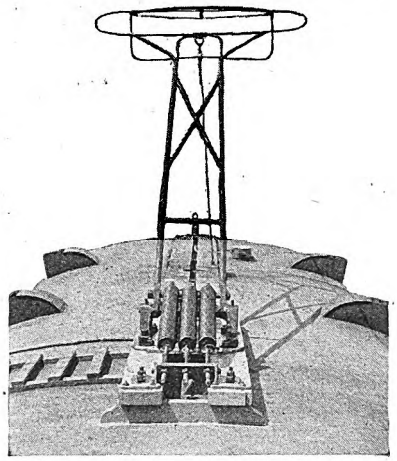
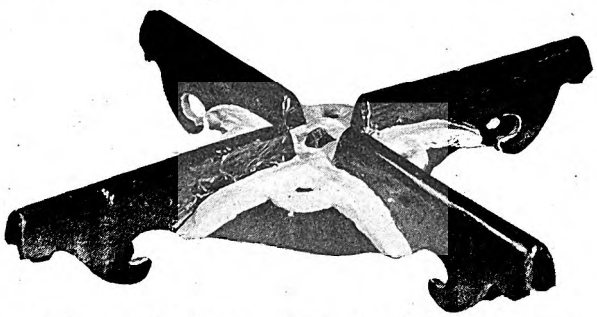


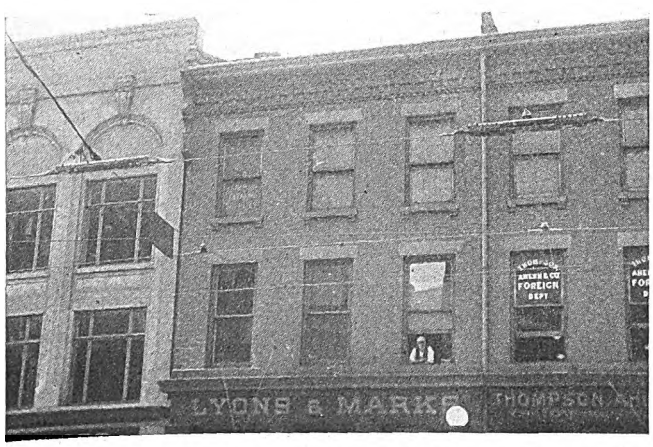
Several cars on the Yonge Street line are equipped with the type of sliding plate collector illustrated



The collecting plate is mounted on an axle and is free to rotate. It is held in position by a counterweight of iron tubing



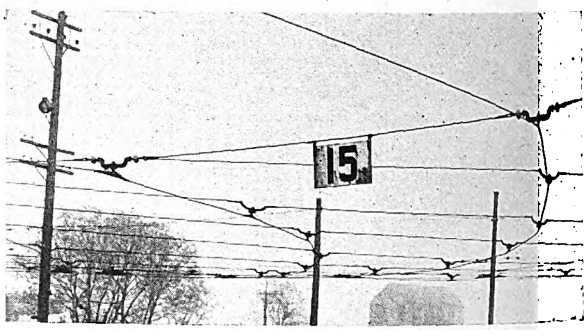
The 90 deg. overhead crossovers were redesigned to accommodate the sliding plate bow collectors by filling in the clearance gap somewhat and leveling the leads



Separate overhead contactors are used for actuating electric switches with trolley wheels and with sliding collectors

gap somewhat and level the leads on the 90 deg. crossovers.

Additions and modifications were necessary to the electric switch overhead contactor equipment, owing to the new position of the sliding plate, as compared with the location of a trolley wheel on similar types of cars. The sliding plate is located 13 ft. forward of the trolley wheel over the center of the rear truck. It was desired



Adaptation of a double track curve for bow collection. Note that the hangers are inverted so that no part of the overhead projects beneath the plane of the contact wire

to continue operating the two types of current collectors over the same electric operated switches. To carry this out the switch contactor on the overhead for the trolley wheel was undisturbed as to location but modified so that the sliding plate in passing the contact could not in any manner cause the switch mechanism to be energized, but still be operated by the passing contact of the wheel. At a distance of 13 ft. forward another contactor was installed. It was so designed that the sliding plate in passing energizes the switch mechanism, but cannot be affected when the trolley wheel passes through it. With this special layout of contactors, as illustrated, the difficulty of operating the two types of collectors over the same electric switches has been successfully solved without any additional hazard, or diminution of safety factors.

While opinion is divided as to the relative merits of trolley wheels and sliding collectors, there certainly are features in connection with the type of sliding collector now being operated in Toronto which cannot be equalled by the wheel. The advantage that makes the heaviest score is that the upward pressure against the trolley wire is only 9 to 12 lb. as against 25 to 30 lb. with trolley wheels. Other features are the entire absence of arcing at the wire due to the large contact area and the feasibility of obtaining adequate greasing of the trolley wire.

Other advantages are that the collector cannot leave

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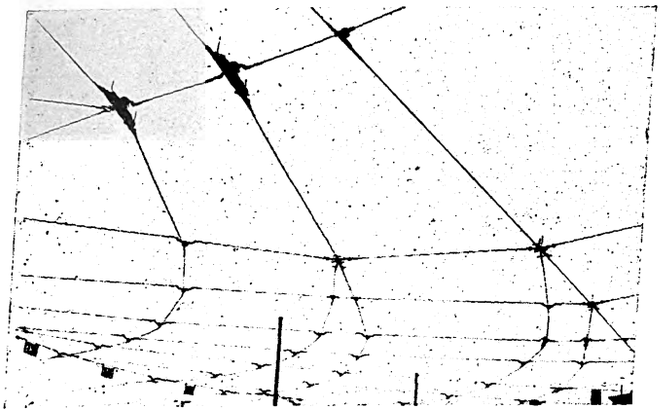
the wire, as sometimes happens with the standard trolley wheel and pole, causing delay and annoyance, particularly in the case of one-man cars. These dewirements and their cumulative effect are frequently the direct cause of breakdown and expense on the overhead system. A feature that is important in the latitude of Toronto is



Overhead special work redesigned to permit of bow collection

that sleet will not readily form or accumulate on a wire coated with grease. If it does form it is removed easily by the sliding plate without any special devices.

At the present time it is not possible to state definitely the saving in cost of maintenance and renewals of the overhead structure with this type of current collector. But it must be apparent, with the low contact pressure of this sliding plate compared with the orthodox trolley wheel, the elimination of side wear, the ultimate abandonment of frogs in favor of a spot-welded splice, and many other such details, that the potentialities for saving maintenance costs are very great.

Trolley Operated Traffic Signals Prevent Delays

DELAYS to car operation caused by automatic traffic signal lights have been much reduced at one important street intersection in Louisville, Ky., by the installation of apparatus co-ordinating the lights with the movements of the cars. This apparatus consists of four trolley contactors and a relay box, which are connected with the ordinary signal lights and timing device without any change being required in the original apparatus. Overhead trolley contactors have been installed on each wire as far back from the intersection as the car will travel during the time of the red light. Leaving contactors are set at the crossing. The distance from the setting to the clearing contactor on each track constitutes a block.

If the car is stopped by the signal at red, the control will not shorten this period, but it will prolong the green under certain conditions. In other words, the car does not change the indications at the instant of passing the entering contactor, but merely causes a prolongation of the green, if necessary. If a car enters and leaves the block within the normal green period, the special control will not be actuated, and the green will not be prolonged. This would be true if one or more cars on both tracks passed within the normal green period. The relays on the two tracks are connected as though all cars were on one track.

When the car stays in the block between the entering and leaving contactors longer than the normal green period, the traffic control causes the green display to be continued, so as to run into the next green period. This maintains the cycle without shifting it, which would be detrimental with progressive or wave systems. While this prolongation or extension may be longer than re-

Bardstown Road at the intersection of Eastern Parkway, looking east, Louisville, Ky., showing one of the Louisville Railway's new cars and trolley operated traffic signal. The relay box is on the pole at the extreme right, and the westbound clearing contactor is shown on the wire

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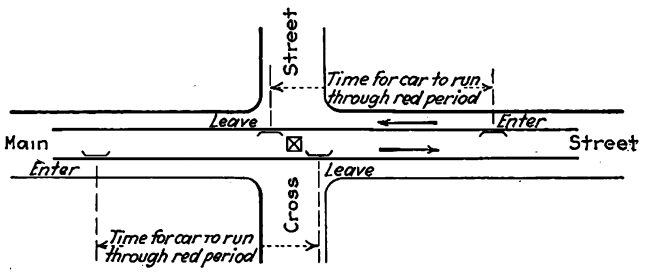
quired for the particular car to pass, it is likely to be useful in releasing the accumulated or bottled traffic behind the car. When a car has caused a prolongation of the green, should another car enter the block at the end of the prolonged period, the green display will not be further prolonged, but the signal will change to red, permitting the cross traffic to be released. Thus if a

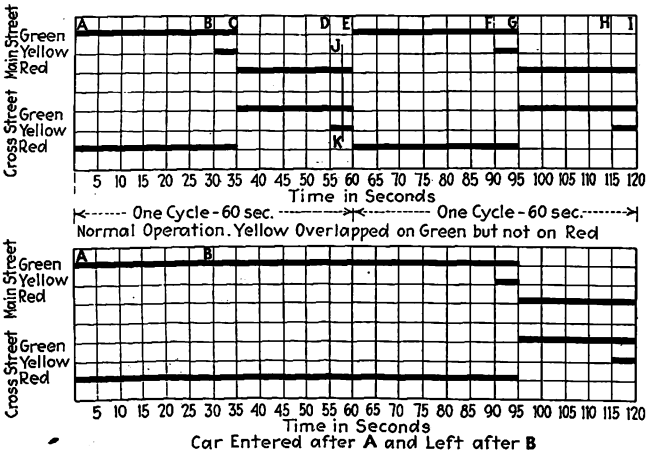


Arrangement of contactors for trolley control of traffic lights

car should for any reason stay in the block indefinitely, the green will not be held longer than one prolongation for each time the red is displayed. This places a limit on the restraint to the cross traffic.

The "Stop" and "Go" signal is at present adjusted for 25-second interval on Bardstown Road and 20-second interval on Eastern Parkway. It is possible to extend the time on Bardstown Road, on which the trolley line operates, by a complete cycle of the signal—45 seconds—thereby holding the green or "Go" period a maximum of 70 seconds.

The apparatus was furnished by the Nachod & United States Signal Company. It does not include the signal nor the timer, but only the overhead contactors and the relay box containing the relays actuated by the



Operation of Trolley Controlled Traffic Signal

A typical signal system has a traffic signal with three decks showing green, amber and red in the upper, middle and lower decks, respectively. The sequence of these indications is shown in the upper chart, and is known as the "split yellow over-lapped" system in which the yellow is over-lapped on the green at the end of the latter period, but not over-lapped on the red. For simplicity a 60 second cycle has been assumed, in which the green is displayed for 35 seconds, during the last 5 seconds of which the yellow is added; and then at the extinction of these the red is displayed for 25 seconds. The cycle then begins anew with green. The same indications are given for the cross street, but in opposing phase, the green with the red or vice versa. A vertical line JK drawn anywhere on the charts shows indications displayed to both streets at that instant. The yellow is used as a caution signal at the end of the green period to warn the moving autoist that the signal is about to go red; but no yellow is shown at the end of the red when it changes to green, so that the driver may not start on the yellow.

contactors and controlling the display of the signals in combination with the timer. There are two 600-volt d.c. relays in the trolley contactor circuit and two a.c. relays operated from the light circuit. Throwover switches are provided, so as to cut out the contactor control in case of trouble, and which permits the complete removal of the control panel. The trolley contactors are of the type without moving parts, as used in the company's standard block signal. They are non-directional, one normal-open and one normal-closed contactor being used on each track.

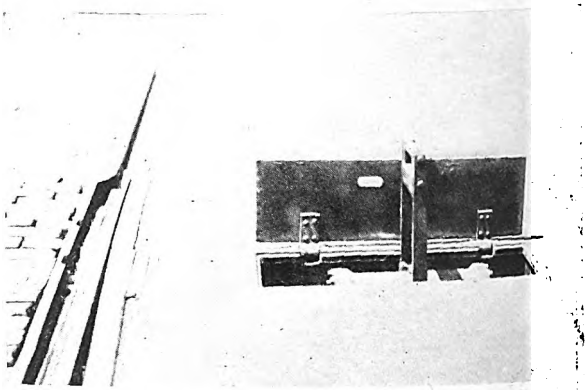
Installations of this nature are in operation also in the cities of Detroit, Mich.; Atlanta, Ga., and Pittsburgh, Pa.

Oil Buffer Eliminates Switch Tongue Slapping

By W. A. Underwood
Engineer Maintenance of Way,
Chicago South Shore & South Bend Railroad

NOISE made by the back slapping of spring-operated tongue switch points, long a cause of complaint by Michigan City residents, has been eliminated with the installation of spring switches with oil buffer shock absorbers by the Chicago, South Shore & South Bend Railroad. Due to heavy freight movement through Michigan City, the back slap of this particular siding used to cause considerable annoyance to the nearby residents, for when a freight train of 40 cars passed through the switch, as several do each day, the former switch tongue slapped 80 times.

The apparatus used is a modification of the "Mechanical Switchman," manufactured by the Pettibone Mul-



Oil-buffed spring tongue switch of the Chicago, South Shore & South Bend Railroad. Box open with manual control handle in neutral position

liken Company, of Chicago, designed for operation on sidings. When a car passes this switch, like any spring switch, the tongue normally returns to its setting. But the oil buffer retards the return of the tongue to normal position, the returning period being adjustable from six to eighteen seconds to suit conditions. This prevents the tongue slapping after the passage of each truck. When a freight train of 40 cars passes, the tongue never gets back to its normal position during the whole movement, eliminating the 80 slaps of the tongue. If it is desired to throw the points manually, the apparatus offers no resistance. The device is assembled in a cast-iron box 14 in. x 5 ft., located in the street.

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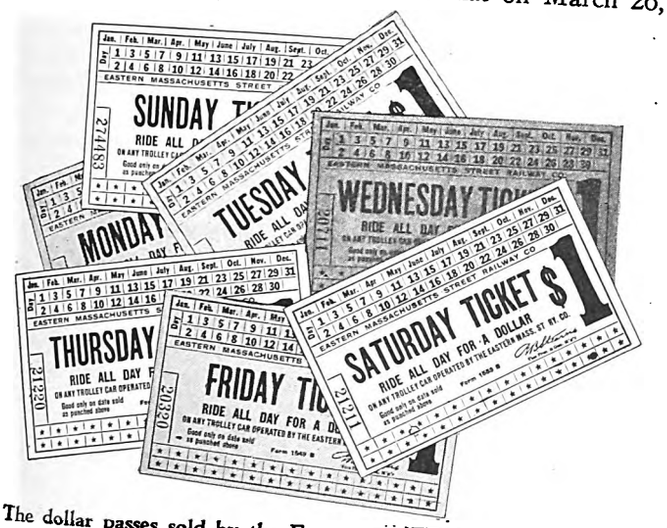
Building Riding with the Dollar Pass

IN AN endeavor to win back to the street car the patronage lost to the private automobile, the Eastern Massachusetts Street Railway decided to experiment with a Sunday pass selling for $1, good on any of the company's routes on the date of purchase. Accordingly, on Sunday, July 10, 1927, this pass was made effective, and in conjunction with it, new de luxe cars with air cushion seats and other improvements were placed in service on the interurban lines. The pass caused so much favorable comment that on March 26, 1928, its use was extended to every day in the week with the exception of Saturday. On May 5, 1928, it was made effective on Saturdays also.

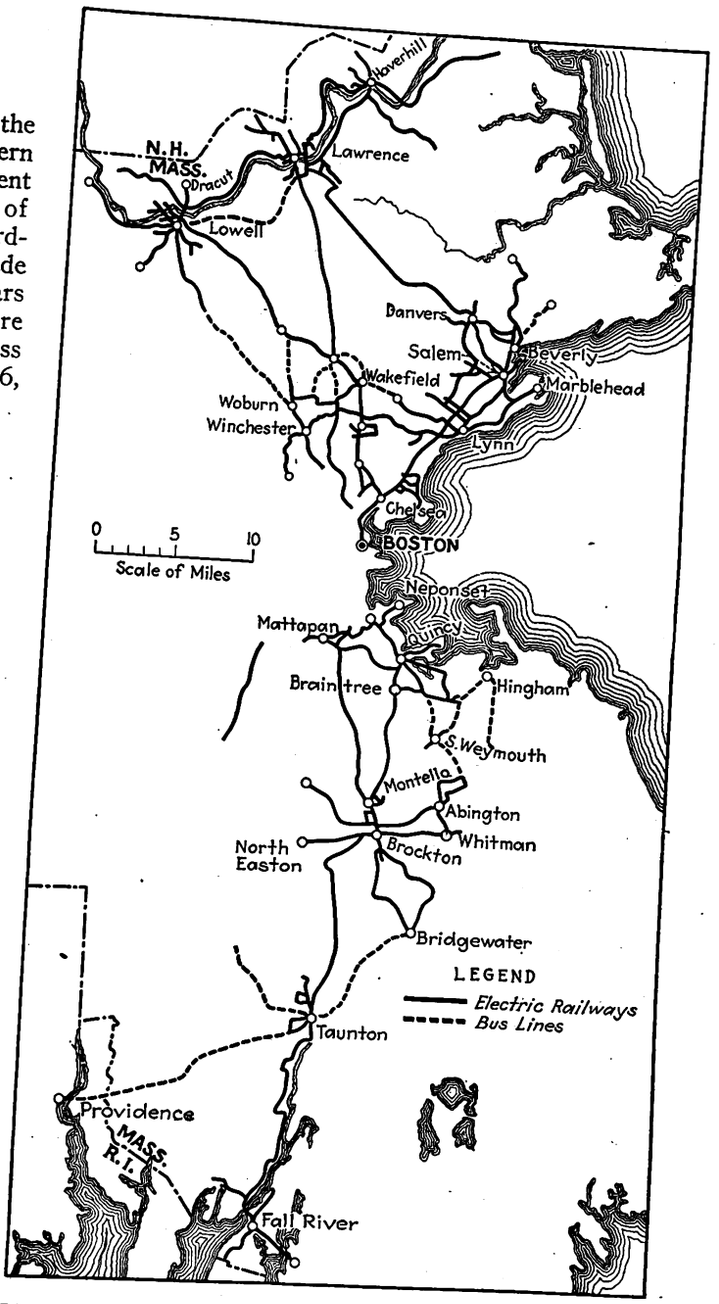


The dollar passes sold by the Eastern Massachusetts Street Railway are colored differently for each day in the week

The pass is particularly attractive since it can be used on any route of the system. The company's lines serve a total of 74 cities and towns, of which 15 cities and 27 towns are north of Boston and 4 cities and 27 towns are south of Boston. Along the lines there are numerous pleasure resorts and places of amusement, as well as many points of historic and general interest. Probably the most striking feature of the ticket is that the stopover privilege is unlimited. Passengers can board and leave the car wherever they please, stay as long as they like during the day, and then board a car in any direction and ride anywhere without the payment of an additional fare.

That the $1 all-day pass has met with the approval of the riders of the system is best shown by the volume of sales. The sales average $2,200 a week, or approximately $115,000 a year. The largest revenue obtained in one day was $2,400. On the interurban routes, particularly where riding had fallen off to a very marked degree of late, there have been crowded cars in the summer and increased riding in the winter.

Aside from enabling families in the summer to enjoy a clean, cool ride at a nominal cost, with a beach, lake, grove, or other amusement place as the destination, without the inconvenience of Sunday automobile driving, these tickets allow the same people during the colder months to visit their friends in warm, comfortable trolley cars at low cost and without the dangers of winter driving. The tickets find favor with salesmen and other business people who make a series of calls daily in a city



Lines of the Eastern Massachusetts Street Railway, serving 74 cities and towns. The $1 pass is good on any of the lines

or adjoining communities. For the person who merely desires to "see the sights" the slogan "trolley all day on a dollar bill" proves to be inviting, indeed.

When first instituted the all-day ticket was advertised for a period of thirteen weeks by a series of radio broadcasts from one of the principal Boston radio stations. The services of an excellent quartet known as "The Four Motormen" were secured, and interspersed with the songs of this quartet was a well-arranged advertising talk featuring the all-day $1 ticket. Small inserts were placed in all the envelopes of outgoing mail inviting attention to these broadcasts. Booklets were distributed containing time-tables as well as line sketches of the more important routes. System maps and divisional time-tables folded to pocket size, containing the same information in more detail, also were made available. Extensive advertising by means of dasher signs and center rack signs carried by every car over the entire system also proved effective in stimulating sales.

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Pedestrians Dominate

PHILADELPHIA'S TRAFFIC

Report of Mitten Management shows that all traffic is impeded by the narrow streets, parked vehicles, and frequent turns of motor vehicles. Many proposals are advanced to bring relief immediately and in the future

PHILADELPHIA'S traffic problem in the central business district revolves very largely around the pedestrian, according to the report recently made to the Chamber of Commerce by Mitten Management, Inc. The report, which is the second of a series, makes a number of recommendations which, it is stated, should be advantageous to the entire community in speeding up the flow of traffic, as well as to the great majority who use the street cars and buses.

Chief among the recommendations made, as listed in the panel opposite, is revision of the existing parking ordinance. While the survey data indicate that the ordinance in general would meet conditions adequately if enforced, some concessions may be made on certain non-essential streets, while the principal streets should have their curb-space free at all times. It is recommended that parking should be prohibited between 3 a.m. and 6:30 p.m. on certain important business streets. On Market Street west of City Hall it is recommended that parking be prohibited at all times.

Signals which permit a continuous movement at a speed of 15 m.p.h. in the business district and up to 30 m.p.h. outside the business district are recommended in a separate report. Establishment of a bureau in the department of public safety, charged with the constant observation and study of city traffic conditions and with making recommendations, is urged. A traffic court and violations bureau, which has been considered by the Legislature, is unqualifiedly endorsed.

Complete co-ordination of Philadelphia's transportation facilities, which now requires only the tying in of the Broad Street subway, is recommended. It will be the subject of a subsequent report.

Construction of a concourse under City Hall and on Broad Street from Vine to Spruce, is the first step in a program of underground sidewalks for the protection and convenience of the pedestrian. Extension of these sidewalks by connecting the platforms of the Market Street subway to provide a continuous underground sidewalk from Fifth Street to Nineteenth Street is proposed. All future subways should provide for this facility, at least in the central business district.

At certain intersections in the business district the volume of pedestrian traffic greatly exceeds the vehicle turning movement. Pedestrians are inconvenienced and vehicular traffic is impeded by these movements. Elimination of all turns into and out of Market Street between Seventh and Juniper Streets, and of certain turns at other points is recommended.

With some 2,500 individuals, companies and corporations in the trucking business, a large part of their operations being in the central business district, consolidation and co-ordination of these interests would result in economies, as well as reduce traffic congestion materially. Placing all vehicles engaged as common carriers under the Public Service Commission would not only provide proper control but would tend to bring about in an orderly manner a gradual merging of these interests.

Legislation is recommended providing that, in the construction of any building in the central business district where merchandise is handled, facilities off the street be provided for the parking of vehicles carrying merchandise to and from such buildings. Legislation should further provide that within a reasonable time, say five years, all such buildings now in this district be reconstructed to provide similar facilities. Already 211 buildings are so constructed.

Rittenhouse, Washington and Franklin Squares present definite obstacles to through traffic. They should be reconstructed, so as to carry the abutting streets through or provide passages which will permit the free flow of traffic without right-angle turns. Logan Square already has been reconstructed, and the plan for Franklin Square was contained in the first report of this series. A comprehensive paving program should be adopted, which will not only care for present and future traffic needs but which will also adequately maintain and repair all existing paving. Standard uniform traffic signs and markings, in conformity with the recommended national practice, should be adopted.

Traffic control legislation should provide for the following regulations designed to relieve the traffic stream from various elements which prevent free flow: (1) Prohibit horse-drawn, slow-moving vehicles from center city streets; (2) require that coal deliveries, ash removals and all similar services in the central business district be performed outside business hours; (3) prohibit parades in central business district except on Sundays and holidays; (4) prohibit the storage of building material on the sidewalks or roadways; (5) mark definite traffic lanes on all wide streets; (6) install loading platforms for street railway passengers on all wide streets; (7) prohibit the moving of theater scenery, safes, heavy building material and similar material on all center city streets during business hours; (8) prohibit all street openings, either on the street surface or manholes, within the central business district during business hours, except in cases of emergency.

The report presents traffic conditions which are a direct

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result of the natural economic growth that has expanded Philadelphia to a community covering an area of 130 square miles, with a population of well over 2,000,000, and which draws daily from a normal commuting radius of 25 miles in which there is a population over 3,500,000. Probably the factor which has had the greatest influence has been the motor vehicle. There was an increase in registrations in the state of Pennsylvania from 1,246,126 vehicles in 1924 to 1,676,025 in 1928, or 34.5 per cent, while in Philadelphia there has been an increase in the same period from 168,417 to 271,347 vehicles, or 61.1 per cent. Meanwhile the population in the state has increased from 9,344,000 to 9,854,000, or 5.46 per cent, and that of Philadelphia has gone from 1,951,076 in 1924 to 2,064,200, or 5.80 per cent.

The central business district, bounded on the north by Callowhill Street, on the south by Pine Street, on the east by the Delaware River and on the west by the Schuylkill River, covers 56,810,944 sq.ft. or 2.04 square miles. Of this 11,157,574 sq.ft. (0.40 square miles) is roadway area, which is 19.6 per cent of the total, comparing with 29.5 per cent in Detroit, 29.0 per cent in Chicago and 25.0 per cent in Boston. Included in this street area are 1,648,596 sq.ft. (0.06 square miles) of unimportant disconnected streets and alleys and 380,584 sq.ft. (0.01 square miles) of roadway in street intersections.

The lineal extent of street surface is 79.52 miles, of which 25.55 miles is in the unimportant streets. The balance, 53.97 miles, includes many streets which, although narrow, are of use in moving traffic. The subdivision as to width is as follows: 20 ft. and less, 5.51 miles; 21-30 ft., 35.94 miles; 31-40 ft., 6.03 miles; 50 ft. and more, 6.49 miles. Of the total in this classification, 41.45 miles, or 76.8 per cent, are 30 ft. or less in width.

Summary of Philadelphia Recommendations

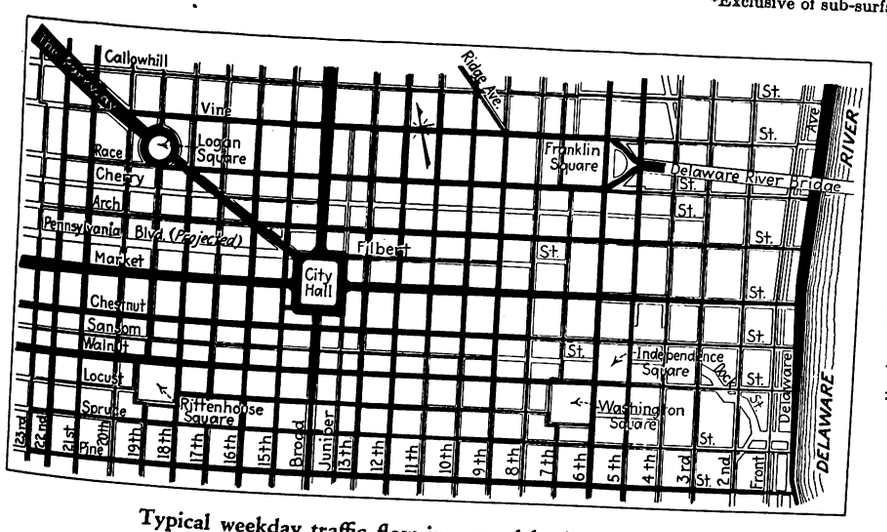
1. Revise existing parking ordinance.
2. Install signal system on main streets.
3. Establish a city traffic bureau.
4. Establish a traffic court and violations bureau.
5. Completely co-ordinate transit system.
6. Construct underground sidewalks.
7. Eliminate many right and left-hand turns.
8. Co-ordinate and control trucking.
9. Provide off-street loading facilities in new buildings and reconstruct old buildings within five years.
10. Reconstruct streets through certain squares to remove traffic obstacles.
11. Adopt comprehensive paving program.
12. Erect proper signs and markings.
13. Miscellaneous.

To determine the traffic flow into and out of the central business district, its direction and its characteristics, a cordon count was made covering a period of several days. Table I shows the figures of this count compared with a similar count made in 1925. The change in the various classes of traffic is shown in Table II. There has been an increase in the total of 18.6 per cent.

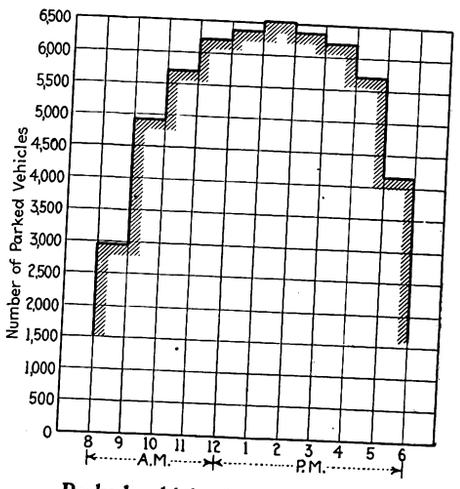
TABLE I—VEHICLES ENTERING AND LEAVING PHILADELPHIA CENTRAL BUSINESS DISTRICT, 1925–1928. TYPICAL WEEKDAYS, 5 A.M. TO 12 MIDNIGHT

Kind of Vehicle	Typical Weekday, November, 1925 Entering	Leaving	Total	Per Cent	Typical Weekday, December, 1928 Entering	Leaving	Total	Per Cent
Passenger automobiles	76,245	72,437	148,682	53.1	104,441	101,310	205,751	61.9
Taxicabs	6,914	6,662	13,576	4.8	6,032	5,715	11,747	3.5
Trucks	36,691	35,508	72,199	25.8	37,880	38,068	75,948	22.9
Horse-drawn vehicles	9,971	9,907	19,878	7.1	5,824	5,455	11,279	3.4
Surface cars*	12,427	12,350	24,777	8.8	10,701	10,671	21,372	6.5
Buses	508	503	1,011	0.4	3,038	3,031	6,069	1.8
Total	142,756	143,367	280,123	100.0	167,916	164,250	332,166	100.0

*Exclusive of sub-surface trolley cars.



Typical weekday traffic flow in central business district of Philadelphia



Parked vehicles in main streets Jan. 7-8, 1929

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TABLE II —CHANGES IN VEHICLE TRAFFIC ENTERING AND LEAVING CENTRAL DISTRICT

Kind of Vehicle	Increase or Decrease, Per Cent	Per Cent Change in Vehicular Traffic To and From the South	West	North	East
Passenger automobiles	38.4	44.1	18.2	33.2	142.0
Taxicabs	—13.5	16.5	—3.1	—34.5	577.0
Trucks	5.2	10.3	—3.1	1.3	25.6
Horse-drawn vehicles	—43.3	—40.0	—59.5	—43.7	—51.2
Surface cars	—13.7	—7.6	—17.0	—17.4	.....
Buses	502.0	148.0	168.5	105.0	*

*No buses in 1925

TABLE III —PASSENGERS CARRIED BY PUBLIC AND PRIVATE CONVEYANCE

Kind of Vehicle	Number of Daily Passengers November, 1925	December, 1928	Increase or Decrease Passengers	Per Cent
Passenger automobiles	260,516	353,202	92,686	25.6
*Taxicabs	15,532	9,780	—5,752	—37.0
Trucks	103,033	107,307	4,274	4.1
Horse-drawn vehicles	23,993	13,577	—10,416	—43.4
Surface cars	820,727	703,262	—117,465	—14.3
Buses	25,471	102,741	77,270	304.0
Sub-surface and elevated	342,075	437,028	94,953	27.8
Total	1,591,347	1,726,897	135,550	8.5

*Taxicab drivers not included

The number of passengers carried by public and private conveyance is shown in Table III. The total number of passengers carried by mass transportation units on the street decreased from 846,198 in 1925 to 806,003 in 1928, a decrease of 40,195 or 4.8 per cent. The number carried by mass transportation, sub-surface or elevated, increased from 342,075 to 437,028, an increase of 94,953, or 27.8 per cent. The total increased 4.6 per cent. These mass transportation units carried 74.5 per cent of the total persons entering and leaving the district in 1925 and 72.2 per cent in 1928.

A similar cordon count embracing the district between Walnut and Arch Streets and the two rivers was made in 1919. A comparison of the three counts, with necessary adjustments for the difference in territory, is made in Table IV.

Summarizing the results of the cordon count, the outstanding facts are as follows: There is a daily flow into and out of the central business district of about 332,000 vehicles, or approximately 166,000 each way. This is an increase of 143 per cent during the past ten years. The principal element in the flow—the passenger automobile —increased 279 per cent and the smallest numerical element—the horse-drawn vehicle—decreased 65 per cent in the same period. From 9 a.m. to 6 p.m. the flow is fairly uniform, showing a total hourly movement of about 20,000 vehicles.

Comparison with the 1925 count shows the greatest change in movement has been the 127 per cent increase in flow to and from the east, due to the opening of the Delaware River Bridge. Seven streets handle 66 per cent of the traffic with North Philadelphia and 49 per cent of the traffic with South Philadelphia, the heaviest flow being on the Parkway and on Broad Street.

While the total number of passengers carried by mass transportation units on the street decreased 4.8 per cent in 1928 from 1925, the total handled by the surface, sub-surface and elevated increased 4.6 per cent, and while these services in 1925 carried 74.5 per cent of the total persons entering and leaving the district, in 1928 the proportion had dropped to 72.2 per cent.

TABLE IV —INCREASE IN TRAFFIC, 1928 OVER 1919 AND 1925

Kind of Vehicle	December, 1928, March, 1929 Number	Per Cent	Increase or Decrease from November, 1925 Number	Per Cent
Passenger automobiles*	139,702	279.0	45,582	31.7
Trucks	43,154	138.0	3,250	4.6
Horse-drawn vehicles	—20,645	—64.8	—8,592	—43.2
Total	162,211	143.0	40,240	17.1

*Includes taxicabs

Narrow Streets Make Movement Difficult

With streets that are only 26 ft. wide between curbs and carrying street car tracks in the center, the problem of movement is difficult. On account of the street car loading zones, the right-hand lane on one-way streets is of little use as a through traffic artery. Over 50 per cent of all vehicles in the narrow streets use the street car lane. Assuming a 50 per cent stop, 50 per cent go, distribution of time, the maximum capacity of such streets is 1,065 vehicles per hour. With two free lanes and a 10 per cent reduction due to unequal distribution and lag between the permissive signal and the actual movement of the vehicle, it can be assumed that the normal capacity of a free traffic lane is between 450 and 500 vehicles per hour.

A special investigation was made of Chestnut Street. A large proportion of the Chestnut Street traffic is made up of vehicles using it for only a few blocks. This is due in part to the system of one-way streets requiring vehicles to use several streets to reach their destination. Abolition of parking will not only increase the street space available for moving vehicles but will tend to reduce the number of vehicles due to elimination of the "cruising parking-space seeker." The elimination of turns into Chestnut Street would aid in reducing traffic in that street. Improved paving and complete elimination of parking in Sansom Street from Broad to Eighteenth would provide a bypass route for vehicles now making these turns.

A series of riding checks on both street cars and motor vehicles was made to determine the rate of traffic flow through the business district. It was found that on north-south streets, street car speeds range from 6.54 m.p.h. on Thirteenth to 9.79 m.p.h. on 22d over a distance of approximately one mile. On east-west streets speeds range from 5.83 m.p.h. on Walnut to 8.68 m.p.h. on Pine. The average speed for the entire district is 6.9 m.p.h.

Distribution of the running time of street cars was found as follows:

	Per Cent
Actual operation of car	70.6
Passenger stops	13.8
Delays due to cross-traffic and signals	13.7
Delays due to other causes	1.9

Thus 84.4 per cent of all time on the street is devoted to the transportation of passengers. Of the delays 88 per cent were due to cross traffic or signals.

Analysis of the automobile riding checks indicates an average over-all speed of about 9.5 m.p.h. Classification of the observed delays was as follows:

	Per Cent
Cross traffic	83.05
Congestion*	6.73
Auto or trolley loading or unloading passengers	4.47
Vehicle parking	1.99
Vehicle obstructing track	1.66
Loading or unloading merchandise	0.82
Street repairs	0.67
Stalled vehicles	0.61

*Delays for which the observers were unable to detect any readily apparent reason.

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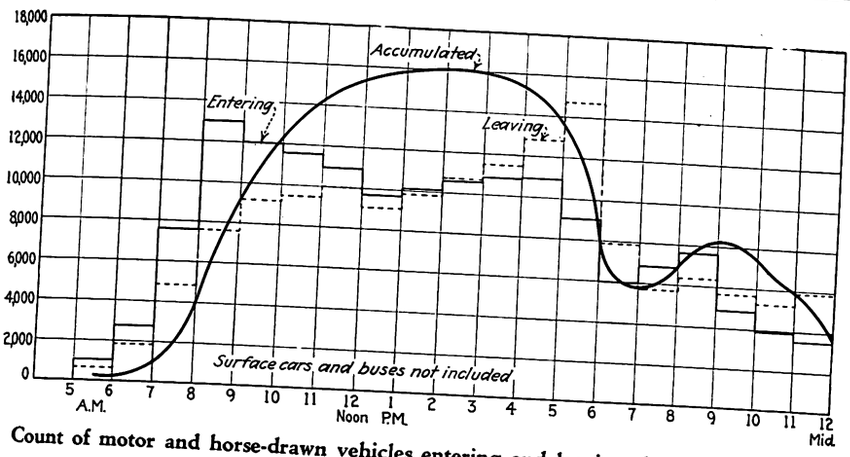

Count of motor and horse-drawn vehicles entering and leaving the central business district on a typical weekday

The actual time on east-west streets is divided as follows:

	Per Cent
Moving at speed greater than 5 m.p.h.	67.5
Moving at speed less than 5 m.p.h.	4.4
Stopped due to cross traffic or other causes	28.1

Three Groups of Conditions Affect Traffic Flow

The conditions which affect traffic flow may be classified into three groups: (1) The inclusion in the traffic stream of elements which tend to hinder its flow; for example, parking, and slow-moving elements such as horse-drawn and certain types of commercial trucks; (2) those conditions which tend to impose on traffic arteries loads which are in excess of their normal carrying capacity (the most outstanding elements of this sort is the increasingly dense concentration of business and even social life in small areas, due to the construction of high buildings; (3) improper or inadequate direction and control of the traffic stream, such as faulty signal installation or lack of proper directional regulation.

TABLE V—PARKED VEHICLES IN PHILADELPHIA BUSINESS DISTRICT

Length of Time Parked, Hours	Number of Vehicles Total	Per Cent
Less than 1	23,590	72.5
1–2	4,425	13.6
2–3	1,693	5.2
3–4	812	2.5
4–5	546	1.7
5–6	364	1.2
6–7	274	0.9
7–8	280	0.8
8–9	307	1.0
9–10	207	0.6
Total	32,498	100.0

To determine actual parking conditions a survey covering the period from 8 a.m. to 6 p.m. was made on Jan. 7, 8, 14 and 15, 1929. A maximum of 6,523 vehicles parked between the hours of 1 and 2 p.m. An interesting comparison between 1925 and 1928 may be made by taking the accumulation of vehicles in the district obtained from the algebraic summation of the ins and outs from the cordon counts, the 1925 showing 14,200, and the 1928 count showing 16,271. The increase in accumulated vehicles for 1928 is 14.6 per cent.

In September, 1927, a parked vehicle count was made, which showed a total of 3,650 vehicles as compared with 5,462 in 1929, an increase of 50 per cent.

A summary of the parking survey shows that the accumulated vehicles in the central business district have increased 14.6 per cent since 1925. In the district between Vine and Pine Streets, there has been an increase in parked cars of 50 per cent in the past two years. As seen in Table VI, 72.5 per cent of all vehicles parked for periods of less than one hour, and of the cars parking in excess of one hour 25.4 per cent were "repeaters," being found during both checks. The total number of vehicles using the streets for parking purposes during the business day is about 12 per cent of the city registration. These cars carry only 2 per cent of the people entering the central business district. Repeaters or regular parkers are long-time parkers, the percentage of the total repeaters for periods of from 4-5 hours to 9-10 hours varying from 45.5 per cent to 53.9 per cent. Of all repeaters, 73 per cent are evidently regular parkers as they were found in practically the same location during both checks.

TABLE VI—CHECK TO DETERMINE "REPEATERS" IN PARKING

Length of Time Parked First Check, Hours	Total Number Parked, First Check	Repeaters Total Number	Repeaters Per Cent of Total
1–2	4,425	751	17.0
2–3	1,693	345	20.4
3–4	812	260	32.0
4–5	546	202	36.9
5–6	364	196	53.8
6–7	274	133	48.5
7–8	280	145	51.8
8–9	307	140	45.6
9–10	207	94	45.4
Total	8,908	2,266	25.4

Through the co-operation of the Keystone Automobile Club, a survey of the actual garage and parking facilities was made. The summary is given in Table VII. It was noted that in certain sections of the business district there are not proper facilities for the garaging of automobiles. It is unreasonable to expect that any plan of parking regulation can be entirely successful unless suitable garaging facilities are provided, including reasonable and uniform rates. As this is a matter in which the city is directly concerned, it should encourage the construction of garages at such points throughout the city as will provide proper facilities.

Difficulties in Way of Parking Regulation

With regard to the regulation of parking, the report states:

> All attempts that have been made to regulate parking in this city have met with strenuous opposition from business interests, with the claim that such regulation seriously interferes with business. It is an open question whether this claim is justified. From the experience of other cities and from such information as we have been able to secure, we are inclined to believe that this claim is based on a state of mind rather than on actual facts, and an unbiased investigation of the facts would not sustain the claim. It is certain that in other cities where there is effective parking regulation business has been helped rather than hindered, and that such regulation has brought more people, more traffic and more business to the business districts.
>
> We secured the co-operation of a number of large and representative stores in making a three-day survey to determine facts. A total of over 56,000 customers were canvassed as to the method used in reaching the various stores, and the following tabulation

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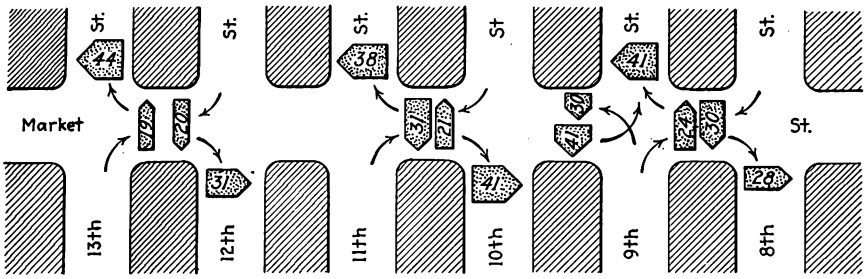

Conflicting movements of vehicles and pedestrians 8 a.m.—6 p.m. on a typical weekday in March, 1929

of transportation methods used by customers shows the percentage of the total using the means indicated.

	Per Cent
Auto parked at the curb	9.02
Auto not parked at the curb	8.32
Public conveyance	68.57
Walked	14.09

It will be noted that while the number of customers requiring curb parking space is considerably higher than shown by checks in other cities, yet it is a small percentage of the total and must represent a comparatively small number of the aggregate of customers using our central city shopping centers. It is doubtful whether it is to the advantage of the business houses to inconvenience the free movement of 91 per cent of their customers to provide free parking in the streets for the other 9 per cent.

A check of conditions made since the recent enforcement of the no-parking ordinance shows that while parking has not been entirely eliminated, vehicle speeds have been increased about 20 per cent. The number of parked vehicles on Chestnut and Walnut Streets has been reduced 90 per cent from the number observed during the parking survey made in January, and on north-south streets the number of parked vehicles has been reduced about 50 per cent.

Another reason for the inability of Philadelphia's streets to handle the traffic is the increasingly dense concentration of business and even social life due to the construction of high buildings. Of the buildings above ten stories in height approximately 17 per cent are 20 stories or over, 27 per cent are 15 to 19 stories and 77 per cent are 10 to 14 stories. A survey of 141 buildings in this district shows a total estimated population of 89,238 persons and a total daily traffic of 286,664 persons, or 4.4 times the population, and while the opening business hour is fairly well distributed, the closing hours are rather concentrated at 5 o'clock.

It has been estimated that during the closing hour—5 to 6 p.m.—people leave office buildings at the rate of 480 per floor, per hour. A 20-story building, therefore, discharges about 10,000. If one in 30 uses an automobile to get home, there would be required sixteen cars per floor or 320 cars for the building, or six times the number that could be parked in one city block, which would make the street impassable. Should all these people use street cars, on the basis of 100 persons per car, 100 cars would be required, which, stretched end to end, would reach almost a mile. No demonstration is necessary to visualize the effect of the sudden imposition of such loads on the narrow city streets. Only high-speed surface transportation could meet such requirements, and the continuing development of this nature is a powerful argument for a completely co-ordinated and comprehensive transit system.

TABLE VII—GARAGE AND PARKING LOT FACILITIES COMPARED WITH PARKING ON STREET

Number of parking lots	23
Number of garages	76
Total available parking places	99
Total car capacity	19,528
Number of cars stored	9,919
Available car space	9,609
Per cent of capacity available	49.2
Number of cars parked on street at peak hour	6,524

Observations were made of persons and vehicles entering certain selected intersections. The counts, made for an average weekday between 8 a.m. and 6 p.m., show only persons moving across the roadway and exclude those who turn the corner and remain on the sidewalk. The distribution of the persons and vehicles was: pedestrians, 65.8 per cent; passengers in street cars and buses, 25.2 per cent; passengers in other vehicles, 9.0 per cent.

Several charts indicate the conflicting movements between pedestrians and vehicle passengers in making turns at certain intersections along Market Street. One of these is reproduced. The conflict is most noticeable at Thirteenth, Tenth and Ninth at Market, where the number of pedestrians are 44, 41 and 41, respectively, for each passenger in private vehicles making the right turn from Market to the intersecting street. It was found that a well-defined cruising circuit used by private chauffeurs exists, including Chestnut, Fifteenth, Walnut and Sixteenth Streets.

The turning movements at certain Chestnut and Market Street intersections cause serious inconvenience to the greatly predominating pedestrian movement and very definitely slow up all vehicular traffic.

Other Sections of the Report

Other reports in the Philadelphia traffic survey already released are No. 1, which treats of the traffic conditions in the vicinity of the Delaware River Bridge Plaza: No. 3, on the traffic control signal system for the central business district, and No. 4, concerning accidents and the street traffic situation. In the first report it is recommended that Fifth Street be carried across the bridge approach through a tunnel, so that the through movements will not interfere with each other.

The third report recommends a progressive co-ordinated traffic control signal light system, which would be entirely automatic. It would be operated as a unit, controlled from one or more central points. The lights at each intersection would be so timed that a vehicle could move continuously through the district without stopping. This speed would be 15 m.p.h. on that section of Broad Street between South and Vine and at a materially higher speed beyond these limits. It is estimated that the proposed system would increase the average speed of traffic on all streets almost 50 per cent.

In the fourth report, on accidents and traffic, it is recommended among other things that a city traffic engineering bureau be organized to plan for future as well as present relief from traffic hazards and congestion; that there should be properly constituted traffic courts with adequate punishments; that further development of safety patrols and teaching of safety in the schools, and education of the police, be encouraged; that more playgrounds and other inducements to discourage play in the streets be established; that commercial vehicle movements and loading be controlled; that travel lanes and pedestrian crossings be marked; that loading platforms for street railway passengers be installed on all wide streets.

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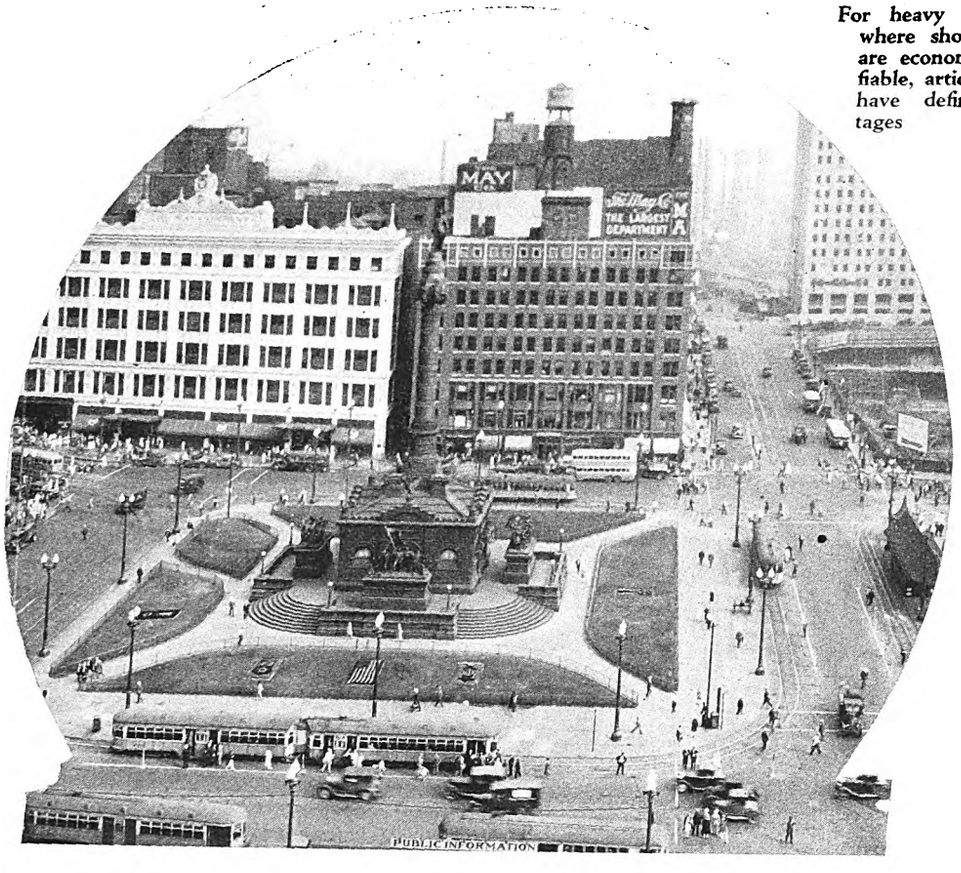

For heavy traffic lines, where short headways are economically justifiable, articulated units have definite advantages

Determining the Proper Vehicle

By
GEORGE M. WOODS
Westinghouse Electric & Manufacturing Company

Characteristics of large and small cars, multiple-unit trains and articulated units compared, and their advantages and disadvantages under various operating conditions outlined

ONE of the major problems confronting railway operators who are about to purchase new equipment is determining the type of rolling stock to buy. This question cannot be answered according to any fixed rule. There are so many variables involved that numerous exceptions can be taken to almost any general statement. The first choice must be between a rail vehicle and a trackless vehicle, that is, between car and bus. Next, if the car is chosen, should it be articulated, multiple unit, or single unit—double truck or single truck?

In determining the proper vehicle, the traffic conditions must first be analyzed to ascertain the number of persons to be hauled at the various hours of the day. The number of cars required or the number of buses required, with their tentative schedules, must be determined. The total investment for each can then be calculated within fairly close limits. The investment must include not only the cost of the vehicles themselves, but also such items as track construction, additions to substation and distribution systems, garages, shop additions, etc. Generally the investment for cars and the items which accompany car operation, will exceed the investment for buses. It is equally true that the operating costs of buses per seat-mile ordinarily will exceed the operating costs of street cars. If the annual fixed charges on the necessary investment are added to the annual operating costs, the total annual charges give a true comparison of the two systems from a cost standpoint.

The earning power of cars compared with buses is another factor that must be considered. Obviously it would be poor policy to select a method of transportation merely because it is cheap, if the public would not patronize it after it had been provided. Not only the present desires of the public but also its future attitude must be considered. While this phase of the analysis approaches the realm of prophecy, it cannot be ignored. In some instances bus operation was started a number of years ago with wholly unsatisfactory vehicles; the patrons became dissatisfied and today the street car is generally

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favored. But such a comparison is fundamentally unfair if modern street cars are compared with out-of-date buses. On the other hand there are numerous street railways which have purchased few new cars in recent years, while at the same time they have been consistent purchasers of modern buses. It is only natural that many persons, comparing street cars of the vintage of 1900 with buses of the vintage of 1929, consider the street car an obsolete vehicle and can see no prospect of the street railways continuing in operation. Their judgment is biased just as much as that of the people who base their opinions on old buses and modern cars. Actually there is less fundamental difference from the passenger's viewpoint between street car and bus than there is between either and the private automobile.

Wages are such a large part of the total operating expense that every effort must be made to have each man operate as large a unit as is practicable. The electric railway man is always between the "devil" of high operating costs, and the "deep sea" of infrequent service. A street railway which operates large cars at long intervals can no more expect to prosper than an office building which would attempt to operate elevators at similarly infrequent intervals.

In considering this question, let us take for example a route with the following characteristics:

Length of line, miles per round trip	15
Schedule speed, miles per hour—non-rush	10
Schedule speed, miles per hour—rush	9.4
Running time, minutes—non-rush	90
Running time, minutes—rush	96
Headway, minutes—non-rush	5
Headway, minutes—rush	2
Number of cars—non-rush	18
Number of cars—rush	48
Equivalent hours of non-rush service	18
Equivalent hours of rush service	3

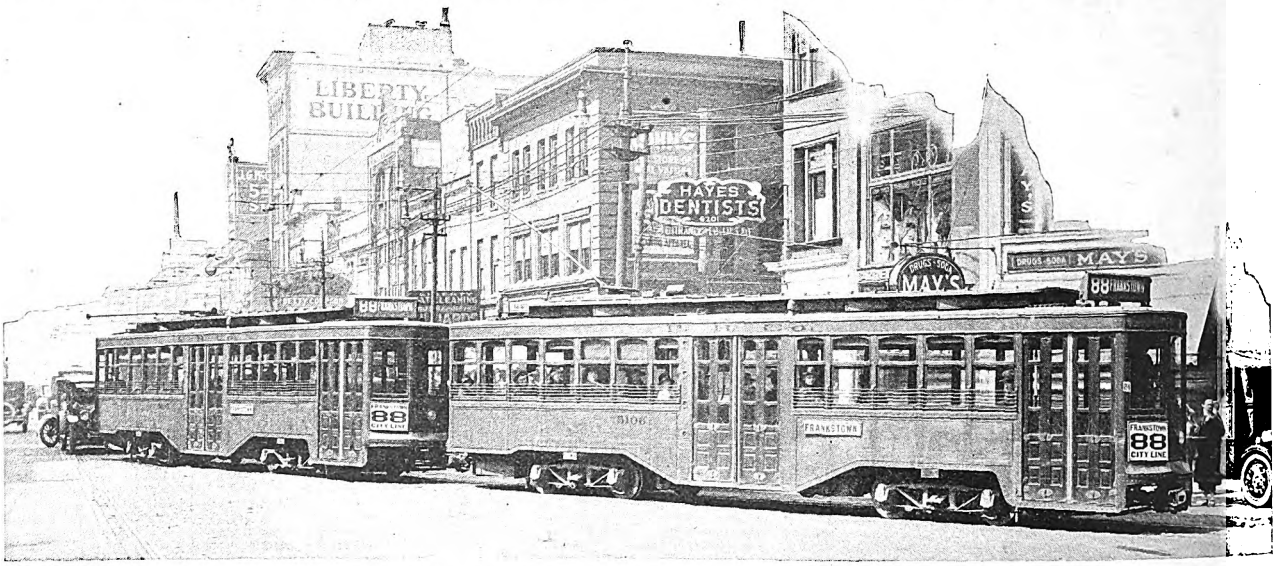
A typical modern car for this class of service would weigh about 35,000 lb. and seat 50 passengers. This car should be maintained for not more than 2.5 cents per mile and the energy cost should be approximately 4.2 cents per mile. A car of this type could readily be arranged for train operation. The platforms and couplers might be somewhat heavier but the increase in weight is so slight that the same weight may be used for the multiple-unit car without appreciable error. An articulated car with two body sections and three trucks would weigh approximately 66,000 lb. for the same seating capacity as two single units. The electrical equipment should have the same capacity per unit of weight. In the same service the maintenance would be expected to be 4.5 cents per car-mile and the cost of energy consumption, 7.5 cents per car-mile. For the purposes of comparison let it be assumed that motormen and conductors receive 60 cents per hour on single cars, articulated cars, or multiple-unit trains and 65 cents per hour on one-man cars.

Between single cars and multiple-unit operation, there would be little difference in operating expenses, except wages of conductors and motormen. During the rush hours the headway would be doubled with the multiple-unit trains, but since the resulting headway is only four minutes, fairly frequent service is afforded. Under the conditions previously outlined, taking two-man operation of all single cars and three-man operation of multiple-unit trains, the total daily wages would be $562 for the single cars and $519 for the multiple-unit cars, a saving of $43 per day for the latter.

If all cars were operated by one man during the non-rush hours, the wages per day would be $384 for single cars and $341 for multiple-unit cars. The relation between single-car and multiple-unit operation remains unchanged, but a saving of $178 per day in each case would be effected by one-man operation. If the service conditions were such that one man could run a single car successfully throughout the day, the total daily wages for single cars would be $304. The wages for multiple-unit cars remain unchanged at $341. Under these circumstances there would be a saving of $37 per day for the single cars.

When the operating costs of articulated cars are compared with those of single cars and multiple-unit trains the power and maintenance expenses differ and must be included. On page 845 is a comparison based on the provision of the same number of seats throughout the day with the three types of equipment. In some instances the larger units might have to make more stops, especially during the non-rush period, than the smaller units and, hence, would make lower schedule speed and have higher energy consumption per ton-mile. This tendency is neglected in order to avoid obscuring the main point to be developed.

Under these conditions the articulated cars save



Multiple-unit cars provide a convenient means of handling light traffic during the day and heavy traffic in the rush hours

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$174 per day, compared with single cars and $131 per day, compared with multiple-unit cars. The former, however, have the disadvantage of affording 10-minute headways during the non-rush hours instead of the 5-minute headways furnished by the latter.

If the single cars and multiple-unit cars are operated by one man during the non-rush hours the wages are reduced, as previously mentioned, to $384 and $341, respectively. The articulated cars remain unchanged. The total expense for wages, power and maintenance become: single cars, $693; multiple-unit cars, $650; articulated cars, $697. On this basis the expenses for the articulated car are $4 per day more than for single cars, and $47 per day more than for multiple-unit cars of the same capacity.

Single-car operation under extremely heavy traffic conditions has many staunch advocates

Although some of the most recently designed articulated cars are arranged for three-man operation, there are a number of articulated cars in service which are operated by two men. If the latter plan is followed the expense of one man for the entire day is saved and the total cost of wages, power and maintenance of the articulated cars becomes $555. The two-man articulated cars, therefore, save $138 per day, compared with single cars, and $95 per day, compared with multiple-unit cars.

If it be assumed that the articulated car at ten-minute intervals affords a service which is too infrequent, and that, in order to retain the business, maximum headways should be five minutes, the three types of cars compare as given in the table below.

On this basis the multiple-unit cars save $295 per day, compared with the articulated cars. It so happens that in the example chosen the resulting non-rush headway, when the articulated cars provide the same number of seats as the single cars, is such that there may be a difference of opinion as to its adequacy. In some cities 10-minute headways are considered satisfactory even on important lines, in others they are regarded as too long to meet the demands of the public.

Multiple-unit cars are the most flexible means of providing service for varied traffic conditions. Operated singly they can provide frequent service on the lighter lines during the entire day and on the heavier lines during the non-rush hours. At periods of heavy traffic, the cars can be operated in trains of two or three. In the past multiple-unit cars have been looked on with disfavor in some instances because of the assumed complication.

COMPARISON OF OPERATING COSTS—SAME SEATING CAPACITY

	Single Car	Multiple Unit	Articulated Car
Car-hours per day non-rush	324	324	162
Car-hours per day rush	144	144	72
Wages per day non-rush	$389	$389	$292
Wages per day rush	173	130	130
Total wages per day	562	519	422
Car-miles per day non-rush	3,240	3,240	1,620
Car-miles per day rush	1,355	1,355	677
Total car-miles per day	4,595	4,595	2,297
Cost of energy per day	$194	$194	$172
Maintenance per day	115	115	103
Wages, power and maintenance per day	871	828	697
Saving per day compared with single car operation	....	$43	$174

COMPARISON OF OPERATING COSTS—SAME MAXIMUM HEADWAY

	Single Car	Multiple Unit	Articulated Car
Car-hours per day, non-rush	324	324	324
Car-hours per day, rush	144	144	72
Wages per day, non-rush	$211	$211	$389
Wages per day, rush	173	130	86
Total wages per day	384	341	475
Car-miles per day, non-rush	3,240	3,240	3,240
Car-miles per day, rush	1,355	1,355	677
Total car-miles per day	4,595	4,595	3,917
Cost of energy per day	$194	$194	$294
Maintenance per day	115	115	176
Wages, power and maintenance per day	693	650	945
Excess per day compared with multiple unit	43	....	295

The single-truck car has a definite field of usefulness on light traffic lines

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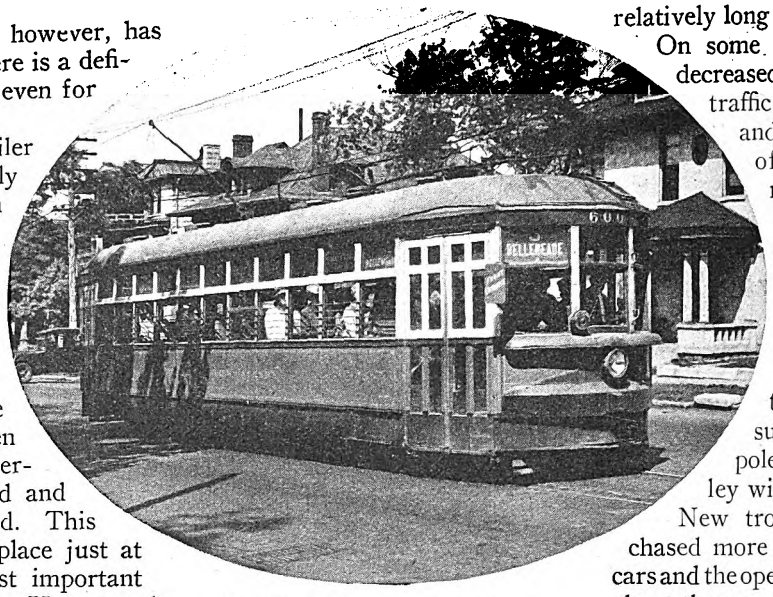
Modern remote control, however, has many advantages and there is a definite trend toward its use even for single units.

Motor car and trailer trains are less favorably regarded at present than formerly. It has always been known that the equipment of the motor car had to be heavier and less economical in operation than if designed for the motor car alone. When the trailer is added acceleration rates are decreased and the car speed is decreased. This decrease in speed takes place just at the time when it is most important to move traffic quickly. Unmotored trailers are difficult to handle in switching operations, and equipment to move them from carhouse to line and around the carhouse must be provided. If motor troubles occur on the car hauling a trailer, it is impractical to continue the train in service. However, the main objection to motor car and trailer trains is the fact that low rates of acceleration are too great a handicap today.



Double-truck cars of moderate size are frequently preferred to single-truck cars, even where traffic is light

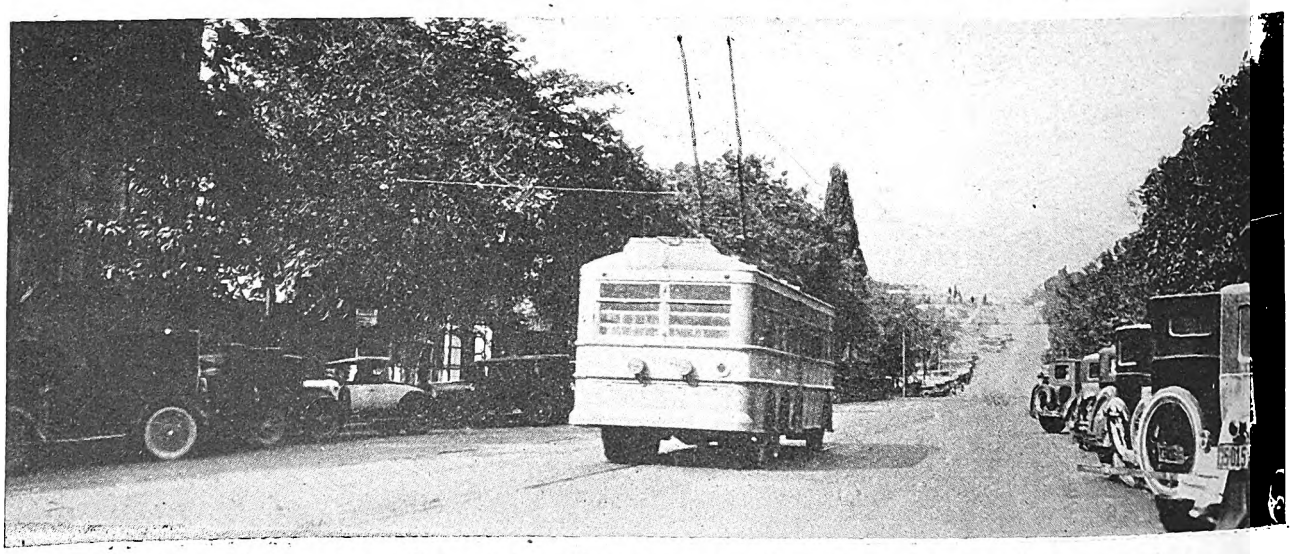
Single-car operation for almost all classes of service has many staunch advocates. Short headways can be maintained, and in these days of private automobile competition are a most effective weapon. Single cars operated by one man compare favorably in operating expenses with any other form of transportation.

In certain cities where vehicular traffic is dense and street intersections are close together, trains and articulated cars interfere with cross-street traffic. Under these conditions single cars are preferred, even if two-man crews are required.

The single-truck car has a definite field in small cities or on lightly traveled lines. Distances traveled are short and unless frequent service is available, patronage is sure to decrease. The single-truck car has never had as good riding qualities as the double-truck car, especially on poor track, and that sometimes has caused it to be unpopular. In many small cities double-truck cars, even at relatively long headways, are preferred. On some railway lines traffic has decreased or expected increases in traffic have not materialized, and the continued operation of street cars is not economical. The track may require high reconstruction costs. The cars also may have reached the stage where replacement is necessary. To these conditions the trolley bus is eminently suited. The substations, a pole line and one of the trolley wires are already available. New trolley buses can be purchased more cheaply than new street cars and the operating expenses should be about the same as those of the street car.

It is possible to make theoretical studies of the investment and operating costs of each of the various types of vehicles discussed, in service of various densities. From these studies deductions could be drawn as to the exact field of application of each type. But these studies usually ignor local conditions which quite frequently are the determining factors. No general rule can be applied to evaluate the earning power of the various vehicles. A slight change in assumptions of unit costs, changes the relative economy of various schemes. For instance, in the comparisons made between single cars, multiple-unit and articulated cars each could be shown to be most economical, depending on the number of car operators.

It is probably fortunate that definite divisions between the fields of application cannot be made. It is human nature to continue to do things in the same old way once a standard procedure is established. The urban transportation business is changing so rapidly that the industry cannot afford to over-standardize. By carefully studying each application of new equipment, the railway operator keeps in touch with new conditions and is better able to meet the requirements of the public. The best results can be obtained only by thoroughly analyzing each problem and by applying the correct vehicle.



Trackless trolleys involve smaller capital cost than street cars and are cheaper to operate than are motor buses

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Gross Up; Expenses Down

DESPITE the advent of summer weather and the increased use of the automobile the earnings of electric railways reported for the most recent months compare quite favorably with similar reports for 1928. In the larger cities and in some of the smaller ones there is an increase of gross business. All the Canadian properties except one small one show increases in gross revenue. Approximately two-thirds of the companies for which returns are published show a reduction in operating expense for the current year, as compared with last year, so that more than two-thirds of these companies had a higher gross income for the month reported for this year.

The statement of the Brooklyn-Manhattan Transit Corporation for the month of July is the first one issued since the consolidation of the surface lines of that com-

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Key System Transit Co., Oakland, Cal.					
June, 1929	563,518				*258,183*
June, 1928	567,208				*75,785*
6 mo. end. June, 1929	3,509,570				*673,587*
6 mo. end. June, 1928	3,557,093				*309,730*
Market Street Railway, San Francisco, Cal.					
July, 1929	781,241	660,985*a*		120,256	60,687*h*
July, 1928	783,899	688,132*a*		95,767	33,399*h*
12 mo. end. July, 1929	9,582,725	8,178,553*a*		1,404,172	676,890*h*
12 mo. end. July, 1928	9,857,675	8,336,388*a*		1,521,287	753,337*h*
Denver Tramway, Denver, Colo.					
6 mo. end. June, 1929	2,119,250	1,441,482	247,441	455,102	196,578
6 mo. end. June, 1928	2,142,946	1,417,089	253,480	491,316	242,210
Jacksonville Traction Co., Jacksonville, Fla.					
June, 1929	90,651	74,798	8,969	6,392	
June, 1928	97,551	78,281	9,079	9,613	
12 mo. end. June, 1929	1,170,896	948,063	106,554	110,024	50,450
12 mo. end. June, 1928	1,257,265	1,021,819	107,469	120,663	44,841
Honolulu Rapid Transit Co., Honolulu, Hawaii					
June, 1929	84,625	47,694	7,932	29,999	16,776
June, 1928	95,860	54,044	15,042	27,823	22,225
6 mo. end. June, 1929	527,607	303,303	58,328	172,576	93,238
6 mo. end. June, 1928	533,693	315,822	68,558	155,665	109,547
Chicago Surface Lines, Chicago, Ill.					
July, 1929	5,077,970	4,097,625*a*		980,345	854,219
July, 1928	4,963,631	3,958,992*a*		1,004,639	858,532
Boston Elevated Railway, Boston, Mass.					
June, 1929	2,654,942	1,867,539	130,009	662,247	*32,187*
June, 1928	2,793,329	1,867,607	78,231	854,172	179,790
Eastern Massachusetts Street Railway, Boston, Mass.					
June, 1929	685,475	434,577	30,658	241,557	69,138
June, 1928	714,212	512,376	25,799	192,866	51,642
6 mo. end. June, 1929	4,437,489	2,700,241	199,581	1,648,727	537,689
6 mo. end. June, 1928	4,634,129	2,904,938	178,224	1,662,796	542,647
Boston, Worcester & New York Street Railway, Framingham, Mass.					
6 mo. end. June, 1929	350,373	315,500*a*		44,654	35,834
6 mo. end. June, 1928	340,808	308,552*a*		33,451	24,482
Middlesex & Boston Street Railway, Newtonville, Mass.					
3 mo. end. June, 1929	297,550	246,720		42,453	3,732
3 mo. end. June, 1928	296,860	246,563		44,954	5,051
6 mo. end. June, 1929	599,801	492,596		90,508	12,704
6 mo. end. June, 1928	611,602	501,496		97,910	16,575
Springfield Street Railway, Springfield, Mass.					
6 mo. end. June, 1929	1,411,256			274,915	129,132
6 mo. end. June, 1928	1,462,324			288,823	149,378
Worcester Consolidated Street Railway, Worcester, Mass.					
6 mo. end. June, 1929	1,581,376			379,628	147,924
6 mo. end. June, 1928	1,633,852			311,982	80,347
Detroit Municipal Railway, Detroit, Mich.					
July, 1929	2,134,500	1,631,004	62,023	449,755	309,149
July, 1928	1,961,367	1,514,618	63,435	403,879	245,510
12 mo. end. July, 1929	26,502,205	21,005,052	753,333	4,918,566	3,193,925
12 mo. end. July, 1928	23,693,967	18,416,492	784,330	4,732,911	2,835,975
Duluth-Superior Traction Co., Duluth, Minn.					
3 mo. end. June, 1929	428,995	368,410		60,585	*16,611*
3 mo. end. June, 1928	543,109	373,607		79,502	*1,273*
6 mo. end. June, 1929	945,193	784,073		161,120	4,910
6 mo. end. June, 1928	1,010,438	792,978		217,459	49,040
Kansas City Public Service Co., Kansas City, Mo.					
July 1929	714,416				48,095*f*
July, 1928	701,495				
7 mo. end. July, 1929	5,232,681				453,356*f*
7 mo. end. July, 1928	5,318,081				427,777*f*
International Railway, Buffalo, N. Y.					
6 mo. end. June, 1929	5,451,496	4,590,513*a*		899,807	249,870
6 mo. end. June, 1928	5,538,871	4,622,947*a*		934,599	240,031
Fonda, Johnstown & Gloversville R. R., Gloversville, N. Y.					
June, 1929	85,895	80,169	7,840	52,807	17,774
June, 1928	77,118	58,448	7,840	23,427	*11,201*
6mo. end. June, 1929	516,531	388,780	47,040	148,338	*46,488*
6 mo. end. June, 1928	546,801	383,551	47,040	152,516	*40,185*

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Brooklyn-Manhattan Transit Corporation, New York, N. Y.*g*					
July, 1929	5,150,887	3,507,239	333,762	1,373,745	607,513
July, 1928	4,986,467	3,483,492	343,331	1,269,883	561,957
B.-M.T. Corp., July, 1928	4,086,272	2,705,886	293,884	1,173,970	507,475
B.C.R.R., July, 1928	900,195	777,606	49,447	95,913	54,482
Hudson & Manhattan Railroad, New York, N. Y.					
July, 1929	985,313	510,735*a*		474,578	138,602
July, 1928	963,070	529,059*a*		434,011	98,722
7 mo. end. July, 1929	7,271,946	3,672,638*a*		3,599,308	1,247,032
7 mo. end. July, 1928	7,232,934	3,724,507*a*		3,508,427	1,159,892
Interborough Rapid Transit Co., New York, N. Y.					
June, 1929	5,725,994	3,452,601	189,726	2,083,666	*48,761e*
June, 1928	5,615,594	3,535,386	208,570	1,871,636	71,970*e*
12 mo. end. June, 1929	69,735,730	42,344,462	2,393,735	24,997,532	3,007,900
12 mo. end. June, 1928	67,502,320	39,657,346	3,200,615	24,644,359	3,021,582
Long Island Railroad, New York, N. Y.					
June, 1929	3,824,992	2,273,087	303,923	1,246,798	1,058,443
June, 1928	3,567,729	2,315,696	290,663	960,305	751,017
6 mo. end. June, 1929	19,331,691	13,573,277	978,402	4,768,190	3,838,361
6 mo. end. June, 1928	18,776,234	14,217,879	935,715	3,617,274	2,743,642
New York, Westchester & Boston Ry., New York, N. Y.					
June, 1929	222,960	129,902	24,035	69,730	*143,867*
June, 1928	201,405	134,480	19,581	47,978	*149,443*
6 mo. end. June, 1929	1,213,111	756,939	129,665	330,847	*941,472*
6 mo. end. June, 1928	1,137,941	753,850	114,901	276,983	*913,950*
Staten Island Rapid Transit Co., New York, N. Y.					
June, 1929	277,571	182,262	17,000	78,303	43,321
June, 1928	286,707	191,773	20,000	74,401	38,025
6 mo. end. June, 1929	1,455,686	1,046,519	106,000	303,150	83,583
6 mo. end. June, 1928	1,517,120	1,085,254	122,850	308,324	86,194
Third Avenue Railway System, New York, N. Y.					
June, 1929	1,334,854	1,005,457	97,552	255,795	*4,714*
June, 1928	1,341,316	1,014,382	106,198	255,385	15,378
12 mo. end. June, 1929	15,611,026	11,975,174	1,085,351	2,781,739	*286,333*
12 mo. end. June, 1928	15,559,183	11,923,226	1,124,340	2,731,785	*54,492*
New York State Railways, Rochester, N. Y.					
6 mo. end. June, 1929	4,750,177	3,705,810*a*		1,044,367	281,663*f*
6 mo. end. June, 1928	5,069,678	3,942,889*a*		1,126,789	355,028*f*
Galveston-Houston Electric Railway, Houston, Tex.					
June, 1929	57,316	29,176	2,565	25,573	
June, 1928	65,178	35,046	2,513	27,618	
12 mo. end. June, 1929	609,311	341,302	31,717	236,291	*34,656*
12 mo. end. June, 1928	693,501	401,811	30,394	261,295	*7,091*
Houston Electric Co., Houston, Texas					
June, 1929	280,162	174,422	25,121	80,617	
June, 1928	290,107	173,884	26,485	89,736	
12 mo. end. June, 1929	3,373,511	2,087,177	286,417	999,915	593,022
12 mo. end. June, 1928	3,272,802	1,995,676	291,446	985,679	587,950
Pacific Northwest Traction Co., Seattle, Wash.					
May, 1929	76,362	60,866	4,157	11,338	
May, 1928	71,780	58,635	3,314	9,829	
12 mo. end. May, 1929	889,408	749,670	53,215	86,521	*37,909*
12 mo. end. May, 1928	879,989	696,799	47,743	135,445	*45,463*
Pacific Northwest Traction Co., Seattle, Wash.					
June, 1929	79,766	56,721	4,131	18,913	
June, 1928	74,305	57,879	4,105	12,319	
12 mo. end. June, 1929	894,869	748,512	53,241	93,115	*24,748*
12 mo. end. June, 1928	883,902	700,312	48,242	135,346	*48,505*
Edmonton Radial Railway, Edmonton, Alta.					
June, 1929	61,616	43,091		18,525	*1,823*
June, 1928	58,694	43,827		14,867	*3,876*
6 mo. end. June, 1929	433,763	267,541		166,226	14,133
6 mo. end. June, 1928	406,840	266,246		140,594	1,135
Lethbridge Municipal Railway, Lethbridge, Alta.					
May, 1929	4,561	4,258		303	*2,281*
May, 1928	4,652	4,614		38	*2,546*
5 mo. end. May, 1929	25,535	20,168		5,367	*7,661*
5 mo. end. May, 1928	24,769	22,752		2,017	*10,908*

a Includes taxes. *b* Net operating revenue. *c* Surplus (deficit) after dividend. *d* Before taxes. *e* Rentals paid for city-owned subways were $335,606 greater in 1929. *f* Before depreciation. *g* See text. *h* Before depreciation and federal taxes

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	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Calgary Municipal Railway, Calgary, Alta.					
June, 1929	82,486	49,062	.....	33,422	3,321
June, 1928	72,060	50,312	.....	21,747	*3,077*
6 mo. end. June, 1929	514,703	293,611	.....	221,091	39,293
6 mo. end. June, 1928	458,657	278,863	.....	179,793	29,264
British Columbia Electric Railway, Vancouver, B. C.					
May, 1929	1,175,623	787,370	.....	388,253*b*	.....
May, 1928	1,095,798	744,043	.....	351,295*b*	.....
11 mo. end. May, 1929	12,847,132	8,565,854	.....	4,281,278*b*	.....
11 mo. end. May, 1928	12,056,243	8,207,247	.....	3,848,996*b*	.....
London & Port Stanley Railway, London, Ont.					
May, 1929	50,357	49,225	.....	1,132*b*	.....
May, 1928	.....	.....	.....	.....	.....
5 mo. end. May, 1929	169,228	173,117	.....	*3,889b*	.....
5 mo. end. May, 1928	156,207	158,074	.....	*1,867b*	.....
Hydro-Electric Railways, Essex District, Toronto, Ont.					
7 mo. end. May, 1929	756,349	546,830	2,746	206,773	886
7 mo. end. May, 1928	636,857	513,238	2,798	120,820	*28,538*
Regina Municipal Railway, Regina, Sask.					
June, 1929	30,538	19,453	.....	11,085	*357*
June, 1928	26,683	19,954	.....	6,729	*3,254*
6 mo. end. June, 1929	218,490	131,660	.....	86,830	15,351
6 mo. end. June, 1928	183,006	121,619	.....	61,387	1,479
Saskatoon Municipal Railway, Saskatoon, Sask.					
June, 1929	26,515	18,898	1,034	6,583	*3,051*
June, 1928	23,697	17,611	958	5,139	*2,038*
6 mo. end. June, 1929	203,575	129,327	8,024	66,224	14,750
6 mo. end. June, 1928	173,258	114,231	6,930	52,097	8,895
Havana Electric Railway, Havana, Cuba					
3 mo. end. June, 1929	1,486,833	1,161,977*a*	.....	332,718	171,754
3 mo. end. June, 1928	1,358,009	1,110,328*a*	.....	257,171	96,112*f*
6 mo. end. June, 1929	2,864,581	2,285,997*a*	.....	593,610	271,673*f*
6 mo. end. June, 1928	2,725,993	2,272,760*a*	.....	475,270	153,247*f*

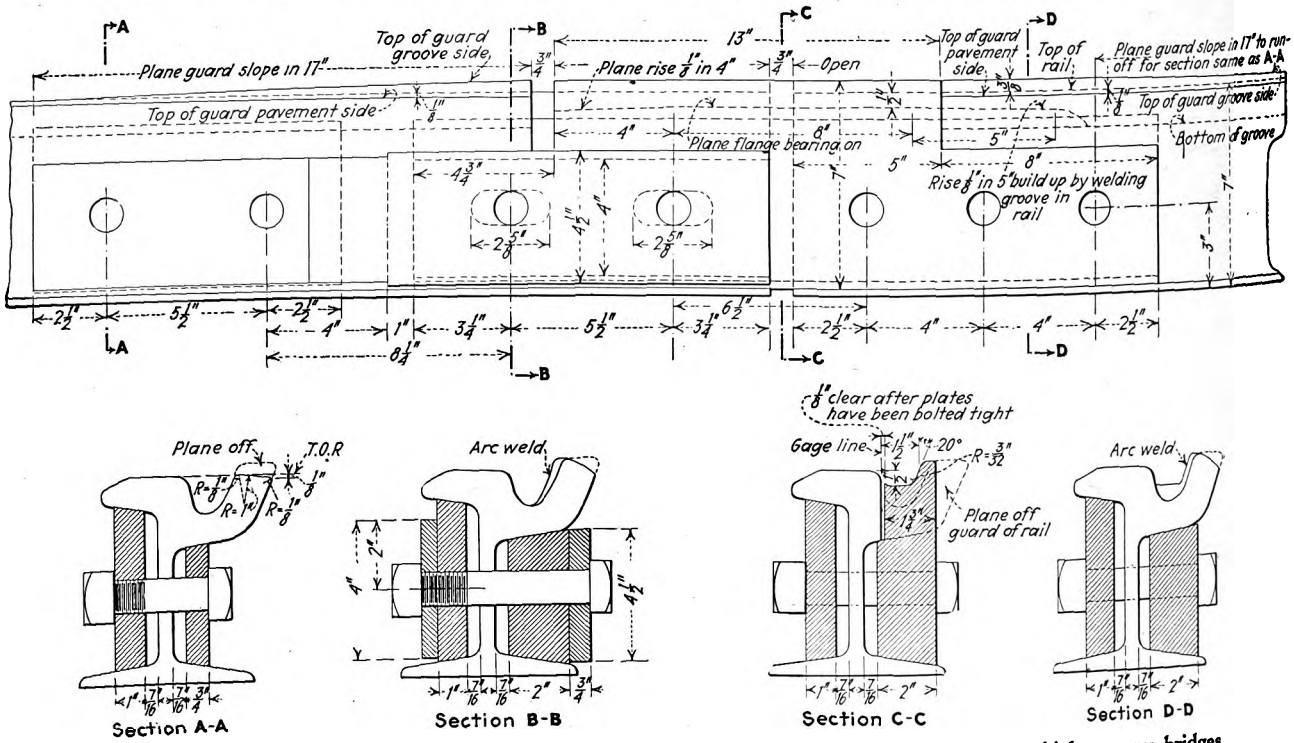
pany and the Brooklyn City Railroad into the Brooklyn & Queens Transit Corporation. The statement for the current year shows the combined results for the entire system. For purposes of comparison the results in July, 1928, for the two systems that were consolidated are shown both separately and together. Gross revenue, gross income and net income are all higher this year. The net income of $607,513 for July, 1929 for the system includes $99,400 accruing to minority interests in the B. & Q. T. Corporation, making a balance of $508,113 for July, 1929, for the B.-M.T. that compares with $507,475 net income for the B.-M.T. in July, 1928.

Flange Bearing Expansion Joint Used in Brooklyn

By H. F. Merker

EXPANSION joints have been installed at numerous locations on the lines of the Brooklyn City Railroad on bridges and approaches. Recently a joint was designed to permit expansion and contraction up to 1½ in. and having a flange bearing at the gap in the rails. In order to provide the flange bearing, the guard was cut away and in its stead a bar of steel was used so constructed as to serve as a splice bar, a guard and a floor of the flange-way, in one piece. This bar of steel was tightly bolted to the one rail end through round holes with reamed fit bolts. On the other end the combination splice bar and guard was equipped with slotted holes similar to the accompanying splice bar on the opposite side of the rail, permitting the two splice bars to slide along the fishing space of the adjacent rail end. In order to prevent the bolts through the slotted holes from changing the 90 deg. angle which they made with the rail, a bar was provided with a set of 2 in., equivalent to the thickness of the combination splice bar and guard. This permitted one end to be bolted against the web of the rail and the other end to be bolted against the outside of the combination splice bar and guard. It was fitted with round holes in order to hold the bolts firmly in their position.

The joint as designed provided ½ in. depth of flangeway where the flange bearing was desired, and while there is little need of any riser beyond the limit of the bar, the riser or arm was continued by arc welding into the flange-way of the guard rail to which the combination piece was bolted. The joint as designed was intended to be used where car speeds are not higher than is customary over such special trackwork. It is provided with flange bearings at frog intersections. The design also contemplated welding the floor of the flange bearing groove when wear made it necessary.



Straight track expansion joint constructed by the Brooklyn City Railroad for use on lines which traverse bridges

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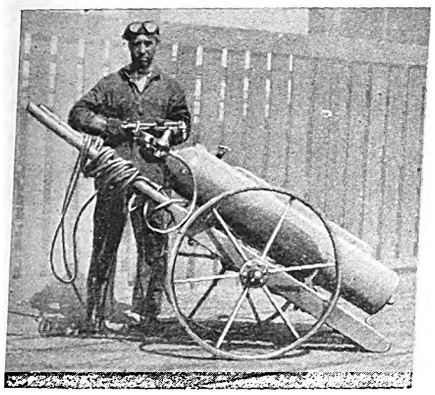
Practices Found Useful in Expediting

MAINTENANCE WORK

in Railway Shops

The Maintenance Contest $200 cash award and the departmental certificates of merit will be presented at the Tuesday morning meeting of the Engineering Association during the Atlantic City Convention



This truck for welding equipment is easy to move about and requires the services of only one man under the most unfavorable conditions

Truck for Welding Equipment

CONSIDERABLE trouble was experienced in transporting the welding equipment until the truck shown in the accompanying illustration was designed and constructed in the shop of the Staten Island Rapid Transit Railway, Staten Island, N. Y. The equipment is used throughout the shop and yards on cinder and dirt paths and passes over rails and rail crossings. Metallic frame trucks with small wheels of various designs were tried out but they were found unsatisfactory. The services of two men were required to transport these trucks and often the mechanical structure did not hold together.

The truck shown is made of wood and steel. Two longitudinal members of the frame of 3x4-in. oak are spaced 21½ in. centers and tied together by means of two ¼x1½-in. angles spaced 22 in. centers. A ¼x10-in. plate is riveted to each of these angles which are notched to receive the oxygen and acetylene tanks. These act as a support for the tanks. This construction takes care of any lateral motion of the tanks during transportation. The longitudinal motion is prevented by a ⅜x1-in. bar bolted to the oak beams near the end. Two iron wheels 31 in. in diameter with a rim 2½ in. wide by ½ in. thick are mounted on a 1½-in. square axle and spaced 30 in. centers.

The oak frame is 80 in. long and one end is rounded for a distance of 36 in. to provide for a suitable hand grip. The other end is beveled so that it will rest firmly on the ground. The axle is installed at about the center of gravity when the tanks are in position, and, as a result, little effort is required to maintain a balance. The oak beams are notched 1½ in. square for the reception of the axle, and a ⅜x1¾-in. plate fastened to the beams across the axle holds the axle in position.

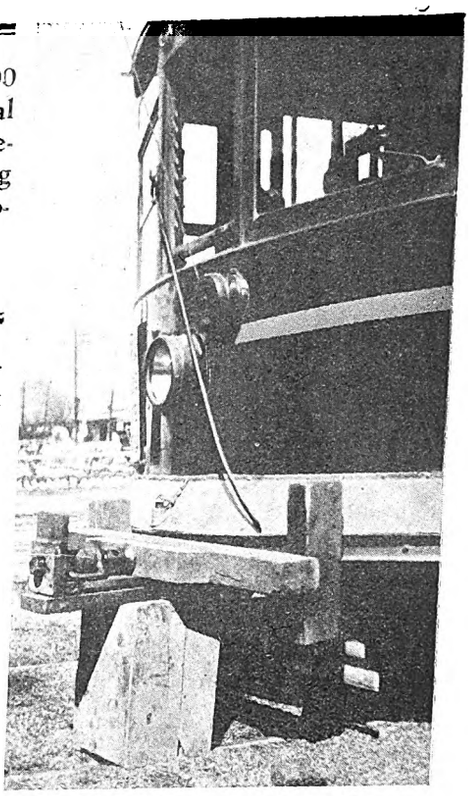
Straightening Front End Channel Irons*

By H. C. Pressler

Master Mechanic Eastern Texas Electric Company, Beaumont, Tex.

A TOOL for straightening the front end channel irons, or those on the sides of street cars, was recently designed in the shops of the Eastern Texas Electric Company. This tool consists of a 6-in. jack, one piece of 1¼ in. No. 5 iron, bent 4 in. at 90 deg. at one end and 12 in. also at 90 deg. at the other end, both bends made in the same direction 26 in. apart. When a bumper is to be straightened the long end of the iron is placed behind the channel to be pulled out. The jack is placed in a horizontal position between the short end and a wooden block or bar which rests against two blocks attached to the undamaged part of the bumper. When the apparatus is in position, supported by wooden blocks, if necessary, the jack is screwed out in the conventional manner, thus straightening the bumper.

**Submitted in* Electric Railway Journal *Prize Contest.*



Jack for straightening bent bumpers

Special Winding Stand for Compressor Armatures

TO PROVIDE a special stand for compressing armatures that are not designed with a shaft extension on the commutator end, the device shown in the accompanying illustration is being used by the New York & Queens County Railway, Woodside, N. Y. This stand consists of oak

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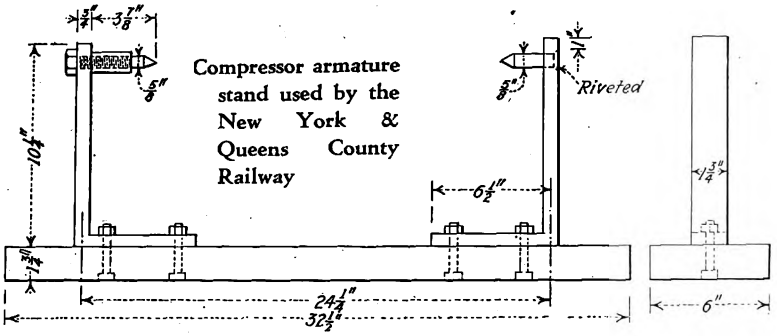


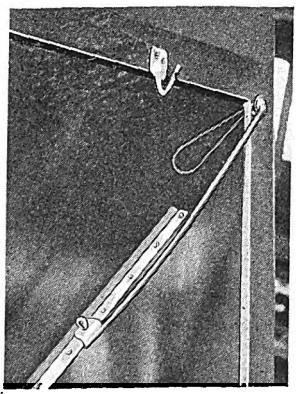
Compressor armature stand used by the New York & Queens County Railway

1¾ in. thick, 6 in. wide and 32½ in. long, to which are bolted two angles 10¼ in. high with centers spaced 24¼ in. These angles are made from ¾x1¾-in. steel. A supporting center ⅜ in. in diameter and 2¾ in. long is riveted to one of these angles. The other angle has an adjustable supporting center ⅝ in. in diameter and 5⅝ in. long.

Prolonging Life of Window Wiper*

By H. F. Rexroth
Master Mechanic Harrisburg Railway Harrisburg, Pa.

A SIMPLE device for prolonging the life of rubber windshield wipers has been devised by the Harrisburg Railway. It consists of a V-shaped hook attached to the upper window frame against which the wiper usually rests when not in use. When placing



V-shaped hook which holds window wiper off glass when not in use

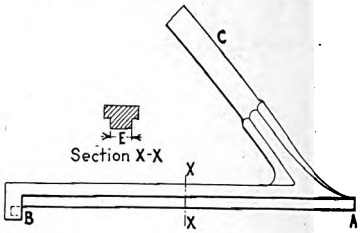
the wiper in the rest position by turning the handle upward, the wiper will be pushed over the V-shaped hook and thus will be lifted from the window. This will relieve the rubber from the continual pressure and thus preserve the flexibility necessary to wipe the water thoroughly from the windshield. It has been found that wipers consisting of five plies of rubber give better service over the uneven glass than did the single heavy piece.

*Submitted in Electric Railway Journal Prize Contest.

Driving Tools Speed Up Armature Stick Removal*

By S. M. Spindle
Engineer Power Department Cleveland Railway, Cleveland, Ohio

IN THE past the electrical maintenance division of the Cleveland Railway has used several methods for driving the coil-retaining sticks when repairing large armatures. Recently this division developed a simple driver, which does the work more effectively. This device is shown in an accompanying illustration. *B* is a shallow pocket, into which the rear end of the stick is placed as it is about to be driven. The distance from *A* to *B* is the length of the stick to be driven. The width *E* is just a trifle less than the width of the armature slot. A small air hammer is slipped over the round, case-hardened



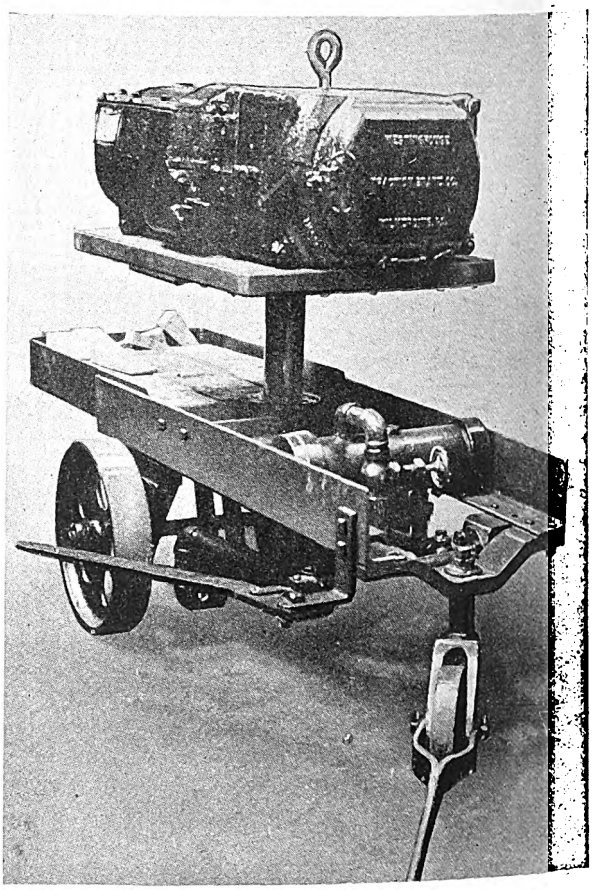
Handy tool designed by Cleveland Railway for removing armature sticks

end of the tool at *C*. As the point of the stick is held snugly against the coil by the point *A*, the long flat lower surface of the tool keeps the stick from buckling. Three times as many sticks can be driven in a given period with this tool, and the resulting job is more satisfactory than can be obtained from any other appliance formerly used.

Portable Hydraulic Lift

By W. L. Briar
Shop Supervisor Kansas City Public Service Company, Kansas City, Mo.

CONSIDERABLE labor has been eliminated in the shops of the Kansas City Public Service Company by the use of a portable hydraulic lift. The device is used to remove and install air compressors, resistance boxes, air tanks, brake cylinders, and other heavy equipment, when cars are in the shops for overhaul or repairs. Parts are also moved between the repair benches and the cars by the use of the same device. The lift is operated by a hand pump on the side of truck. Oil is used for lifting.



Hydraulic lift for heavy units in use by the Kansas City Public Service Company

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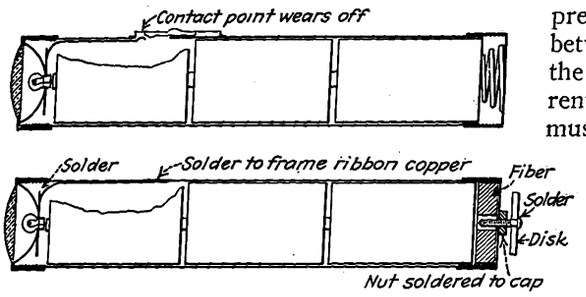
Improved Switch for Flashlights*

By Farrell Tipton
Electrician San Diego Electric Railway, San Diego, Cal.

A SIMPLE method has been devised by the Electrical Department of the San Diego Electric Railway to use a screw contact in the bottom of the case of electric flashlights instead of the sliding switch ordinarily used. The sliding switch is taken off the case and replaced by a piece of strip copper—the other end of which is soldered to the reflector. The tension spring in the cap of the flashlight is replaced with a fiber filler block, with a hole in the center large enough to permit the passage of a ¼ in. stove bolt. A hole is drilled through the center of the cap and a ¼ in. nut soldered to it. A disk of convenient size is soldered to a ¼ in. stove bolt, which is then used to control the light circuit through the cap.



Screw control used instead of sliding switch on electric flashlight

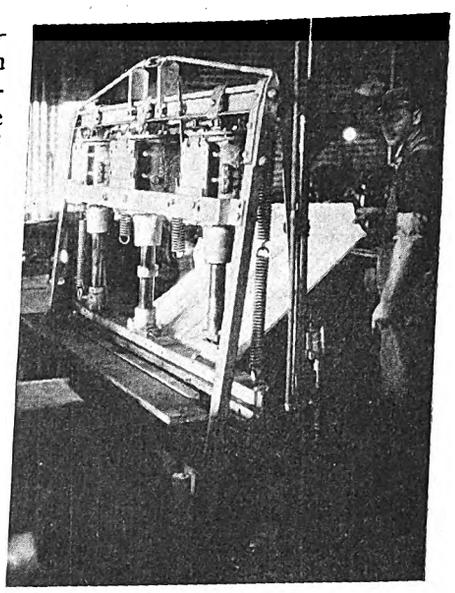
Special Tools Speed Up Heater Installation*

By Glenn S. Reeves
Assistant Master Mechanic
Omaha & Council Bluffs Street Railway
Omaha, Neb.

LAST fall electric heaters were installed on 67 cars of the Omaha & Council Bluffs Street Railway in a remarkably short time. The heaters were placed in ducts running the full length of the car on each side, and with openings at each heater unit for the heat to escape to the inside. Each of the ducts was about 27 ft. long with ten openings the size of a heater unit. Construction of the ducts was difficult, and the work had to be done quickly. It was evident that a spot welder and sheet-iron break and punch would speed work considerably, and it was decided to construct suitable equipment in the railway shop.

The spot welder contained a transformer coil which was built up from laminations salvaged from a substation transformer not in use. There were 290 primary turns made of No. 6 wire with two coil taps to vary the secondary voltage. The secondary consisted of two turns of 1x1.5-in. copper made from GE-57 motor field ribbon. Primary voltage used was 440 at 25 cycles.

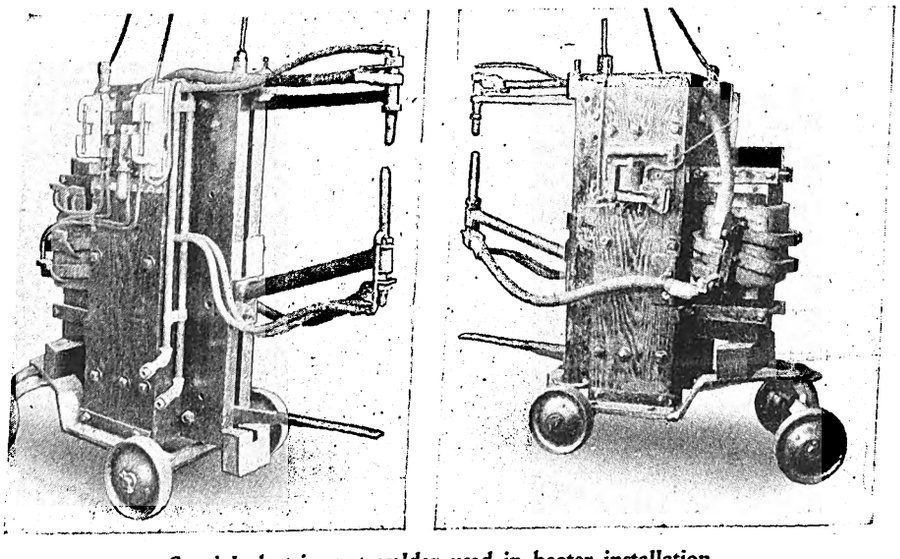
Satisfactory control was particularly important since the pressure contact must be made between the electrodes before the secondary welding current flows, and the current must be interrupted before the electrode pressure is released. If this is not done it was found that instead of making a weld the arc would burn a hole in the metal. A pedal-operated toggle switch connected with a magnetic switch in the primary circuit was used for control. The toggle switch operates only after the electrodes are together and under pressure. This was made possible by the fact that the pedal is not connected directly to the movable electrode but is connected to it by means of a heavy coil spring which stretches after the electrodes are brought together and the pedal is further depressed. The bottom electrode is stationary, and both electrodes are water cooled. In the accompanying illustration the primary tap switches are shown on the opposite side from the magnetic switch. At the bottom is the pedal, and the toggle switch is operated by it when the pedal is depressed sufficiently. Through the use of this welder the work was completed six times faster and at only one-sixth of the cost.



Sheet iron break and punch

For bending and punching the long lengths of sheet iron used for the heater ducts, a special sheet-iron break and punch was constructed. The machine consists of three 10x12-in. brake cylinders mounted on an A frame with a light T-rail at the top of the A reinforced by a truss. The three brake cylinder push rods attach to an inverted T-rail at the lower ends. The tread of this rail is planed to a male 90 deg. V and the tread of the stationary T-rail at the bottom of the frame is planed to a female 90 deg. V. The sheet iron to be worked is placed between the two V's. An ordinary engineer's valve controls the air.

This device can be converted also into a gang punch for punching sheets up to 9 ft. long. This is done by attaching a home-made gang punch in the two V rails.



Special electric spot welder used in heater installation

*Submitted in Electric Railway Journal Prize Contest.

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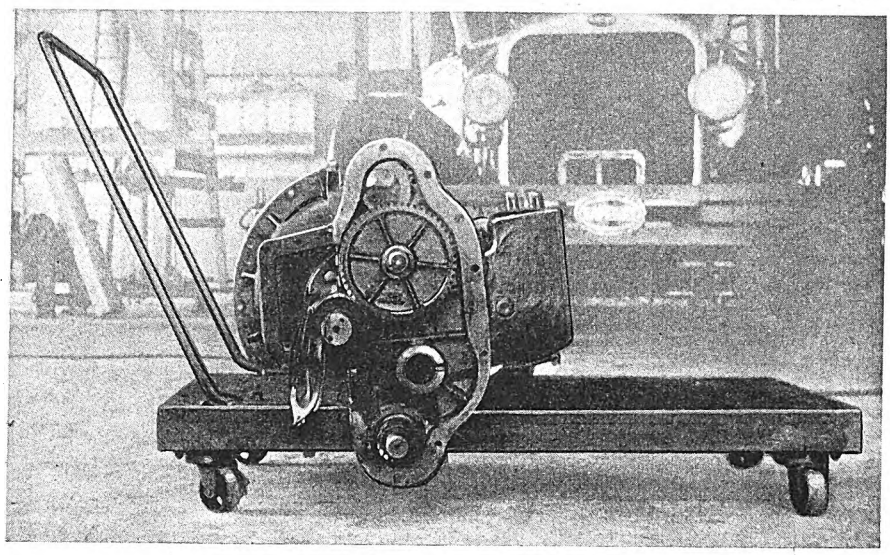
Handy Devices Used in Bus Maintenance



This truck has been found convenient for transporting bus engines around the shop and has facilitated maintenance work

Rugged Hand Truck

TRANSPORTING bus parts around the shop of the Surface Transportation Company, bus subsidiary of the Third Avenue Railway, New York, N. Y., has been facilitated since the design and construction of a number of hand trucks, as shown in the accompanying illustration. The side and end framing is made from 3¾x2-in. yellow pine joists and is surfaced with yellow pine planks 12 in. wide and 1 in. thick.

The length of the platform is 48 in. and the width 24 in. A swivel roller is installed on each corner of the platform. These rollers are 3½ in. in diameter and 1⅜ in. face. The height of the platform above the floor is 7½ in. The rollers are spaced 40 in. centers on the long sides of the platform and 20 in. centers on the short side. A U-shape handle made of ⅞-in. round iron and 40 in. long is bolted to one end of the platform.

Front Axle Assembling Stand*

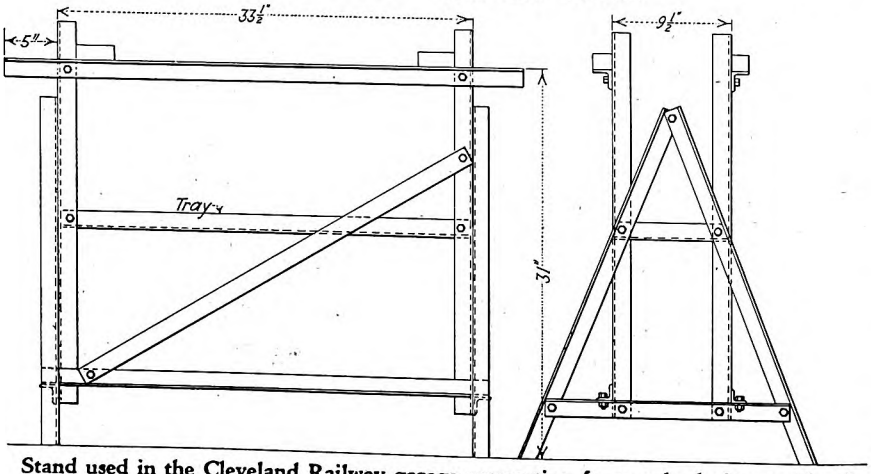
By Hoy Stevens

Assistant Superintendent of Maintenance
Cleveland Railway, Cleveland, Ohio

IN AN overhaul shop the problem presented itself as to how to support the front axle most conveniently while various parts such as bushings, springs, steering knuckless and, in the case of newer equipment, brake shoes and diaphragms, were being assembled and adjusted. This was accomplished in a convenient manner in our shop by the stand shown in the accompanying illustration. The stand may be constructed so that it can be adapted to almost any make of axle. Our stand is built to fit a White Model 50 B and Safeway double-deck units. It was constructed from material on hand, which happened to be 1½ x 1½ x 3/16-in. angle iron.

The cost of the stand depends upon the material that is used and the efficiency of the labor, which, in our case, brought the expense down to a little less than $8.

*Submitted in Electric Railway Journal Prize Contest.



Stand used in the Cleveland Railway garage supporting front axle during overhaul

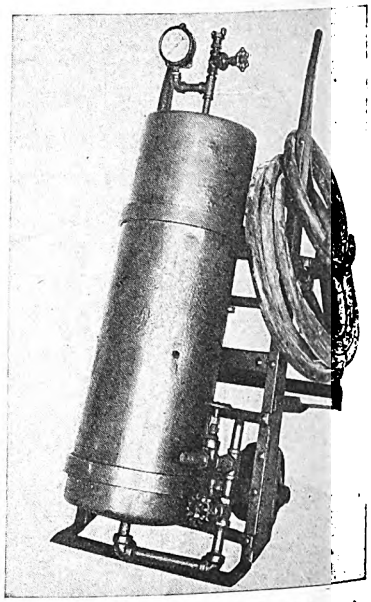
Cooling System Flushing Machine

By Del A. Smith

General Manager
Department of Street Railways
Detroit, Mich.

FOR thoroughly flushing the radiator and cylinder block of a bus engine, the Department of Street Railways in Detroit has designed a simple but effective machine. The device consists of a 4-cu.ft. air tank, supplying air under pressure at 40 lb., against a line of water under 30 lb. pressure.

The two lines, merging into one, are directed into the radiator or engine block, forcing air and water in the direction opposite to the regular flow of the cooling system. The result



Portable flushing machine for bus engine cooling systems

is a "thumping" effect of the water, caused by a greater pressure of the air against a heavier product, loosening the sludge, scales and other foreign matter which lodged in the cooling system. This machine can be

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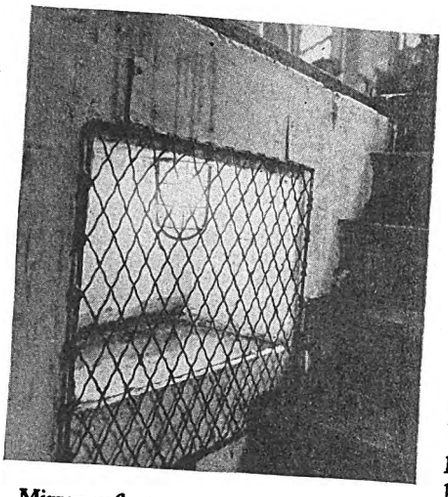
used to advantage also in conjunction with the well-known regular "boiling process."

Mirrors Improve Pit Lighting

MIRRORS are used in the base of repair-pit light recesses in the Walden garage of the International Railway, Buffalo, N. Y. As shown in the accompanying illustration, a ¼-in. plate mirror is placed directly beneath the 75-watt, inside, frosted lamp in the side-wall recess of the repair pit.

Three such recesses are spaced uniformly in each side of the pit, with a seventh pit light located in the short-end wall. The mirrors in these recesses reflect a large share of the available illumination upward to the underside of the bus which is run over the pit for inspection or repairs.



Mirror reflects upward the light of the 75-watt lamp in pit wall recess

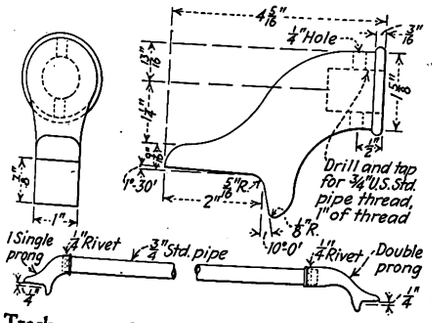
After experimentation 10 deg. was found to be the right angle at which to tilt the mirrors from the horizontal, to secure the maximum of reflected light. To prevent possible deterioration of the silver backing of the mirrors, a rubberized paint was applied to the cement base of each recess before the mirror was installed permanently. This system not only provides better light for the mechanics but it results in better workmanship also.

Track and Line Maintenance Practices

Track Gage Assures Exact Spacing of Rails*

By Joseph Croyle
General Foreman Cleveland Railway, Cleveland, Ohio

ADVANTAGES resulting from the use of a track gage designed by the Cleveland Railway are two-fold. First: the prongs conform to the contour of the rail on the gage side, thus making the proper contact between rail and instrument and insuring a true gage when the instrument is fitted snugly between the rails by the spikers. Second: the connecting bar to which the prongs are fastened is raised in order to clear the guard of all guard-rails, thereby eliminating interference and allowing the gage to rest firmly upon the rail.



Track gage designed by Cleveland Railway fits contour of the rail head

The Cleveland Railway has adopted as standard on tangent track a gage of 4 ft. 8⅜ in., and for curved track, 4 ft. 8¾ in. In order to avoid any confusion on the part of the spikers, two track gages are used: a straight track gage enameled black and a curved rail track gage enameled red. This arrangement enables the spikers to select the correct track gage immediately.

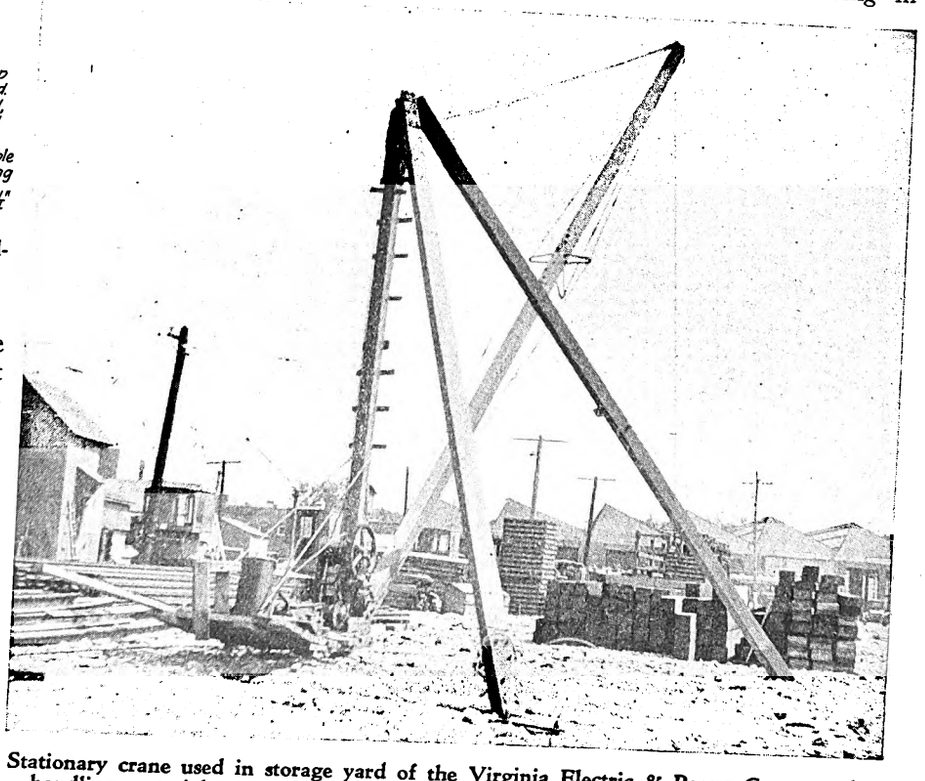
Previously, it had been the experience of this company that the spikers were unable to maintain an exact gage. The new gage was designed to overcome this difficulty, and, by its use, the company has been able to secure track built exactly to the desired gage.

Submitted in Electric Railway Journal Prize Contest.

Stationary Track Department Crane*

By C. B. Hall
Chief Clerk Virginia Electric & Power Company, Norfolk, Va.

LOADING and unloading of heavy materials by means of a stationary crane, instead of by hand, has brought about a marked saving in



Stationary crane used in storage yard of the Virginia Electric & Power Company for handling materials resulted in a considerable saving in labor expenses, as well as a reduction in the number of accidents

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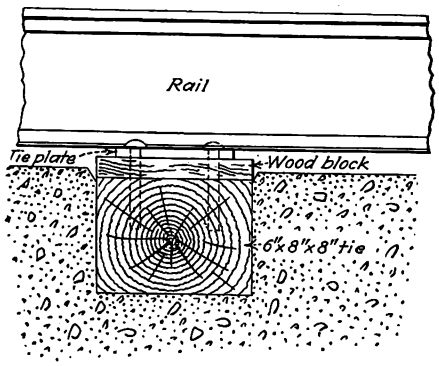
time and labor in the storage yard of the Virginia Electric & Power Company, and has also resulted in a considerable reduction of personal injury cases. The crane is equipped with a 55-ft. boom and has a lifting capacity of 3 tons at an angle of 45 deg. It is motor driven, an old GE-62 street car motor being used for this purpose, with a hand operated turning mechanism. Its cost was $225. The crane is used for lifting heavy bridge timbers, rails, frogs, switches, scrap materials, etc., in both loading and unloading from railroad cars to the ground, and on company cars for distribution on the road. Heavy materials are now being handled at from 12 to 15 cents per ton, whereas the hand method, prior to the crane installation, usually cost $1 per ton.

Raising Paved Track to Proper Grade*

By A. E. Gleason
Assistant Superintendent of Construction Louisville Railway

DURING the last several years a considerable amount of track in Louisville has been damaged by underground work, mostly sewer construction in the business section of the city. This sewer work was carried on by tunneling from shafts, at various points, and caused the tracks to sink in a number of places from ½ to 3 in. In most instances it was



Wood blocks on old ties used to raise track to grade

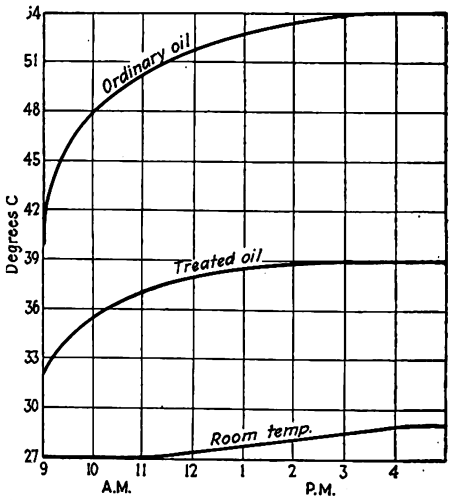
found that the entire track foundation had gone down and was solid at the new level. Because of the short headway of cars, repairs had to be made at night, and in a manner that would interfere as little as possible with traffic. Oak blocks were cut 8x12 in. ranging from ½ to 2½ in. in thickness. Two ½ in. holes were bored in these blocks for spike holes, as shown in the accompanying illustration. The low places in tracks were excavated to the top of ties. A block of the proper thickness with a standard tie plate bringing the rail to the proper level was placed on each tie and fastened with a long spike. Tie-rods were renewed where needed to hold track to gage. Concrete was placed and paving laid. In addition to the great saving in time, this method of repair saved the labor and material that would have been used had excavation been carried to bottom of ties and track tamped with concrete, as had been the practice in the past under similar circumstances.

*Submitted in Electric Railway Journal Prize Contest.

Synchronous Converter Lubrication*

By F. W. Braund
Superintendent of Power Conversion Cleveland Railway, Cleveland, Ohio

OVER a period of years a high grade mineral oil, with a life of twelve months, has been successfully used by the Cleveland Railway in



Treated oil for converter bearings showed lower temperatures than ordinary oil in test at Cleveland

synchronous converter bearings in manually operated substations. A fairly even temperature is maintained by the attendant by opening or closing doors, windows or ventilating equipment or stoking a boiler. In automatic substations, however, openings for ventilation are fewer, heating equipment is unnecessary, and, with no attendant available, extremely high and low operating and room temperatures are encountered. With the installation of the automatic control, the problem arose of furnishing the bearing during summer months with a heavy viscous oil, and then removing and storing this oil in the fall in order to supply bearings with a less viscous oil for winter use.

SUMMARY OF CONVERTER BEARING TEMPERATURE TESTS

Time	Room Temperatures, Deg. C.	Bearing Temperature Ordinary Oil, Deg. C.	Bearing Temperature Treated Oil, Deg. C.	Temperature Difference, Deg. C.
9:00 A.M.	27	40	32	8
9:15 A.M.	27	45	34	11
9:45 A.M.	27	47	35	12
10:00 A.M.	27	48	35.5	12.5
3:30 P.M.	28	54	39	15
4:00 P.M.	29	54	39	15
4:30 P.M.	29	54	39	15
5:00 P.M.	29	54	39	15

Many tests were made to discover an oil the viscosity of which changed but little between temperatures of 0 deg. F. and 160 deg. F. Such an oil finally was obtained and temperature tests were made, showing an average reduction in running temperature of 15 deg. C. in favor of the new oil. This oil, a treated product containing a portion of edible tallow, will function in extreme temperatures with a viscosity change of but 2 per cent.

The new Maintenance Contest will start after the annual convention in Atlantic City. Many equipment men have already indicated that they will submit contributions

Reclaiming Steel Tubular Span Wire Poles

Economical method of reclaiming span-wire poles by reinforcing sleeves

OXIDIZATION at the ground level has partially destroyed some of the steel tubular span wire poles on certain lines of the Third Avenue Railway System, New York, N. Y. These are being reclaimed by means of reinforcing sleeves. A tube 30 in. long and of the proper inside diameter is split longitudinally by means of a cutting torch. The halves are clamped over the oxidized surface. These clamps are made of ⅞-in. material and are 6 in. wide and 16 in. long. They are clamped together by means of ⅞-in. bolts. The splits are welded and the ends of the sleeve are welded to the pole.

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New Products for the Railways' Use

New Dead-end Sling

MUTILATION of corner or dead-end poles has been eliminated through the development of a new type of dead-end sling by the American Cable Company, New York. This sling consists of a shackle and cotter-pin bolt which are

How dead-end sling is attached to post

merely steel cylinders slipped over the unseized ends of preformed wire rope, then by means of 100 tons hydraulic pressure so processed as to cold flow the steel into the interstices of the wire rope, thereby locking it to the rope with unfailing security. This new type of dead-end sling is being adopted by several public utilities and railroads.

Tap Grinder Newly Developed

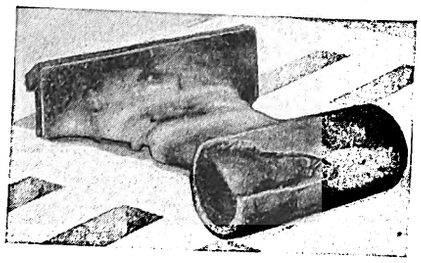
DEVELOPMENT of a new machine for tap grinding is announced by the J. G. Blount Company of Everett, Mass. This machine, driven by a specially designed 1¼ hp. Westinghouse type SK motor, is applied to the grinding of tap flutes by the use of a taper arbor on the end of a spindle, using various sizes of grinding wheels. For the grinding of small taps, wheels of small diameter and width are used, while, on larger taps, grinding wheels up to 6 in. in diameter and ½ to ¾ in. wide are employed.

These grinders are self-contained, being driven by a special direct connected totally enclosed, ball-bearing motor with a speed range of 4,000 to 7,000 r.p.m. The motor is controlled by a field rheostat, so that any grinding speed may be obtained up to 7,000 r.p.m. A smooth finish can be obtained by the inherently close speed regulation of the drive.

Carbon Paste Used in Welding

WHERE missing sections of metal parts are built up by welding, the use of carbon paste, manufactured by the Oxweld Acetylene Company, New York, has been found of advantage for supporting loose pieces and making walls so that the molten metal will stay where desired. It is necessary to pack the paste tightly to give a satisfactorily smooth job, and thus save grinding or machining after the welding is completed.

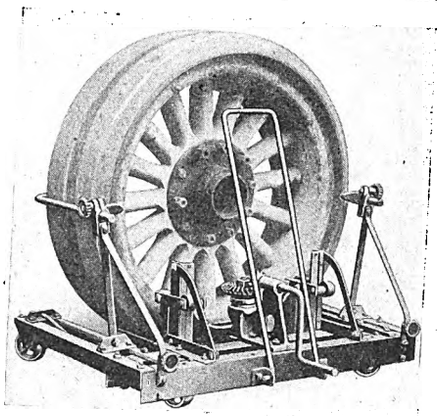
The accompanying illustration shows a cast-iron support for a drill table on which carbon paste has been used to form a bottom support for welding metal. Near the center of this casting is a ¼-in. threaded hole for a set-screw, part of which was broken out. This hole was filled carefully and after the welding it was unnecessary to redrill the hole. When cold the carbon paste is removed easily, and the inside is of correct contour so that no finishing is necessary.



Cast-iron support for a drill table on which carbon paste is used to hold welding metal

Wheel Dolly for Removal of Bus Wheels

THE use of this new dolly for handling bus wheels is said to make a job that is ordinarily difficult and dangerous, much easier and safer with a resultant saving in time and



Taking off wheels from buses or trucks is speeded up considerably with the use of a Manley wheel dolly

labor. This bus wheel dolly has just been announced by the Manley Manufacturing Company, Bridgeport, Conn., as an addition to its complete line of garage equipment.

Non-Corrodible Resistors for Railway Service

AN EDGEWISE-WOUND, non-breakable and non-corrodible resistor, weighing about one-half as much as cast grid resistors of corresponding capacity, has been introduced by the General Electric Company. It is particularly suited to railway application where vibration and exposure tend to shorten the life of the more fragile cast grid types.

The resistor units are of unbreakable, non-corrodible ribbon rolled from special alloy. The ribbon is wound edgewise over heat-resisting and mechanically strong insulation, which is fitted over the edges of reinforced punched steel bars. The units themselves are supported on

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steel rods with secondary insulation of mica. The six-unit resistor weighs approximately 47 lb., and the four-unit one approximately 37 lb., about half the weight of cast grid resistors.

Space is conserved by having the units elliptically shaped. The special alloy ribbon has a temperature coefficient which results in only a slight variation in resistance whether hot or cold, and the specific resistance of the alloy is extremely high, so that it is possible to use a relatively large cross-section for the conductor. Rigidity, with sufficient thermal capacity to care for abnormal conditions such as large currents on grades, pulling in dead cars, etc., is thus obtained.

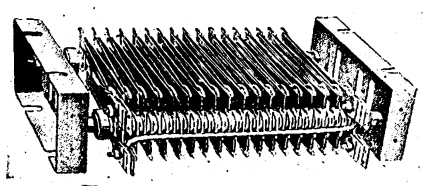
The few joints are copper to copper, affording minimum contact resistance. Terminals at the ends of the resistor frame simplify the connection of the leads, and clamp terminals for connecting intermediate turns of each unit permit accurate adjustment of each resistance step.

Any single-coil unit may be replaced without disturbing the others. Both the four-unit and six-unit resistors of the new style, known as Type EW, are interchangeable with Types CG and RG Form A and BG Form A-4 resistors, all having identically located supporting bolt holes. In many instances, however, fewer boxes are needed than are necessary with the cast grid types.

Unbreakable Resistor

DUR-RISTOR, a new unbreakable resistor with a continuous resistance element, is announced by Cutler-Hammer, Inc. of Milwaukee, Wis. Designed to meet the need for a resistor which would give maximum service under the most severe operating conditions, it is vibration-proof, unbreakable, non-corrodible, light of weight and compact.

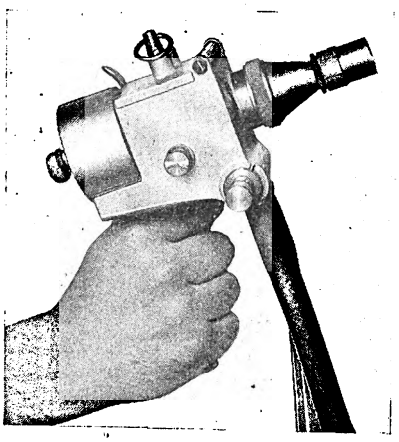
The main body of Dur-ristor—the resistance element—consists of two continuous, unbreakable strips, which are made of a rust-proof, non-corrodible alloy. They are proportionally ribbed on the sides as well as on the turning edges. A new method of supporting the strips, combined with the ribbing, permits the strips to expand and contract freely during temperature changes. The entire resistor is made unbreakable and permanent by the elimination of brittle material and by the use of mica for all insulation. All Dur-ristors, regardless of ampere rating, are of equal size. The thickness of the resistance strip is the only part that varies in size, i.e. according to ampere rating. Dur-ristor is adaptable for any standardization plan for resistor banks, and is used with equipment where minimum resistor maintainance is required.



New resistor designed to meet severe operating conditions

Metal Coat Applied by Spray Gun

A CONVENIENT means of applying a thin coat of metal to surfaces needing protection or resizing is offered by the Metals Coating Company of America in the form of a "MetaLayer" spray. It simultaneously melts, atomizes and applies a coating of molten metal of any desired thickness to metallic or non-metallic objects. The tool has been used to fill surface defects in castings, to build up undersize metal parts, to protect metal parts against corrosion, to apply decorative metal coatings, and for many special uses. The manufacturers claim that wood, metal, tile, pottery and even glass can be coated with the spray.

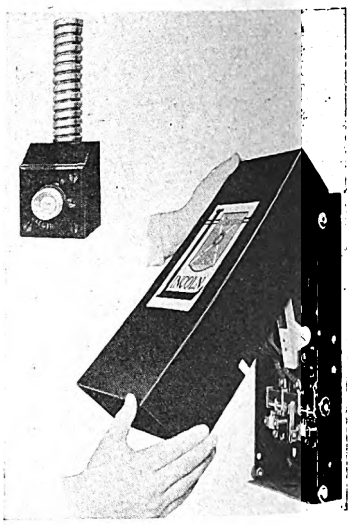


Metal in wire form fed into this gun may be sprayed on any metal or non-metallic material

The coating metal is fed into the spray in the form of wire, and any of the commercial metals may be thus applied. The tool combines the following elements in it: An oxy-acetylene melting flame; a compressed air turbo-motor which feeds the metal into the flame in the wire form; a compressed air jet which atomizes the metal and a 3-way valve which controls the burning gases, the motor and the spray, so that all operate in unison.

Safety Starter for Shop Motors

CONTROLLED by the new Lincoln safety push button, an improved starter which starts a shop motor directly across the line has been recently placed on the market by the Lincoln Electric Company, Cleveland, Ohio. Installation of the starter is simple. Only four screws are required to hold it in place. Releasing two other screws permits the contactor panel to swing out, thus making lead contacts easily accessible. A cover of the drop-hinge type incloses the entire mechanism and permits installation of starters closely grouped, a 2-in. clearance between starter boxes being ample for easy accessibility. Long life is assured to contact points by the wiping action, which prevents pitting, and by the cadmium plated steel shields, which provide an instantaneous thermal and magnetic quench for arcs. Arc chimneys are of heavy pressed magnesite. The relay armature has a cushion action and is provided also with replaceable bronze bearings and actuated by a coiled spring.



Starting switch and push-button control

The Lincoln safety push button provides an additional safety factor to the Lincoln across the line safety starter in that the red stop button encircles and protects the green starting button, so that it is impossible to close the starting circuit unintentionally. The push button can be mounted on the side of the starter box or arranged for remote control.

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A.E.R.A. Program Announced

DETAILS of the program of the 48th Annual Convention of the American Electric Railway Association now are available. The convention will be held at Atlantic City in the new municipal auditorium.

The formal sessions of the American Association will open at 10 a.m. on Monday, Sept. 30, while the sessions of the Accountants' Claims, Engineering and Transportation and Traffic Associations will begin on Tuesday afternoon. As in former years there will be a series of luncheon conferences at which specific topics will be discussed.

The exhibit will be open beginning Saturday, Sept. 28, and will be available to delegates until noon the following Friday. Monday afternoon and Wednesday morning have been set aside for inspection of exhibits, and no meetings will be held.

Following is the program as revised up to the time of going to press.

American Association

Monday, Sept. 30, 10 a.m.
Auditorium Ball Room, Second Floor

JAMES P. BARNES, Chairman

General Subject—*Today's Transit Task*

Welcome.

Address of the President — James P. Barnes, president Louisville Railway, Louisville, Ky.

Report—Managing Director Charles Gordon, American Electric Railway Association, New York, N. Y.

Revision of Constitution and By-Laws.

Routine.

"At the Public's Service," by W. L. Willkie, general counsel Northern Ohio Power & Light Company, Akron, Ohio.

"Better Cars and Buses," by M. B. Lambert, transportation sales manager Westinghouse Electric & Manufacturing Company, New York, N. Y.

"Men and Machinery," by W. E. Wood, president Virginia Electric & Power Company, Richmond, Va.

Informal Round Table Luncheon Conferences

AMBASSADOR HOTEL, 1 P.M.

No. 1—"Fares," G. H. Clifford, sponsor.

No. 2—"Industrial Relations," Edward Dana, sponsor.

No. 3—"Interurbans," Charles H. Jones, sponsor.

No. 4—"New Cars," T. Fitzgerald, sponsor.

No. 5 — "Public Relations," Lucius S. Storrs, sponsor.

Inspection of Exhibits
2:30 p.m.

This afternoon has been set aside by the officers of the association for the inspection of manufacturers' exhibits. The official business of the afternoon is the inspection of exhibits, and every delegate is urged to take advantage of the opportunity to visit the manufacturers' booths, where the most modern equipment and latest appliances are on display.

Tuesday, Oct. 1, 10 a.m.
Auditorium Ball Room, Second Floor

JAMES P. BARNES, Chairman

General Subject—*Traffic Regulations*

Report—Committee on Nominations—W. H. Sawyer, chairman, president Stevens & Wood, Inc., New York, N. Y.

Election of officers.

"Increasing Street Capacity," by Elmer T. Stevens, chairman transportation section Chicago Association of Commerce.

"Basic Regulation Principles," by Col. A. B. Barber, manager transportation and communication department Chamber of Commerce of the United States of America, Washington, D. C.

Address, by E. F. Wickwire, vice-president Ohio Brass Company, Mansfield, Ohio.

Informal Round Table Luncheon Conferences

AMBASSADOR HOTEL, 1 P.M.

No. 6—"Motor Bus, Interurban and Long Distance Operation," B. W. Arnold, sponsor.

No. 7—"Traffic," D. L. Fennell, sponsor.

No. 8—"Education and Training," Jesse S. Hyatt, sponsor.

No. 9—"Small City's Problem," A. C. Spurr, sponsor.

No. 10—"Taxation," Harold L. Geisse, sponsor.

ADVISORY COUNCIL EVENING

Tuesday, Oct. 1, 8:30 p.m.
Auditorium Ball Room, Second Floor

J. N. SHANNAHAN, Chairman

Plans are under way for an interesting program under the auspices of the Advisory Council. Announcement will be made as soon as the details are completed.

Informal dancing—Music by Roger Wolfe Kahn's orchestra.

Wednesday, Oct. 2, 10 a.m.
Inspection of Exhibits

This morning has been set aside by the officers of the association for the inspection of manufacturers' exhibits. There will be no sessions of the American Association this morning. The Round Table Luncheon Conferences listed below and also the affiliated sessions will be held in the afternoon. The official business of the morning is the inspection of exhibits, and every delegate

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is urged to take advantage of the opportunity to visit the manufacturers' booths, where the most modern equipment and latest appliances are on display.

Informal Round Table Luncheon Conferences

AMBASSADOR HOTEL, 1 P.M.

No. 11—"Motor Bus, City Operation," D. E. Blair, sponsor.

No. 12—"Financing," R. P. Stevens, sponsor.

No. 13—"Merchandising," G. A. Richardson, sponsor.

No. 14—"The Manufacturer's Interest in Public Transportation," Cornell S. Hawley, sponsor.

No. 15—"Motor Bus Maintenance Methods," Adrian Hughes, Jr., sponsor.

Thursday, Oct. 3, 10 a.m.

Auditorium Ball Room, Second Floor

JAMES P. BARNES, Chairman

General Subject—*Progress*

Award—Electric Traction Speed Contest—T. Fitzgerald, chairman, vice-president Pittsburgh Railways, Pittsburgh, Pa.

Routine.

"Benefits of Unified Transportation Systems," by Thomas N. McCarter, president Public Service Co-ordinated Transport, Newark, N. J.

"Outlook for Interurbans," by Dr. Thomas Conway, Jr., president Cincinnati, Hamilton & Dayton Railway, Philadelphia, Pa.

Installation of officers.

Informal Round Table Luncheon Conferences

AMBASSADOR HOTEL, 1 P.M.

No. 16—"Publicity and Advertising," E. B. Atchley, sponsor.

No. 17—"Freight," Julian M. Bamberger, sponsor.

No. 18—"Safety," R. N. Graham, sponsor.

No. 19—"Management," D. W. Pontius, sponsor.

No. 20—"Motor Bus Design," C. W. Stocks, sponsor.

Accountants' Association

Tuesday, Oct. 1, 2:30 p.m.

Address of President.

Report of Executive Committee.

Report of Secretary-Treasurer.

Report—Representative of the Accountants' Association at the Annual Convention of the National Association of Railroad and Utilities Commissioners—W. L. Davis, auditor Lehigh Valley Transit Company, Allentown, Pa.

Discussion.

Report—Committee on Standard Classification of Accounts—M. W. Glover, chairman, general auditor West Penn Railways, Pittsburgh, Pa.

Discussion.

Report—Sub-Committee on Bus Accounting—E. A. Tuson, chairman, general auditor Public Service Co-ordinated Transport, Newark, N. J.

Discussion.

"Depreciation," by Thomas Conway, Jr., president Cincinnati, Hamilton & Dayton Railway, Philadelphia, Pa.

Discussion.

Report—Committee on Nominations.

Election of Officers.

Wednesday, Oct. 2

RITZ-CARLTON HOTEL, 1 P.M.

Accountants' informal luncheon, followed by round table discussion of accounting problems.

Thursday, Oct. 3, 2:30 p.m.

"The Position and Responsibilities of the Auditor in a Railway Organization," by G. J. Bunting, vice-president in charge of accounting Illinois Central Railroad, Chicago, Ill.

Discussion.

Report—Committee on Stores Accounting—R. A. Weston, chairman, special accountant the Connecticut Company, New Haven, Conn.

Discussion.

Report—Committee on Fare Collection—E. A. Tuson, chairman, general auditor Public Service Co-ordinated Transport, Newark, N. J.

Discussion.

Report—Committee on Resolutions.

Installation of Officers.

Presentation of Past President's Badge.

New Business.

Claims Association

Monday, Sept. 30, 1:30 p.m.
Informal Claims Luncheon

RITZ-CARLTON HOTEL

Tuesday, Oct. 1, 2:30 p.m.

Reading of Minutes of Previous Meeting.

Address of the President.

Report of the Executive Committee.

Report of the Secretary-Treasurer.

"Efforts of the Bench and Bar to Correct Ambulance Chasing Evils in New York City," by A. C. Mayo, trial attorney Third Avenue Railway System, New York, N. Y.

Formal discussion by:

Bert C. Wood, general claim agent Pennsylvania-Ohio Public Service Corporation, Youngstown, Ohio.

P. W. Klabunde, general claim agent the Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

General Discussion.

"Traumatic Surgery," by a Representative of the American College of Surgeons, Chicago, Ill.

Discussion.

Report—Committee on Safety—Bert C. Wood, chairman, general claim agent Pennsylvania-Ohio Public Service Corporation, Youngstown, Ohio.

Discussion.

Wednesday, Oct. 2, 2:30 p.m.

"The Effect of the Massachusetts Compulsory Liability Insurance Acts Upon the Number of Accidents, the Number of Suits and the Size of the Verdicts," by P. G. Carleton, general counsel Eastern Massachusetts Street Railway, Boston, Mass.

Discussion.

"The Extent to Which Compulsory Insurance Has Been Adopted in Connecticut and Its Effect Upon the Number of Accidents, Suits and Verdicts," by Seth W. Baldwin, attorney the Connecticut Company, New Haven, Conn.

Discussion.

Thursday, Oct. 3, 2:30 p.m.

"What a Claim Agent Can Do for His Company and His Community Through a Public Safety Campaign," by C. E. Redfern, claim agent United Electric Railways, Providence, R. I.

Discussion.

"The Importance to Companies of Claims Men Attending Annual Conventions of the American Electric Railway Claims Association," by Wallace Muir, general attorney Kentucky Traction & Terminal Company, Lexington, Ky.

Discussion.

Report—Committee on Nominations—Wallace Muir, chairman, general attorney Kentucky Traction & Terminal Company, Lexington, Ky.

Election of Officers.

Installation of Officers.

Presentation of Past President's Badge.

Engineering Association

General Meeting, Tuesday, Oct. 1, 10 a.m.

FRANK H. MILLER, Chairman

Address of President.

Report of Executive Committee.

Report of Secretary-Treasurer.

Electric Railway Journal Maintenance Contest Award.

Paper by H. H. Adams, superintendent shops and equipment Chicago Surface Lines, Chicago, Ill.

Discussion.

Discussion and moving pictures—Use of Cylindrical Wheel Treads in Place of Conical Wheel Treads.

General Meeting
Thursday, Oct. 3, 2:30 p.m.

FRANK H. MILLER, Chairman

Report—Committee on Revision of Rules—W. W. Wysor, chairman, chief engineer United Railways & Electric Company of Baltimore, Baltimore, Md.

Report—Committee on Co-operation with U. S. Department of Commerce—E. P. Goucher, chairman, engineer of way and structures Capital Traction Company, Washington, D. C.

Paper by Edwin W. Ely, chief Simplified Practice Division, Bureau of Standards, Department of Commerce.

Discussion.

Paper by A. E. Harvey, superintendent of construction Kansas City Public Service Company, Kansas City, Mo.

Discussion.

Report—Committee on Nominations—R. H. Dalgleish, chairman, chief engineer Capital Traction Company, Washington, D. C.

Election of Officers.

Installation of Officers.

Presentation of Past President's Badge.

New Business.

POWER DIVISION

Tuesday, Oct. 1, 2:30 p.m.
Committee Room 3, Second Floor

W. E. BRYAN, Chairman

Report—Standing Committee on Power—W. E. Bryan, chairman, superintendent of power St. Louis Public Service Company, St. Louis, Mo.

Reports of Committees:

No. 1—Manual Review—J. Walter Allen, chairman.

The Convention Reported!

ELECTRIC RAILWAY JOURNAL'S October number will be devoted to a report of the Atlantic City Convention. Published immediately following the close of the sessions, it will contain a complete account of the proceedings.

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No. 5—Specifications for Overhead Line Material—Dwight L. Smith, chairman.

No. 8—Braking Device for Trolley Wire Reels—J. F. Neild, chairman.

No. 9—Conduit Specifications—W. J. Quinn, chairman.

General Discussion.

Address—W. W. Wysor, first vice-president American Electric Railway Engineering Association, New York, N. Y.

"Power Requirements of City Cars as Affected by Gear Ratio," by S. B. Cooper, manager railway engineering department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Discussion.

"Comparison of Results of Operation and Maintenance Between Properties," by J. F. Neild, electrical engineer Toronto Transportation Commission, Toronto, Canada.

Discussion.

Wednesday, Oct. 2, 2:30 p.m.
Committee Room 3, Second Floor

W. E. BRYAN, Chairman

Reports of Committees:

No. 6—Trolley Wire Wear—H. S. Murphy, chairman.

No. 2—Power Rectifiers—H. W. Codding, chairman.

No. 13—Proper Trolley Voltage for Congested City Districts—A. J. Klatte, chairman.

General Discussion.

"Effect of Trolley Voltage on Schedule Speed," by speaker to be announced later.

Informal Presentation of progress reports of other Power Division committees.

General Discussion.

PURCHASES AND STORES DIVISION

Tuesday, Oct. 1, 2:30 p.m.

A. A. ORDWAY, Chairman

Report—Standing Committee on Purchases and Stores—A. A. Ordway, chairman, general storekeeper Boston Elevated Railway, Boston, Mass.

Discussion.

Address—W. W. Wysor, first vice-president American Electric Railway Engineering Association, New York, N. Y.

"Engineering Aspects of Purchasing," by R. C. Cram, assistant engineer Third Avenue Railway System, New York, N. Y.

Discussion.

Wednesday, Oct. 2
Informal Luncheon Meeting

RITZ-CARLTON HOTEL, 1 P.M.

Wednesday, Oct. 2, 2:30 p.m.
Committee Room 4, Second Floor

A. A. ORDWAY, Chairman

"Advantages of the Simplified Practice Movement," by Edwin W. Ely, chief Simplified Practice Division, Bureau of Standards, Department of Commerce, Washington, D. C.

Discussion led by George A. Cooper.

Reports of Committees:

No. 1—Manual Review—J. Fleming, chairman.

No. 2—Unit Piling and Standard Packages—W. E. Scott, chairman.

No. 3—Investment in Material and Supplies and the Cost of Operating Stores—W. S. Stackpole, chairman.

No. 4—Methods and Practices for Keeping Price Records and Pricing Materials and Supplies—A. A. Ordway, chairman.

No. 5—Simplification and Standardization of Stock Including the Disposition of Surplus and Obsolete Material—W. L. Wuster, chairman.

No. 6—Control of Materials and Supplies Including Control of So-called Floating or Line Stocks—E. F. Kelley, chairman.

No. 7—Reclamation of Used Material and Sale of Scrap and Salvage—W. H. Staub, chairman.

General Discussion.

ROLLING STOCK DIVISION

Tuesday, Oct. 1, 2:30 p.m.
Committee Room 2, Second Floor

A. T. CLARK, Chairman

Report—Standing Committee on Rolling Stock—A. T. Clark, chairman, superintendent rolling stock and shops United Railways & Electric Company of Baltimore, Baltimore, Md.

General Discussion.

Reports of Committees:

No. 1—Manual Review—W. C. Bolt, chairman.

No. 2—Motor Coaches—P. V. C. See, chairman.

Address—W. W. Wysor, first vice-president American Electric Railway Engineering Association, New York, N. Y.

Reports—Special Committees:

No. 3—Car Design—H. H. Adams, chairman.

No. 4—Lighting—R. W. Cost, chairman.

No. 5—Roller Bearings—W. C. Bolt, chairman.

No. 6—Lubrication—J. H. Lucas, chairman.

No. 7—Automatic Coupler Specifications—P. V. C. See, chairman.

No. 8—Fire Hazards in Shop Practices—E. J. Jonas, chairman.

No. 9—Noise Reduction—H. S. Williams, chairman.

No. 10—Welding Wheel Flanges—J. S. McWhirter, chairman.

No. 11—Current Collecting Devices—Hugh Savage, chairman.

No. 13—Limits of Wear—W. T. Vivian, chairman.

General Discussion.

Report—Committee on Heavy Electric Traction—H. F. Brown, chairman, assistant electrical engineer New York, New Haven & Hartford Railroad, New Haven, Conn.

General Discussion.

Wednesday, Oct. 2, 2:30 p.m.
Committee Room 2, Second Floor

A. T. CLARK, Chairman

"Seeking Ideal Car Performance," by W. A. Keller, supervisor of method, technical division Pittsburgh Railways, Pittsburgh, Pa.

Discussion.

WAY AND STRUCTURES DIVISION

Tuesday, Oct. 1, 2:30 p.m.
Committee Room 1, Second Floor

E. M. T. RYDER, Chairman

Introductory Remarks—W. W. Wysor, first vice-president American Electric Railway Engineering Association, New York, N. Y.

Report—Standing Committee on Way and Structures—E. M. T. Ryder, chairman, way engineer Third Avenue Railway system, New York, N. Y.

Committee Reports:

No. 1—Manual Review—W. R. Dunham, Jr., chairman.

No. 2—Special Trackwork—E. M. T. Ryder, chairman.

No. 5—Wood Preservation—C. A. Smith, chairman.

No. 6—Arc Welding—C. F. Gailor, chairman.

No. 8—Pavement—A. E. Harvey, chairman.

No. 11—Track Construction—C. L. Hawkins, chairman.

No. 13—Joint Railway and Bus Terminals—E. D. Eckroad, chairman.

General Discussion.

Report—Committee on Welded Rail Joints—E. M. T. Ryder, vice-chairman, way engineer Third Avenue Railway System, New York, N. Y.

Discussion.

Wednesday, Oct. 2, 2:30 p.m.
Committee Room 1, Second Floor

E. M. T. RYDER, Chairman

Reports of Committees.

No. 7—Alloy Steels Other Than Manganese for Special Trackwork—A. T. Spencer, chairman.

No. 9—Motor Bus Garage Design—Morse W. Rew, chairman.

No. 12—Rail Corrugation—W. W. Wysor, chairman.

No. 14—Light Section Rail—C. A. Alden, chairman.

No. 15—Track Gage—C. H. Clark, chairman.

No. 16—Study of Foundation and Supporting Structures for Steam Railroad Crossings—H. F. Merker, chairman.

General Discussion.

Transportation and Traffic Association

Tuesday, Oct. 1, 2:30 p.m.

Address of the President.

Report of the Executive Committee.

Report of the Secretary-Treasurer.

Report—Committee on Resolutions—Paul E. Wilson, chairman.

Report—Committee on Nominations.

Election of Officers.

Report—Committee on Movement of the Vehicle—D. L. Fennell, chairman.

Discussion.

Address, by Labert St. Clair, director of advertising, American Electric Railway Association.

Report—Committee on "The Small City"—A. C. Spurr, chairman.

Discussion.

Wednesday, Oct. 2, 2:30 p.m.

Address—"Competition and Rate Making," by Philip Cabot, professor of public utility management Harvard University School of Business Administration, Boston, Mass.

Discussion.

Report—Committee on "Equipment"—Adrian Hughes, chairman.

Discussion.

Thursday, Oct. 3, 2:30 p.m.

Report—Committee on "The Passenger"—W. W. Holden, chairman.

Discussion.

Address—"Public Transportation from a Woman's Viewpoint," by Miss Mary A. Brennan, Pittsburgh, Pa.

Report—Committee on "The Employee"—Ralph W. Emerson, chairman.

Discussion.

"Trainmen's Conference"—Demonstration by employees of Pittsburgh Railways.

Canadian Meetings at Atlantic City

Two meetings of the Canadian Electric Railway Association will be held at Atlantic City during the period of the A.E.R.A. Convention. The first, a general get-together meeting, is scheduled for 10:30 a.m. on Wednesday, Oct. 2. The second, which will be an executive meeting, will be held at 3 p.m. on the same day. Both meetings will be held at the Auditorium in the Ball Room Smoking Room.

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News *of the* Industry

Sliding Scale Fare Expected in St. Louis

The Public Service Commission is expected to issue a formal order permitting the St. Louis Public Service Company, St. Louis, Mo., to put into effect the new sliding scale fare plan suggested by City Counselor Muench at a public hearing held by the commission on Aug. 20.

Under the Muench plan the company will sell 12-ride books for 90 cents good for use in any one week. If a bookholder rides more than twelve times in the week he is to pay 5 cents for each additional ride. The single fare for adults will be 10 cents. The fare for children between the age of five and twelve years remains 3 cents. The universal transfer system now in effect on all of the cars and bus lines in St. Louis will be continued.

At the outset of the hearing Mr. Muench submitted a formal statement explaining the city administration's views. He said in part:

"Some means must be found to retain the railway. The problem of service at a reasonable cost that at the same time gives the operators a fair return on the value of their property, is one which has confronted every community in this country during the past ten or fifteen years. It still confronts most of them.

"To some extent increased expenditures and loss of patrons have had to be compensated for through an increase in rates; however, means should be found to retain a large number of the car riders, and to bring back those who are patronizing competitive means of conveyance, by innovations or improvements in the service and by fare concessions."

Company Prepared to Try Plan

The statement then reviewed how competition had eaten into the patronage of the company with nothing done in the way of a fare concession except the 25-cent Sunday pass.

It pointed out that shortly after the company applied for a flat 10-cent fare and four rides for 35 cents, and the commission suspended this schedule for 120 days from Aug. 1, the matter of making a concession in rates to the regular consumer came up for consideration. At the request of the commission several conferences were held and finally the company proposed a flat 10-cent fare for casual riders and 16-ride book for $1 and extra rides in any one week at 5 cents. He said:

"The reaction to this proposal on the part of the public and the press was that the regular car riders would be obliged to buy more rides than they would normally use in a week in order to obtain a reduction in the fare."

His proposal of 12 rides for 90 cents was made to meet this objection.

Stanley Clarke, president, said that the company is willing to try the Muench plan "although we are convinced that we have not more than a fifty-fifty chance that it will prove successful."

Pending the promulgation of the new schedule, the company has restricted the sale of tokens on its cars and buses. The company desires to have a minimum number of tokens in the hands of the public when the 10-cent fare for casual riders goes into effect.

Interstate Line Expands Its Freight Facilities

A permit for the erection of a new freight house at 443 South First Street, Louisville, Ky., to cost $30,000 has been issued by the city building inspector's office to the Louisville & Southern Indiana Traction Company, subsidiary of the Interstate Publice Service Corporation. The building is to be part of the company's new freight terminal at that point.

The company operates the interurban service between Louisville and Indianapolis. For several months it has been cut off from direct connection over its own rails into Louisville due to reconstruction work by the Big Four Railroad on its bridge, over which the interurban operated. Meanwhile passengers have been brought across from Southern Indiana by bus.

"Deadlock Committee" in Chicago

Every effort being made to reach settlement so new grant can go before voters in fall

THE appointment of a "deadlock committee" has offered what promises to be a satisfactory solution of an acute situation in Chicago's long drawn out struggle for a new railway ordinance. This committee was appointed on Aug. 16 by Col. A. A. Sprague, acting chairman of the citizens' committee, whose help was solicited when the Council sub-committee reached a deadlock in its efforts to write an ordinance in which the rate of return is the principal bone of contention between the city and the transit companies.

As matters stood early in the week commencing Aug. 19, unless an agreement was reached during the week it will be impracticable to submit the franchises to a referendum at the judicial election in November. In that case a referendum will have to go over until the next Mayoralty election, unless a special election be held not later than Feb. 1.

Prof. Charles M. Thompson, dean of the college of commerce at the University of Chicago, is chairman of the new committee. Other members are David A. Crawford, president of the Pullman company; John A. Carroll, head of several south side banks; Victor A. Olander, prominent labor leader, and John Stuart, president of the Quaker Oats Company. The last named takes the place of George A. Ranney, vice-president of the International Harvester Company, who was originally named, but was unable to accept. Both Dean Thompson and Mr. Carroll are members of the citizens' traction settlement committee.

Negotiations came to a deadlock on Aug. 13. Colonel Sprague pointed out the chief reasons for the lack of progress as: the construction of subways, the rate of return to the company, and its financial structure. Since the engineers have as yet made no report, no difference of opinion is involved over the subway matter. The other two points he defined as "purely financial problems" to be weighed and tested by men versed in financial matters. As the result of Colonel Sprague's suggestions, the committee was appointed and held a preliminary session on Aug. 19.

On Aug. 20, the new committee, together with the present transit sub-committee of the City Council, opened public hearings. After collecting expert data and information on financial structure, rates of return and the ratio between stocks and bonds, the committee will express its views, acting in an advisory capacity to the City Council, which is charged with the duty of writing the ordinance, subject to review by the voters.

As stated before, the real bone of contention is the rate of return. The companies' attitude, set forth in a written statement at the beginning of negotiations, asks a "just and reasonable return" on all money invested in the property, that return to be determined by the local transit commission which would be appointed by the Mayor, with the approval of the City Council. The city, represented by Walter Fisher, stands for an agreed rate of return on the present investment, which is

COMING MEETINGS

Aug. 27—National Association of Railroad and Utilities Commissioners, Glacier National Park, Mont.

Aug. 30—Maryland Utilities Association, Plimhimmon Hotel, Ocean City, Md.

Sept. 10-11—Central Electric Railway Master Mechanics' Association, Fort Shelby Hotel, Detroit, Mich.

***Sept. 28 - Oct. 4*—American Electric Railway Association, 48th annual convention and exhibit, Atlantic City Auditorium.**

Sept. 30-Oct. 4—National Safety Congress, Chicago, Ill.

Oct. 23-24—Public Utilities Association of West Virginia, Wheeling, W. Va.

Nov. 6-7—Association of Electric Railway Equipment Men, Middle Atlantic States, Richmond, Va.

Nov. 7-8—Iowa Electric Railway Association, Operators Section, annual convention, President Hotel, Waterloo, Iowa.

Nov. 21-22—Public Utilities Association of Virginia, annual meeting, Chamberlain-Vanderbilt Hotel, Old Point Comfort, Va.

Jan. 23-24, 1930—Central Electric Railway Association, Statler Hotel, Cleveland, Ohio.

Jan. 27-29—Electric Railway Association of Equipment Men, Southern Properties, Birmingham, Ala.

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about $260,000,000. On new money put into transportation, the Fisher plan provides that only its actual cost be paid, plus a reward for economy and efficiency in service. Alderman E. L. Frankhauser, chairman of the Council sub-committee, supports this view.

When Mr. Fisher asked information concerning the financial structure of the new corporation, the lawyers for the companies replied that details had not yet been worked out. Mr. Fisher desires that the new financing be by issuance of bonds. Company attorneys say that the Fisher plan is a new and untried scheme, that no utility company in the country is now operating under such a system, and that under the Fisher plan it will be difficult, if not impossible, to finance the many extensions needed. For the first ten years it has been estimated that $135,000,000 will be spent for extensions, and another $100,000,000 for the following ten years.

For three weeks the city and company representatives have debated only "basic principles" and "fundamentals."

One-Man Car Proposal Rejected by Des Moines Men

The union, by an almost unanimous vote at a special meeting, has rejected a proposal made by Walter J. Cummings, president of the Des Moines Railway, Des Moines, Ia., which would have given the city one-man operation and would have provided a maximum hourly increase of 8 cents for the trainmen.

The present maximum wage for trainmen is 59 cents an hour. The proposed agreement was for a flat increase of 5 cents an hour, with 1 cent additional each year for three years.

The position of the union is that the 25-year agreement signed with the Des Moines City Railway in 1915 is binding upon the new owners of the property in spite of the fact that under the terms of the receivership sale, held on June 22, the Federal District Court approved the transfer of the property to Mr. Cummings and associates without the famous two-man car contract.

Apparently the one-man car clause in Mr. Cummings' proposal was the only objectionable feature, as the men expressed themselves in favor of the pension and life insurance provisions, as well as the check-off and several other clauses relating to working conditions.

The company agreed to set aside $18,000 annually for retirement and disability pensions. Any member of the union who had served twenty years or more and had reached the age of 65 years was to be eligible for a monthly pension of $58. The same payment was to be made in a case of total disability in the company's service. The proposed agreement provided that in case of death of any member of the union his beneficiary was to receive $1,000 life insurance, to be provided by the company.

The negotiations between union leaders and railway officials have been carried on with good will on both sides. J. Ben Wiley, veteran secretary of the union, in addressing the 600 members of the union, complimented Mr. Cummings and General Manager Gifford on their "square dealings" and credited them with "laying their cards on the table."

Conferences have continued since the rejection of Mr. Cummings' proposal, but were declared off for the time being on Aug. 21.

Eighth Week of New Orleans Strike

Company Maintains Its Position and Increases Service on All Lines. Council Battles Jitneys

NO PROGRESS has been made toward a solution of the deadlock at New Orleans. The most recent offer of the union to accept John A. Ryan, Washington; Rabbi Stephen Wise, New York; or Secretary of Labor Davis, as an arbitrator was refused by the New Orleans Public Service, Inc., which declared that the company itself must be the only judge of whether its property shall be operated on an open or closed shop basis.

Failure of this offer to receive more favorable consideration has dampened much of the still current hope that an amicable settlement of the strike could be reached. As a result, persons in touch with the situation were of the opinion that the final outcome will depend largely on the result of the present jitney fight. If the city is sustained in its warfare against the jitneys, it will mean the elimination of this mode of transportation in the face of the costly indemnity bonds. If this happens, it was pointed out that the lot of the striking carmen, many of whom have already been replaced by permanent employees, will be altogether hopeless.

With the strike entering its eighth week, interest is centered in the outcome of a court battle instituted by jitney drivers in an effort to prevent police from interfering with the operation of the 10-cent automobiles. The jitney war came as an aftermath to last week's riotous scenes at the city hall when a mob of 1,000 striking car men and union sympathizers attacked acting Mayor Walmsley and members of the Commission Council in the Council Chamber. A police captain shot and slightly wounded three men before the mob was controlled and the hall cleared of fighting men. Next day the Council ordered the law enforced to compel jitney drivers to obtain $5,000 indemnity bonds, and otherwise to conform to the city and state traffic regulations.

Police arrested hundreds of jitney drivers, the majority of whom later obtained their release in the Recorder's Court when the city was unable to offer conclusive proof that the jitney drivers were charging or accepting fares from passengers.

The police activity, however, resulted in the elimination of a considerable number of the jitneys and in a corresponding increase in the number of street car riders.

In their perplexity the jitney drivers filed suit in the civil court for an injunction to restrain the police from interfering with the operation of the jitneys. The city lost the first round in this battle when the court overruled a motion to dismiss the suit and ordered it tried on its merits. The case was being heard by the court on Aug. 22, but a decision will probably not be reached before the end of the week.

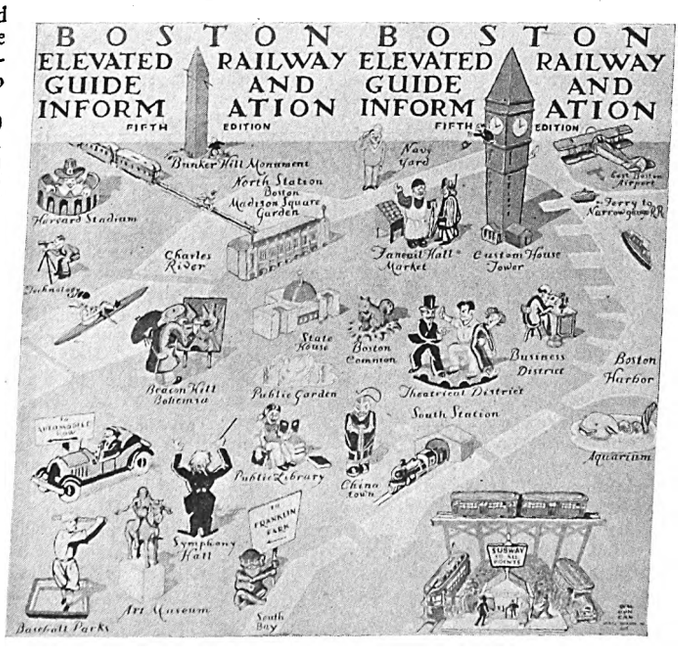
While attorneys for the city and the jitney drivers are exchanging verbal blows, the merry game of hide-and-seek between police and the jitney drivers continues, with the traveling public still making limited use of the jitneys and of private conveyances in going to and from their work. Many cars continue to operate empty in off peak hours, but during the peak most of them carry capacity loads.

Fast Work at Mount Tom

The temporary waiting room, restaurant and observatory on the summit of Mount Tom, recently erected by the Holyoke Street Railway following the loss of the large Summit House by fire, is 40 x 60 ft. in dimensions and the height, from the first floor to the 8,000,000-cp. beacon light on the tower, is 65 ft. The first floor contains the restaurant and the second floor is used as an observatory. From the tower a searchlight is thrown on the Barnes Airport, between Holyoke and Westfield. In the event of the erection of a larger building, the present structure will be turned into a pavilion on Little Mountain or some other part of the Mount Tom property.

Erection of the new building is re-

Telling Bostonians What Goes On in Their Own City



The front page of the fifth edition, just out, of the Boston Elevated Railway guide book is a cartoon-style presentation of Boston with some of the principal features and their approximate location. This design, printed in several colors, was drawn by William Duncan of the Massachusetts Art School, the students of which were invited to enter a competition for designs for the cover.

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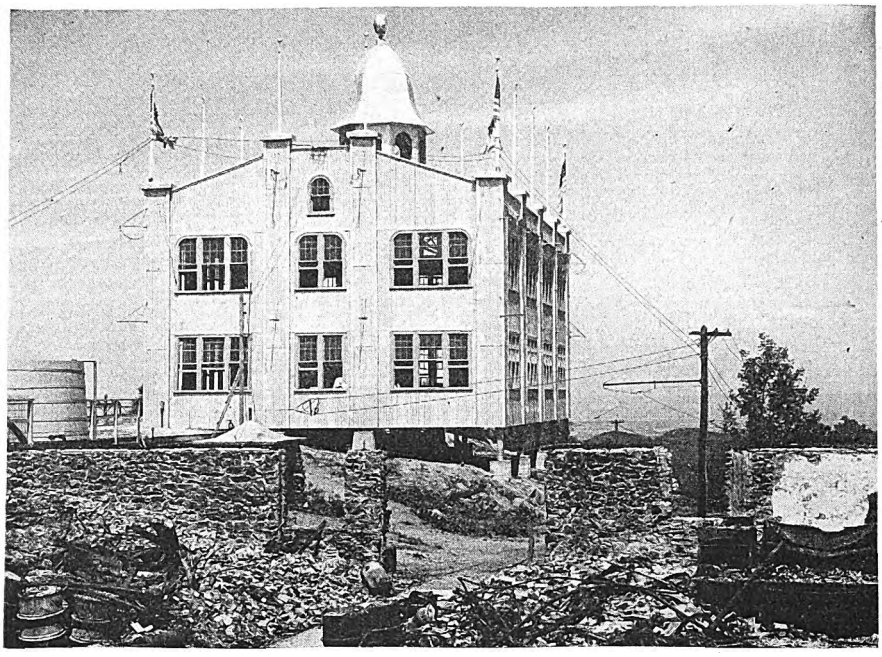

Fast work was done on temporary structure on Mount Tom

garded as notable for speed, considering the conditions encountered. All the material was transported up the mountain in the two cars ordinarily used for passengers. Steel was fabricated in dimensions to permit of this handling and special fastenings were used to bind the metal to the cars. The steel was delivered by the Palmer Steel Company, Springfield, at the carhouse in Holyoke and conveyed by the railway to the site, where it was erected by the Casper Ranger Construction Company, Holyoke. The outer walls are faced with corrugated sheet metal, covered with asbestos. George E. Pellissier, chief engineer of the railway, designed the structure.

The fire occurred on May 2, the vote to erect the new building on May 11, plans were in preparation May 13, construction started on May 16 and work was completed on June 1. The building was officially opened on July 1. It was necessary to build a new water tank and connections.

There are 28 spotlights on the building and long parallel strings of light from the building to the upper station, 500 ft. distant, to light up the premises as viewed from a distance.

The dining room contained in the old building is much missed as a place for large meetings, but the receipts at the new building for July were about the same as at the old house in July, 1928.

Many Topics Discussed

Competition afforded by gasoline driven vehicles hour, holds place of interest at meeting of Wisconsin Utilities Association

AUTOMOBILE competition was discussed in practically all the papers and reports presented at the seventh annual convention of the Transportation Section, Wisconsin Utilities Association, held Aug. 15 and 16 at Green Bay. In his opening address Chairman Henry Cordell, Chicago, North Shore & Milwaukee Railroad, urged that street traffic be regulated with more sympathetic regard for public transportation patrons, rather than to conform to the wishes of the individual motorist. Cars must be made more inviting architecturally and must be more harmoniously furnished, said A. F. Tegen of the Milwaukee Electric Railway & Light Company, in developing the argument that the industry problem today is to furnish rail equipment that will surpass the comfort and convenience of the automobile.

Ways and means of attacking the parking problem were described by J. B. O'Connell, Chicago Surface Lines. For their own interest and for the good of the community, railway properties should take the initiative in analyzing the use of the streets. Parking restrictions should be tightened gradually, Mr. O'Connell said, meanwhile showing business men that the process is an asset rather than a liability to them.

The very success and popularity of the automobile is proving its undoing, according to C. Edward Thorney, Chicago, North Shore & Milwaukee Railroad, who outlined the advertising campaign being conducted by the North Shore and associated companies. Newspapers, car cards and billboards are directing the attention of the public to the number of automobiles on the roads and their badly congested condition, and the convenience of high-speed electrified transportation. Free parking at terminals is intended to encourage the use of automobiles between stations and points not served by electric railway lines. In every conceivable manner of publicity, the campaign is hammering home the slogan "The Steel Highways Are Always Open," together with "Go the Carefree Way."

The second day's session was opened with an address by President G. W. Van Derzee of the Wisconsin Utilities Association. After referring to the unwarranted abuse and unscrupulous attack directed against the utility industry as a whole during the past year, Mr. Van Derzee emphasized the importance of employee education. The human element, he said, is the most important in the long run. "If contacts between the men and women who are responsible for the service and those who use it are not up to or better than the standards of public contact which one expects to receive in successful merchandising organizations of today, our job of service is not well done."

Many Pointers on Car Cleaning

Considerable discussion followed the presentation of a report on car cleaning, by John H. Kuony of the Milwaukee Electric Railway & Light Company. The report was concluded with a set of instructions for performing the various cleaning operations. It costs on the average $100 a year to keep each car clean. The problem is of doing the best possible job at the least expense. A cleaning agent other than water must be used at frequent intervals, the report held. A carefully planned method must be followed on a regular time or mileage schedule. Mr. Kuony told of a promising scheme being tried out in Milwaukee. This consists of the application of wax to newly finished jobs or on any cars with a good finish. More time is required at first than for normal cleaning, but afterward the car can be cleaned merely by wiping off the waxed surfaces with a dry cloth. Waxing every six months is sufficient, he said, to maintain the necessary protective film.

A rotary brush type of washer, used with gratifying success by the North Shore system, was described by Kenneth M. Wilkins of that company. The cars are driven through, under their own power, in three minutes, when both sides are cleaned with a solution and rinsed with water at 300 lb. pressure. An additional five minutes is required for hand washing of the two vestibules. With one man at the hose and one motorman, the machine handles fifty units a day, Mr. Wilkins said, at a total cost of 47.5 cents each. The quality of the cleaning is uniform, whereas with the manual method it falls off at the end of the day when the cleaners become fatigued. The cost is 63 cents a car for hand work where long-handled brushes are used.

An outstanding feature of the convention was the report of the committee on standard maintenance practice. This took the form of a maintenance guide, submitted as an 84-page printed pamphlet containing complete and yet simple instructions for the foremen and employees actually doing the work. The guide can be secured by properties outside the association at a price of $1 a copy, to cover the cost of printing. This guide was merely a start, to be adapted to local conditions, and was not intended to destroy initiative. It was compiled primarily by the supply members of the committee, but their suggestions were reviewed and approved by the operating members.

A paper on safety—the essential in transportation—was presented by A. A. Oldfield. This urged adequate recognition of the safety expert. He should be permitted to function without undue interference and should have the wholehearted co-operation of other departments. A. L. Thomas described the conference work being done by the Chicago, North Shore & Milwaukee Railroad to improve relations between the platform men and the passengers. This was carried on by the conference method. In 2½ years complaints from the public had been cut down from an average of ten to two a week.

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Two-Cent Fare Advance in Miami

The City Commission of Miami, Fla., on July 29 signed a one-year agreement with the Miami Beach Railway for the collection and payment to the city of the additional 2-cent fare which went into effect on Aug. 1. The new agreement includes a clause protecting the railway from operating deficits should the number of passengers riding the cars decrease.

The commission also has agreed that the railway shall receive a fee of not more than 5 per cent for collecting the additional 2 cents, and that the company shall make an accounting to the city on the tenth of each month and pay the money by the fifteenth of each month for the collections made during the preceding month. Fares collected in corresponding months of 1927 and 1928 will be used as the basis for computing the payment to be made to the company by the city in the event of operating deficits.

Another provision of the agreement states that the company shall collect a 5-cent fare from pupils attending school "up to the age of eighteen years between the hours of 7 a.m. and 5 p.m. on school days." Provision is further made that school pupils must purchase school tickets from the company in order to obtain the 5-cent fare.

Receipts of the 2-cent increase will be placed in a municipal sinking fund for retiring a $1,018,000 bond issue, the money of which was used for the purchase of railway equipment.

Some time ago, Commissioner Reeder made it plain that the interest charges and the sinking fund payment, called for under the terms of a bond issue made by the city to provide funds under which the railway was extended at the city's behest and with city funds, had become a dead weight on the tax payers. Apparently the hope is to ease this burden on the city through an advance in fare.

New Working Agreement Arranged in Providence

Members of the Amalgamated Association at Providence, R. I., have voted to accept the new contract between the union and the United Electric Railways which has been the subject of negotiations between officials of both organizations since June 1.

The executive board of the union recommended five demands, regarded as of minor importance, relating to working conditions on cars and buses and two questions pertaining to power house employees. The members concurred in the opinion that these seven points be laid before the railway officials by the union's agreement committee. The five demands pertain to the work of spare men on cars and buses, and the points relating to the power house employees stipulate that the last man hired be the first man laid off, and that the company use no discrimination against union men in the matter of vacations and the six-day week.

The principal changes in the agreement include an increase in wages for all employees ranging from 1 cent an hour for motormen, conductors and bus drivers to 7½ cents in the bridge building department, a readjustment and shortening of hours, a guarantee of seven hours' work in not more than two shifts daily for spare motormen and conductors, and the elimination of the requirement that men transferred from cars to buses shall have had a driver's license for at least two years.

The contract is for two years and is retroactive to June 1. Under its terms employees will receive back pay ranging from $5.60 to about $21, with a few of the men drawing sums in excess of the latter figure.

The contract adopted in 1927 expired at midnight on May 31 of this year. Since that time the men have continued to work under the terms of the old contract with the expectation that any changes in wage scales embodied in the new agreement, would be retroactive.

Change in Gary Fares Sought

The Gary Railways, Gary, Ind., has asked authority to readjust its fare structure in the city. It would establish a cash fare of 10 cents, a rate of twelve tokens for $1, and a weekly "nickel" ticket for regular patrons to be sold for 40 cents and entitling the holder to ride as often as desired during the week for a 5-cent cash fare. The company would issue free transfers to connecting car and bus routes. School childrens' tickets would remain at six for 25 cents.

The proposed schedule of fares calls for the elimination of the three fare zones in Gary, Hammond and East Chicago, thus doing away with the present double fares in these cities. Such a step would reduce the fare between Gary and Hammond, for instance, from 24 cents, or three 8-cent fares, to 20 cents, or two 10-cent cash fares, and would permit Gary passengers to ride anywhere within the city limits for a single fare.

Under the rate structure now in effect, riders in Gary pay a cash fare of 8 cents. Tokens are sold at fourteen for $1 and a charge of 2 cents is made for transfers between cars and buses. No change in present cash or commutation rates on the Hobart, Crown Point and Valparaiso divisions is proposed by the company.

According to the petition, net earnings show a return of only 4 per cent on the present value of the company's properties. Present net earnings, it is declared, are insufficient to attract the additional capital needed for improvements and extensions demanded by the riding public.

"Stolen from the T.C.C."

Officials of the Toronto Transportation Commission, operating the municipal railway and bus lines in Toronto, Ont., have had "Stolen from the T.T.C." frosted on the glass of every electric light bulb used in the 38,000 or more sockets from which electric energy is drawn in an ordinary day's operation of the system. "Stolen from the T.T.C." has also been burned deep in the wooden legs of the camp stools used during periods of emergent traffic conditions on the Grey Coach Lines, Ltd. According to Eustice Smith, secretary, the commission was losing quite a few bulbs. They were even being removed from the street cars. Since the personal little statement has been affixed on every electric light bulb the losses have become practically negligible. Mr. Smith is reported to have said:

"We figured that if the average person has to sit at home night after night on a stool marked 'Stolen from the T.T.C.' and see 'Stolen from the T.T.C.' on his electric light bulbs he is going to feel rather guilty sooner or later. At night the lettering looms up like a barn in a fog when one of the bulbs is turned on."

Labor Federation on New Orleans Strike

The executive council of the American Federation of Labor, in a public statement issued on Aug. 20 at Atlantic City, N. J., at the closing session of its quarterly meeting, declared the federation "will co-operate in every possible way" with the Amalgamated Association in carrying the New Orleans strike to a successful conclusion. The executive council directed the officers of the federation to investigate the policies of public service corporations in general, to determine their attitude toward labor, and, in consequence, the attitude of the federation toward them. A statement issued by William Green, president of the federation, said in part:

"The executive council is deeply interested in the strike situation in New Orleans. It expresses the hope that the strikers will continue the strike until a satisfactory settlement is reached. It calls upon all the people of New Orleans to assist the striking street car men in every reasonable and honorable way. The executive council will co-operate with the Amalgamated Association in every possible way in carrying on the strike to a successful termination.

"In view of the attitude of the utility at New Orleans toward labor the executive council directs the officers of the American Federation of Labor to conduct an investigation of the policies of public service corporations, including holding companies, in order to determine their general attitude toward labor and the settlement of labor disputes. The future attitude of the American Federation of Labor toward public service corporations and holding companies will be determined in the light of such facts as said investigation may disclose."

Union Charges St. Louis Award Terms Are Not Met

Members of the Amalgamated Association employed by the St. Louis Public Service Company, St. Louis, Mo., in a letter to Mayor Miller on Aug. 15 charged that the company has failed to live up to certain provisions of an arbitration award made by the Missouri Public Service Commission on May 20 last. The union says the company failed to grant a 4-cent an hour increase provided for shop men. It also charges that the company failed to comply with the state commission's stipulation that the tripper runs should not exceed 10 per cent of the regular runs.

Road Builders to Study Traffic

M. O. Eldridge, assistant traffic director, Washington, D. C., as chairman of the committee on traffic of the American Road Builders' Association, has named sub-committees to study every phase of the traffic problem. The findings will be presented at the association convention and road show in Atlantic City next January. The collection of accident statistics and analysis of accidents will be in charge of a group headed by Burton W. Marsh, Pittsburgh, Pa., which will also study traffic flow maps and spot maps, the necessity for uniformity in state and city vehicle laws and the question of why and where parking should be restricted or eliminated entirely. All questions dealing with regional planning will be in charge of the group headed by Dr. J. Gordon McKay, Cleveland, Ohio.

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Franchise Discussion Reviewed at Columbus

At the invitation of Benjamin W. Marr, president of the Columbus Railway, Power & Light Company, Columbus, Ohio, Harry Allensworth, accountant and consulting engineer, has been inspecting the books of the company on behalf of the Council. Mr. Allensworth, his task completed, is now assembling the figures so they can be digested by members of the Council. After the Council has a clear picture of the status of the company's finances and volume of business, company officials will confer with the City Council to work out a franchise acceptable to both.

As matters stand at present it appears likely the railway franchise proposition will again come before the Council for discussion during September. The company has been operating without a franchise for several years, due to a lack of agreement between the Council and the company as to the fare.

When an ordinance is finally passed by the Council it must be placed before the voters for approval.

Briefs Filed in New York "L" Fare Case

In a brief filed on Aug. 16 with the New York Transit Commission the Interborough Rapid Transit Company renewed its plea for an immediate temporary fare "in excess of 5 cents" on its elevated lines, pending final decision on its application of June 19 for a 10-cent fare on that system. The brief declared that the commission has jurisdiction and power to alter the elevated fare regardless of the decision of the United States Supreme Court against a 7-cent rate on the combined subway and elevated network.

Dismissal of the application was urged in a joint brief filed by Samuel Untermyer, special counsel for the commission, and Corporation Counsel Hilly. It declared that the commission was without jurisdiction because the fare was contractual by virtue of the elevated extension certificates of 1913, which were executed at the same time as the subway fare contract.

Binghamton's Color Contest Successful

The Triple Cities Traction Company, Binghamton, N. Y., successor to the Binghamton Railway, has been conducting a contest for a monogram for the new company. A prize of $10 was offered to the winner. The contest closed Aug. 1, but the winner has not yet been selected. One hundred and sixty-five persons submitted 294 designs. Most of them came from the Triple Cities, Binghamton, Johnson City and Endicott—but New York City and Buffalo were on the list.

The company also asked for suggestions for color for cars and buses with the following result:

Sixty-six persons made 78 suggestions, 24 of which favored the company's present color, red. Among the comments contained in the replies were the following:

"You cannot find a better color."

"Have never seen better."

"It seems to me the present color is as good as any."

"I think the present color is much more attractive than dingy green and yellow seen in other cities."

"The present color scheme of your cars and buses is in every way most desirable."

The present color, therefore, will be used for the body of the car, but the color of the upper part may be changed.

Other suggestions were: Dark green, 8; light green, 11; orange, 9; yellow, 7; blue, 11, still others suggested chocolate brown and cream, olive green with cream trim, royal purple with white trim, canary yellow with dark trim, apple green with lemon yellow trim, dust gray with burnt orange trim.

Special School Fare Arranged in Duluth

A 5-cent fare for school children has been agreed upon by the Duluth Street Railway, Duluth, Minn., and city officials. The regular rate in Duluth is 10 cents cash and six tokens for 45 cents. Starting Sept. 3 school children will be able to buy ten tokens for 50 cents good between the hours of 7:30 a.m. and 5 p.m. The new plan is an outgrowth of a recent increase in fare for Duluth. The city appealed, and a citizens' committee was appointed to study the question. The result was the suggestion that the appeal be abandoned if the company would agree to a special rate for children.

The Radial Railway Issue at Toronto

Reeve Fred Lundy, a member of the county traffic committee, authorized by the York County Council to inquire into the proposed action of the Toronto Transportation Commission of discontinuing the Metropolitan Radial service on Sept. 30, says that, according to the evidence already at hand, the county would be able to present a strong case to the Toronto City Council when the committee appears before that body next September and registers opposition to the proposal of the Toronto Transportation Commission to substitute service by bus for that now furnished by the radial railway. The county is said to feel that the deficits said to exist in the operation of the radial line have been overestimated, and to be convinced that a definite contract "forbids the closing of the service without the consent of the county." Colonel Lennox, counsel for the county, has intimated that the county will seek an injunction to prevent the stopping of the service on Sept. 30, if a satisfactory agreement had not been reached by that time.

Late News Briefs

Philadelphia, Pa.—The Public Service Commission has agreed that the hearing on the Universal Cab Company's application for a certificate of convenience should be adjourned until the Philadelphia Rapid Transit Company has had an opportunity to prepare its case in opposition.

Detroit, Mich.—Del A. Smith, general manager of the Municipal Street Railway, and Police Inspector Edward A. Mitte, director of traffic, have informed the Council that removal of the Soldier's and Sailor's Monument would expedite traffic on Cadillac Square.

Los Angeles, Cal. — The Board of Public Utilities and Transportation has approved the application of the Los Angeles Railway for a 21-year franchise to double track Grand Avenue for its electric line, from Jefferson Street to Santa Barbara Avenue, a distance of about 1 mile, instead of operating over its private right-of-way east of Grand Avenue, as at present.

St. Louis, Mo.—Sam W. Greenland, vice-president and general manager of the St. Louis Public Service Company, has sailed from New York for Europe to join Mrs. Greenland, who is ill in The Hague. Mrs. Greenland was touring Europe with the Advertising Club delegation to the international convention of that organization held in Berlin recently.

Baltimore, Md.—To provide faster and more convenient car service from the Guilford and Homeland sections of Baltimore to the downtown area, the United Railways & Electric Company has consolidated the Gilmor Street and Guilford Avenue line, known as No. 1, and the Guilford line, known as No. 11. On the new route the No. 11 cars use the Guilford Avenue elevated road, which saves considerable time. Moreover, residents of the Guilford section now reach the downtown shopping district without transferring. The company has cut the headway of the line from fifteen to ten minutes.

New York, N. Y. — Samuel Untermyer, special counsel for the city, has refused the proposal of Justice Frankenthaler to send the Interborough Rapid Transit fare case before a referee. Mr. Untermyer stresses his intention to restrict the case to the simple issue of the Transit Commission's power to alter the contract rate fixing the fare at 5 cents.

Louisville, Ky.—The Public Utilities Bureau has announced that it has suggested to the Louisville Railway that several stops be eliminated on various lines, since these stops are close to other stops and comparatively few passengers ever enter or leave cars at the locations. The Louisville Railway is studying the situation with a view to increasing speed on all its lines. Dropping of stops where they are not absolutely neecssary is a help in faster schedules.

Boston, Mass.—Rapid transit service to Milton will be started at the Ashmont end of the Cambridge-Dorchester tunnel on Aug. 26. The opening had to be postponed from Aug. 17 because of the inability of the Boston Elevated Railway to complete track construction on the high-speed line between Ashmont and Milton. The transit department is pushing the work to provide rapid transit all the way from Harvard Square to Mattapan Square, using trains of the Boston "L" from Harvard to Ashmont stations, and high-speed trolleys from Ashmont to Mattapan.

Montreal, Que.—A recent meeting of the local executive committee and the Tramways Commission has revived talk about possible subway construction. The general impression prevails that neither the company nor the city is ready to subscribe to a project involving the expenditure of $100,000,000. It is learned that, because of the heavy cost, the city might be called upon to help finance the project and possibly to grant exclusive concessions to the Montreal Tramways for the building of the underground system.

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Recent Bus Developments

350 Miles of Route in Puget Sound System

The transportation department, consisting of North Coast Transportation of the Puget Sound Power & Light Company, Seattle, Wash., Pacific Northwest Traction Company and Portland-Seattle Stage Company, is now settled in its new headquarters on the second floor of Central Terminal.

This new organization consists of all major transportation units belonging to the Puget Sound Company. It includes the two interurban lines between Seattle and Everett and between Bellingham and Mount Vernon; operates over 350 miles of main line stage routes reaching from Vancouver, B. C., on the north to Portland, Ore., on the south, and 42 miles through the White River Valley to Auburn and on into the hills at Enumclaw. Eighty stages are operated, and a check of the payrolls on April 15 shows 384 employees.

It is estimated that the combined gross revenue from the interurbans and stages for the year 1929 will be $2,225,000.

At the start of the summer season eight new stages were placed in service on the Seattle-Vancouver, Portland-Seattle routes, to help materially in the handling of vacation business and give equipment sufficient to permit many of the stages now in operation to be placed in the paint shop. All of the stages will be known as the North Coast Lines.

Work on the new depot at Tacoma, which will be known as Central Terminal, was completed so that the structure could be opened for business by June 1. The opening of this depot permitted stages to be loaded under cover instead of on the streets as at the present time. It also helped the company in handling the Tacoma business, as practically all passengers come to the terminal to board the stage instead of being picked up along the streets, the method employed at present.

New Buses for Gadsden

Delivery has been made to the Alabama Power Company of four new buses recently purchased for use in Gadsden to meet the additional demand for transportation facilities resulting from the industrial activities at the Goodyear Plant and for the replacement of the old bus now in use on Ewing Avenue Line. The chassis are equipped with 29-passenger street car type bodies. A feature of the buses is the Tropic-Aire heating system, which utilizes the heat from the cooling water of the engine. A radiator is installed in the front of the bus and is so connected to the cooling water circulating system that the water from the engine jacket can be bypassed through this radiator before it passes to the radiator in front of the engine. The heat is then circulated through the bus by means of a fan placed behind the radiator. This system gives a clean, odorless and uniform heat. The color scheme is a yellow body trimmed in orange. The fenders and bead are blue and the top gray-green. The inside of the body has a cream colored ceiling, cherry panels and a brown linoleum floor. A garage and shop is now under construction for the maintenance and storage of the new buses. A 15,000 gallon gasoline tank and pump are also being installed at the garage to carry a supply of gasoline for the buses and for other automotive equipment in use in Gadsden.

De Luxe Bus Service in Baltimore

The United Railways & Electric Company, Baltimore, Md., has been authorized by the Maryland Public Service Commission to establish de luxe bus service between the fashionable Roland Park section of the city and the downtown district. The route will be 6½ miles each way and the fare will be 25 cents one way. Seven de luxe White buses will be used on the line. They will be the last word in comfort. Each will seat nineteen passengers. Company officials hope to have the line in operation by Oct. 1. The Public Service Commission made a slight change in the downtown section of the proposed route, but this met with the approval of the company. A ten-minute headway will be maintained during the peak hours and a twenty-minute headway during the rest of the day. The finish will be Alexandria blue with trimmings of desert sand.

Big Chartered Bus Business

During the last two months the number of buses of the Public Service Co-ordinated Transport, Newark, N. J., chartered by organizations and groups of friends for summer outings has shown a large increase over any similar period since the chartered service was organized. On July 18, the Prudential Life Insurance Athletic Association and its friends chartered 111 Public Service buses to carry some 3,300 persons on an excursion to Asbury Park; on Aug. 2, employees of the Wright Aeronautical Corporation of Paterson chartered 107 buses to take some 3,000 persons on an outing to Lake Hopatcong. Another large order has been received to take members of the Hudson County Republican Club on an outing to Sea Girt. In addition to these large orders several hundred buses have been chartered to individuals and groups of friends for outings.

By Bus and Limited from Indianapolis to Cincinnati

Service over the old Indianapolis & Cincinnati Traction Company's line never did penetrate closer to Cincinnati than Connersville, Ind., but the new company, the Indianapolis & Southwestern Traction Company, which purchased the old road some months ago at receiver's sale, has established fast bus connection between Cincinnati and Connersville to connect direct with the new railway service, particularly "The Southeastern Limited" trains, which provide unsually fast service. Southwestern limiteds make no local stops, but no extra fare is charged. Seats may be reserved by telephoning the ticket offices. Porter service is provided. Through service by electric railway from Indianapolis to Cincinnati was the dream which circumstances conspired to prevent the late Charles L. Henry from realizing.

Contractual Factory Service Upheld

Employees of the Mount Hope Foundry in North Dighton have a right to associate together and hire a bus to transport them to and from their work. In the action in which this right was established the Eastern Massachusetts Street Railway sought to prevent John Ingham, Dighton, from transporting men to and from their work, but Judge Lummus of the Suffolk Superior Court ruled they were within their rights as was Ingham. Many of the men at the plant live in Somerset. Five years ago they formed a club and hired Ingham to carry them to the foundry in his bus. They said the service by railway was not dependable, but this was denied by the company. While he decided Ingham had the right to transport the employees of the foundry to and from their work, Judge Lummus ruled Ingham should be enjoined from accepting other business. The route of the Ingham bus parallels that of the railway.

Railroad Protests New Service

Contention that the Hart Motor Coach Company secured local licenses for operation of buses in fifteen towns and one city between Winchendon, Mass., and Williamstown, Mass., by way of the Mohawk Trail, for the new corporation known as the Hart Mohawk Trail Lines without divulging the true owners was made when the Massachusetts Department of Public Utilities heard the petition of transfer of the certificate of public necessity to the new concern. Winchendon Selectmen and representatives of the Boston & Maine Transportation Company appeared as objectors.

Counsel for the Boston & Maine said he understood the Hart Mohawk Trail Lines was a subsidiary of the Boston, Worcester & New York Street Railway. He opposed the granting of permits in Western Massachusetts territory because the Boston & Maine operates trains in that territory. The Boston & Maine Transportation Company expressed a willingness to tie up its Gardner and Greenfield line with Winchendon and serve the town.

Substitution Before State Commission

The Westchester Street Transportation Company, Inc., has applied to the Public Service Commission for authority to substitute buses for electric cars on a portion of its route in Tarrytown and Elmsford; town of Greenburg and White Plains. It also seeks to operate buses in Tarrytown and White Plains not included in but forming a route connecting with the White Plains-Tarrytown line.

As noted previously in the ELECTRIC RAILWAY JOURNAL, the various municipalities have consented to the proposed substitution of buses and these will be filed with the commission when it conducts a hearing on the petition.

The extension of routes was formally authorized by the board of directors of the Westchester Street Transportation Company on July 30. The rate of fare proposed is 10 cents for a ride in zone one; 15 cents for transportation between zones one and two, and 25 cents for a continuous ride from zones one to three.

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The franchises granted by the several municipalities provide for the removal of tracks on streets where they are not imbedded in the pavement and their removal when the municipalities do paving or repaving.

At any time after ten years the company is to be permitted to terminate the operation of buses and to exercise its rights to operate electric cars on tracks.

No More Meterless Cabs in Worcester

The Worcester, Mass., license board has decided that operation of flat-rate taxicabs, which have been competing with the Worcester Consolidated Street Railway through a 35-cent rate to any place in the city, has proved unsuccessful. The board has not acted to require all cabs to meter the service, but it has refused to grant any more licenses for meterless cabs. The companies that operate cabs on the flat-rate basis are said to be ready to return to the meter basis, but each is waiting for the other to take the initiative.

New Carrier Rules in Oklahoma

Electric railways operating buses over the public highways of Oklahoma, outside of incorporated cities and towns and all other bus carriers, are affected by House Bill No. 19, which considerably increases the taxes on bus operators carrying persons and property between fixed termini or over a regular route. House Bill No. 19 amends Chapter 113. Session Laws of 1923, repeals Sec. 5 of that act. It was approved by the Governor on June 24, and became effective immediately.

The section of the present law which is repealed provides that no vehicle weighing more than 15,000 lb., including its load, shall be permitted to operate over the public highways of the State without special permission of the Corporation Commission. The new schedule of taxes for regular motor carriers operating between fixed termini or over regular routes designated as class "A" follows: Each passenger motor vehicle seating capacity not to exceed seven, 3 mills per mile seating capacity from 8 to 11, 5 mills per mile; seating capacity from 12 to 17, 7 mills per mile; seating capacity from 18 to 23, 9 mills per mile; seating capacity from 24 to 29, 11 mills per mile; seating capacity from 30 to 36, 12.5 mills per mile; seating capacity in excess of 36, 15 mills per mile. The tax is computed on the basis of the number of miles covered in schedule per day for 30 days per calendar month, regardless of whether motor carrier carries out such schedule.

Motor carries engaged in the transportation of property will pay two-fifths of a cent per mile on distances traveled, mileage to be determined on the same basis as applies to passenger motor carriers. Lower taxes are provided for class "B" and class "C" motor carriers. In addition to the above each motor carrier upon filing application with the Corporation Commission for a certificate of convenience and necessity shall pay the commission a fee of $100 and upon filing an application for transfer of certificate shall pay the commission a fee of $50.

Direct Service by Bus to Iowa Fair Grounds

The Tri-City Railway, Davenport, Ia., will provide model transportation to and from the Mississippi Valley Fair and Exposition this year, and with the added advantage to riders of transfer privileges, involving a saving in fares. R. J. Smith, general manager, said a few days ago:

"We believe we are in a position this year to realize what has been our desire ever since the fair was inaugurated. The advent of the fair was coincident with the wane of street car travel. Our car lines were not near enough to the grounds to provide direct service, and the bus was still an experimental vehicle of transportation, particularly mass transportation. Nevertheless we were not neglectful in providing motor coach service, such as was possible with the equipment at hand. This year, however, with our reserve fleet augmented by seven new coaches, we will be in a position to offer fairgoers regularly scheduled, dependable service.

"Furthermore, we have found it possible to provide transfer privileges which we think will be attractive. While the regular fare of 25 cents on the fair motor coach is not disturbed, yet with returning passengers a transfer is issued to any local line in Davenport. Upon payment of the established fare on any local line a transfer will be issued which on presentation to the motor coach operator reduces the fare to the grounds to 25 cents.

Mount Vernon, N. Y.—There was a brief ceremony in front of the new City Hall Building on Aug. 17, following which representatives of the South Westchester Bus Company, a subsidiary of the Third Avenue Railway, owner of the franchises, and city officials inspected the four routes which were opened for service the following morning. The fare is 10 cents, with a number of transfer points connecting with trolleys.

Pittsfield, Mass.—Early substitution of buses for trolley cars by the Berkshire Street Railway in the southern part of Berkshire County, Massachusetts, is forecast by the action of municipal authorities of Pittsfield, Lenox, Stockbridge and Great Barrington in granting the company's petition for the change. Other towns are expected to take similar action.

Worcester, Mass.—The local license board has rejected the petition of the Boston, Worcester & New York Street Railway for a permit to operate through the city on a Boston-Albany bus route. This is the second time the request has been refused. It was made in behalf of the Hart Motor Coach Lines, a Boston, Worcester & New York subsidiary. The Boston & Maine and the Boston & Albany Railroads opposed the application of the Hart lines.

Indianapolis, Ind. — The Greenville Transportation Company has asked the Public Service Commission to remove limitations in the company's certificate for a bus route between Winchester and Union City, in the event the Union Traction Company's petition to abandon its railway line between Muncie and Union City is granted. At present the company operates under a limited certificate issued in deference to the Union Traction Company protest.

Worcester, Mass.—Under an agreement reached between the Selectmen of Millbury and the Worcester Consolidated Street Railway a bus line will be substituted for the present railway line between Millbury and Worcester, the first suburban trolley line built out of this city.

Medford, Mass. — The Boston Elevated Railway has announced restoration of three bus lines in Medford. The North Cambridge-Medford Square bus, the Riverside Avenue line and the North Street Medford-Arlington Center services were changed on Aug. 3 in consequence of operating losses. Officials say the lines as restored must pay if they are not to be withdrawn permanently.

Columbus, Ohio—Sept. 23 has been set by the Public Utilities Commission as the date for the hearing on the plea of the Columbus Railway, Power & Light Company for permission to discontinue railway service between Columbus and Westerville. If the abandonment is authorized, the company will substitute buses. The company says that its losses on the railway line which for years it has operated to Westerville have been steadily increasing. Westerville is about 15 miles from Columbus.

Fitchburg, Mass. — The Department of Public Utilities has ordered that the certificate of public convenience and necessity, granted the Suburban Bus Lines, Inc., in 1926, be revised and amended to restrict the buses from discharging passengers on Main and Summer Streets in Fitchburg between Upper Common and the Lunenburg line. While operating in the opposite direction they are not to stop to take on passengers between the points mentioned. The Fitchburg & Leominster Street Railway asked this restriction.

Bennington, Vt.—The Vermont Public Service Commission has granted the Berkshire Street Railway's petition for a permit to replace trolley service between Bennington and the Massachusetts state line with a bus service. Four buses will be put in service soon, to run every two hours through the day and evening.

Indiana Harbor, Ind. — A temporary injunction restraining Frank Dolatowski, local bus owner, from operating his buses over any of the routes of the Shore Line Motor Coach Company within or between East Chicago, Hammond and Whiting has been granted by Judge Greenwald of the Lake County, Superior Court. The Shore Line contended that Dolatowski is offering it competition in violation of a ruling by the Indiana Public Service Commission.

Pasadena, Cal.—The Pacific Electric Railway has applied to the Railroad Commission for a certificate of public convenience and necessity to operate an auto stage service between Montana Street and Lincoln Avenue in Pasadena, and Woodbury Road and Lake Avenue here, a distance of 4.3 miles. The application is the result of conferences held with representatives of the Altadena Chamber of Commerce and other associations and of the engineering department of the Railroad Commission, at which the company agreed to furnish the proposed service.

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Financial and Corporate

O'Fallon Ruling Reflected in Indiana

Commission there modifies its stand in regard to evidence in pending consolidation case

EVIDENCE of a change in attitude in the matter of its consideration of valuation factors is contained in order No. 9499 issued by the Indiana Public Service Commission, the purport of which is to rescind, set aside and declare of no effect that portion of an order issued on Oct. 24, 1928, which stated that the commission in the matter of the petition of the Indiana Electric Corporation, Central Indiana Power Company, Terre Haute, Indianapolis & Eastern Traction Company, et al., "will consider only valuations based upon original cost" in connection with interurban, bus and railway properties.

Order No. 9499 points out that the recent decision of the Supreme Court of the United States in the O'Fallon case makes it clear "that in a matter of this kind it is necessary to consider all pertinent evidence as to the value of the property, as to the cost of reproduction and the cost of reproduction depreciated."

The issue goes back to Oct. 24, 1928, on which date the commission approved an order outlining procedure to be followed in the conduct of the cause looking toward the consolidation of the companies mentioned. In regard to the valuation of interurban, bus and railway properties involved, the order included the following provision:

"As to the interurban, motor bus and street railway properties involved, the commission will consider only valuations based upon the original cost. Appraisals on the basis of the cost of reproduction for the transportation properties would result in valuations too high to be used as the basis for any issuance or exchange of securities. The historic cost of utility property of this kind certainly ought to be a sound basis for consideration of this cause, representing as it does the actual money invested in the property. Appraisals on the cost of reproduction basis reflecting only present day prices would be far in excess of the actual money cost of the property. The commission within the last few months has had an appraisal made of certain interurban property with the result above indicated."

As the commission now sees it the declaration that it would consider only valuations based upon the original cost of the interurban, bus and railway properties obviously is not in harmony with decisions of the Supreme Court of the United States which must be regarded as controlling in the valuation of public utility property, particularly the recently decided O'Fallon case. In order to arrive at a legal valuation in a matter of this kind, it is necessary to consider all pertinent evidence as to the value of the property involved, including evidence as to the cost of reproduction and the cost of reproduction depreciated. The O'Fallon case makes this very clear.

The commission is now of the opinion that in the conduct of this cause it should hear all pertinent evidence as to the value of all property involved and should not, before the hearing of any evidence, be committed to a policy which would confine it to an original cost basis only. It is of the opinion that the portion of the order approved Oct. 24, 1928, relating to a consideration of valuation upon an original cost basis only as to interurban, bus and railway properties should be rescinded and ordered that the previously quoted section be deleted.

Louisville Brief Filed

Arguments to uphold its contention for a fare of 10 cents with three tickets for 25 cents are contained in a brief filed by counsel for the Louisville Railway, Louisville, Ky., in the Federal District Court. The brief is the second filed since the hearing, the first being devoted to argument on the jurisdiction of the court. The brief concludes with the statement that should the company earn all that the city's testimony suggests and a fair rate of return is no more than 7 per cent, the company would barely earn a fair return on as much as $21,105,850, "the lowest fair value that could be justified even upon the prejudiced testimony of defendants' witness Hubley. On every other basis of computation suggested by the testimony the proposed rates will afford far less than a fair return upon the fair value of plaintiff's property which it has devoted to the public service. . . ."

The brief said the favorable rate of return of 1926 is not likely to be equalled in the immediate future at the present rate schedules and cited the falling off in passengers carried in the last five years. The decrease in the period was from 70,204,876 to 66,997,370, the brief said. It set up the value of the property used and useful on the basis of testimony by the various experts as being from $24,486,000 to more than $28,000,000.

Only Liberal Terms Will Promote Flow of Capital

The St. Louis Transportation Survey Commission on July 11 decided to direct its future consideration to the formulation of a contract ordinance which will meet the city charter's provisions relative to street railway and bus company franchises.

Since Governor Caulfield vetoed the terminable permit bill, passed by the last General Assembly, and as he will be the head of the state government until 1933, there is no hope of putting through a similar law in the meantime. The Governor suggested that if the people of St. Louis want the terminable permit plan they can adopt it by amending the city charter, which restricts franchises to a 50-year period. The commission asked Rudolph Kelker, its consulting engineer, to draw up a report on the operation of the bus lines of the city.

At the meeting Mr. Kelker read a statement recommending the improvement and modernization of railway equipment, track extensions to newly settled sections and the use of high-speed buses equipped with pneumatic tires. He said that the flow of capital to permit needed improvements to be made will be largely determined by the conditions under which the companies are permitted to operate.

New Haven Finances Its Trolleys

The Department of Public Utilities in Massachusetts has authorized the New Haven Railroad to purchase from time to time Worcester Consolidated Street Railway first and refunding mortgage 20-year 4½ per cent gold bonds, dated Aug. 1, 1910, and similar bonds of the company dated Aug. 1, 1910, bearing extra coupons, making the rate of interest thereon 6½ per cent per annum at not more than the face value of the bonds and accrued interest thereon, for the purpose of facilitating the refunding of Worcester Consolidated Street Railway's funded debt. The department has also approved the purchase by the New Haven of $300,000, face value, of demand notes of Springfield Street Railway at not more than face value of the notes, plus accrued interest, for the purpose of providing Springfield Street Railway with funds for rehabilitation of its transportation system.

What Will Boston Do About It?

The Boston *Herald* is asking what, if anything, has been done about co-ordinated transit. It will be recalled that the big job done by the last General Court was the passage of an Elevated bill which creates a Transit District made up of the cities and towns served by the Elevated, its affairs to be managed by five trustees who would study proposed new routes and report on them to a Transit Council. This Council, also created by the act, is to be made up of the mayors and chairmen of selectmen of the communities of the district; recommendations from the trustees, if approved, to be referred by the council to the General Court. The act also authorizes the district to acquire from the city of Boston, with the consent of the Mayor and City Council, all the subways and rapid transit lines which the city now owns in its "proprietary capacity," and thereafter to acquire from the commonwealth the Cambridge tunnel. In other words, the act contemplates the unification of the transit system of Greater Boston under centralized management. As the *Herald* sees it, the big item in the program is the taking over of these facilities by the new Transit District. That cannot be done without the favorable action of the Mayor and the Council. The *Herald* says:

"We have been waiting these many weeks for some sign of interest on their part in this extremely important proposal. We do not argue the merits of the plan now, but we do raise the question if it is not high time for the city authorities to take the public into their confidence and let us know their views and probable intentions. Does the city accept, or reject, the act?"

Deal for Twin City Company Rumored

According to the Canadian *Financial Post* rumors are current in St. Paul and Minneapolis that a change in stock control of the Twin City Rapid Transit Company is impending, and it is said that the H. M. Byllesby interests, which control the Northern States Power Company, centering in the cities mentioned, will acquire control and become the dominant factor in a short time. Canadian directors say no hint of any such change had previously reached them. They were unable to offer an opin-

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ion as to whether or not the plan was likely to go through. Twin City Rapid Transit Company owns the entire railway systems in St. Paul and Minneapolis. The total mileage of the lines in the cities and throughout the surrounding urban districts, when reduced to single track, covers more than 516 miles. The company also owns all the local bus lines operating in coordination with the railway service. Several suburban bus lines are also under the same ownership.

Relocation Hearing at East Chicago

Public hearing on the appeal of the Chicago, South Shore & South Bend Railroad from the refusal of the City Council of East Chicago, Ind. to permit the railroad to relocate its tracks there were conducted by the Public Service Commission on Aug. 6.

Notice of the company's intention to prosecute its appeal, which was filed last May, recently was served on the East Chicago board of public works after officials had been advised by the board that, in view of the City Council's refusal to take any action in the matter, it would be futile to pass a new franchise.

Negotiations looking toward the removal of the South Shore Line tracks from Chicago Avenue, the principal business artery, and the construction of a new right-of-way through the south portion of the city were begun nearly a year ago. The original franchise, providing for removal of the tracks to grade location along the Grand Calumet River, was approved by the board of works last December and was sent to the City Council with favorable recommendations. During the ensuing months, however, the franchise has been held in committee.

Property at Hammond to Be Sold

Suit for foreclosure and application for the appointment of a receiver for the Hammond, Whiting & East Chicago Railway has been filed in the United States District Court in Hammond, Ind., by the First Union Trust & Savings Bank, Chicago, and Emile K. Boisot of California, trustees under the mortgage.

The bill was filed by F. C. Crumpacker of the law firm of Crumpacker & Fredricks, counsel for the trustees. He alleges that the street railway has defaulted in payment of interest on its first mortgage bonds since Feb. 1, 1923.

It is expected that sale of the property under the foreclosure proceedings will result from the filing of the suit by the trustees. A syndicate of local business men of East Chicago, Whiting and Hammond has been formed to bid for the property if it is put up for sale in the Federal Court. The Midland Utilities Investment Company has a minority interest in the syndicate.

The Hammond, Whiting & East Chicago Railway operates a system of electric railways in Hammond, Whiting, East Chicago and Indiana Harbor. The service of the railway is interconnected with that of the Chicago Surface Lines.

Minnesota Road Sold at Foreclosure

The Minneapolis, Anoka & Cuyuna Range Railway, Minneapolis, Minn., was sold on Aug. 20 to W. D. Lovell, contractor and engineer, for $25,000, subject to approval by the Federal Court. Mr. Lovell announced no plans for the road, which operates as a trolley line between Minneapolis and Anoka, Minn. The sale was conducted by E. P. Burch, who has operated the line two years or more under receivership. The sale was to satisfy claims of bondholders, the trustee being the American Mortgage Company of Boston, Mass. The road started in 1913 as the Minneapolis & Northern equipped with gas-electric engines. It has 16 miles of trackage and operated 12 under lease. It has two electric locomotives, six electric cars and shops and stations. It is now fully electrified.

Railway and Bus Associates Buys Pennsylvania Properties

The United Power & Transportation Company, Philadelphia, Pa., has sold its interest in the Schuylkill Valley Traction Company and the Lebanon Valley Street Railway to the Railway & Bus Associates. Unofficially the purchasers are believed to be Associated Gas & Electric Company.

Oakland, Cal.—The period for the deposit of securities of the Key System Transit Company under the reorganization plan has been extended to Sept. 20.

Philadelphia, Pa. — The disputed extra dividend of $600,000 announced by the Philadelphia Rapid Transit Company several weeks ago has been distributed, the way having been cleared by the withdrawal of a taxpayer's suit seeking to block the transaction.

Hudson, N. Y.—Application will be made to the Public Service Commission by the Eastern New York Utilities Corporation for authority to abandon the trolley line between Albany and Hudson, as a result of action taken by the directors of the New York Power & Light Corporation.

Pensacola, Fla. — The Gulf Power Company plans to suspend operation of trolley cars on the Belt line, which serves the residential section of Pensacola near Pensacola Bay.

Newark, N. J.—A hearing will be held here on Sept. 25 by the Public Utilities Commission on the application of the receivers of the Morris County Traction Company for permission to dissolve the company. Public Service Co-ordinated Transport is now furnishing service by bus over the route of the supplanted trolley between Newark and Dover.

Plattsburgh, N. Y.—The Public Service Commission has consented to the abandonment by the Plattsburgh Traction Company of a portion of its route known as the north loop of the Belt Line here, a distance of 1.52 miles. The city authorities were in accord with the plan and permission to discontinue service and remove the tracks has been granted by the Common Council.

Dover, N. H.—The Central Park Theater here, owned by the Massachusetts Southeastern Railway, was destroyed by fire on Aug. 6 with a loss of $20,000. The stock company playing at the theater lost costumes and scenery.

Salem, N. H. — The Massachusetts Northeastern Street Railway will sell Canobie Lake Park at Salem, N. H., at public auction on Sept. 14. The park covers about 50 acres. There are many pavilions, buildings and a dance hall. The railway will also sell the brick carhouse and other property at the park.

Conspectus of Indexes for August, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	Aug. 1929 7.76	July 1929 7.76	Aug. 1928 7.65	June 1929 7.76	Jan. 1924 6.91
Electric Railway Materials* 1913 = 100	Aug. 1929 146.4	July 1929 147.5	Aug. 1928 142.5	March 1924 163.9	Feb. 1928 139.5
Electric Railway Wages* 1913 = 100	Aug. 1929 231.0	July 1929 230.9	Aug. 1928 229.7	Aug. 1929 231.0	Jan. 1924 217.4
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Aug. 1929 200.8	July 1929 199.0	Aug. 1928 204.5	March 1924 206.8	July 1929 199.0
Eng. News-Record Construction Cost (General) 1913 = 100	Aug. 1929 205.9	July 1929 204.8	Aug. 1928 207.3	March 1924 224.7	Nov. 1927 202.0
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	July 1929 98.0	June 1929 96.4	July 1928 98.3	Nov. 1925 104.5	April 1927 93.7
Bradstreet Wholesale Commodities 1913 = 9.21	Aug. 1929 12.63	July 1929 12.49	Aug. 1928 13.19	Dec. 1925 14.41	July 1924 12.23
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	July 1929 158.5	June 1929 154.8	July 1928 152.8	Nov. 1925 167.1	May 1924 141.0
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	July 1929 161.6	June 1929 160.0	July 1928 161.1	Nov. 1925 171.8	April 1929 159.3
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	July 1929 129.2	June 1929 135.2	July 1928 120.2	Feb. 1929 140.4	July 1924 73.4
Bank Clearings Outside N. Y. City 1926 = 100	July 1929 107.8	June 1929 102.2	July 1928 100.7	Feb. 1929 110.1	May 1924 84.4
Business Failures Number	July 1929 1581	June 1929 1477	July 1928 1455	Jan. 1924 2231	Sept. 1928 1348
Liabilities (Millions)	102.09	64.22	32.07	122.95	23.13

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

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Personal Items

Brooklyn Surface Lines Personnel Announced

William Siebert, long in service, in charge under Mr. Menden. Many other changes made

INCIDENTAL to the unification of the surface lines of the Brooklyn-Manhattan Transit Corporation and the Brooklyn City Railroad as the Brooklyn & Queens Transit Corporation on July 1, many changes were made in the surface transportation department. William Siebert continues at the head of this department; S. S. Hamilton remains assistant superintendent of transportation; C. A. Drew as superintendent of schedules; W. E. Box as superintendent of employment and instruction, and William Luhrssen as chief clerk. F. J. Brennan joined Mr. Siebert's staff as assistant to the superintendent of transportation. Mr. Brennan previously was assistant superintendent of transportation of the Brooklyn City Railroad. The activities of the employment and instruction divisions for the surface lines have been centralized under Mr. Box, except as to badges and photographs. This change eliminates the separate employment, instruction, badge and photograph divisions of the Brooklyn City Railroad. In connection with the merger of the surface lines, a number of changes in the assignment of division superintendents, day depot masters and night depot masters were made by Mr. Siebert. These were noted in detail in ELECTRIC RAILWAY JOURNAL NEWS for Aug. 3, page 115.

MECHANICAL DEPARTMENT UNDER W. G. GOVE

The mechanical department of the Brooklyn & Queens Transit Corporation is headed by W. G. Gove, and L. J. Davis is engineer of car equipment. Mr. Niles Persons continues as superintendent of surface line shops and P. S. Scott is made general inspector. S. Engebrethson, formerly general foreman at 52d Street shop, was transferred to Fresh Pond shop in the same capacity. The new foreman at 52d Street shop is W. F. Platt, formerly foreman carpenter there. In the inspection shops, George Siebert as foreman was placed in charge of both the 9th Avenue and Franklin Avenue shops. C. L. Knight also is foreman in charge of both the 24th Street and Nostrand Avenue Garage.

H. J. Kolb becomes chief engineer, way and structure, for the new company. The Surface Roadway Division has its headquarters at 849 Nostrand Avenue and F. L. Finch is head of the division. The former headquarters of Mr. Finch, as head of the B.-M. T. surface track division at Smith and 9th Streets, will no longer be used as track division headquarters. W. H. Wharton is superintendent of buildings for the new company and retains his headquarters at 1130 Atlantic Avenue. T. Neilson becomes assistant superintendent of buildings. C. E. Wilcox joins Mr. Kolb's staff as office assistant in charge of records and correspondence and J. A. Rosenberger as special inspector.

Interest naturally centers around Mr. Siebert, the man who will direct the operating of the 500 or more miles of surface lines with their 1,200 cars, and who presumably will be responsible for the operation of the company's motor bus lines when the event of their operation emerges from the tangled meshes of consideration by city officials. Mr. Siebert is one of life's mystery men—men known widely and favorably in their own communities but still escaping the spot light of publicity. Not even Harding, Pulitzer prize-winning cartoonist, when he was on the Brooklyn *Eagle*, discovered Mr. Siebert, or if Harding did discover him then the elusive Mr. Siebert had his own way again and succeeded in escaping publicity. It is a way that has made Mr. Siebert camera-shy to the extent that the ELECTRIC RAILWAY JOURNAL could not secure any portrait of him suitable for half-tone reproduction. That's how diffident is Mr. Siebert.

But about the man. Over in Brooklyn in 1928 at a banquet to him, more fragmentary facts about him came to light than ever before. The occasion was the completion by him of 40 years of service with the surface lines there. Many of the men who attended had worked with Mr. Siebert for years, but in addition there were the county clerk, Supreme Court justices, and others prominent in public life.

From this, that and the other sources, it appears that Mr. Siebert began his railroad career in 1887 as a conductor on the Nostrand Avenue horse-car line. His advance through the ranks was steady until he finally was in charge of the Ridgewood Depot. Then came the turning point—his appointment to the post of superintendent of transportation of the surface lines in 1907.

MR. SIEBERT'S APPRECIATION OF THE WORK OF THE RANK AND FILE

Out of a clear sky one day about twenty years ago, Mr. Menden, now the president in Brooklyn, sent for Mr. Siebert to come downtown and see him. When Mr. Siebert arrived at Mr. Menden's office, he told Mr. Siebert he wanted him to take the job of superintendent. Here's Mr. Siebert's own version of what took place:

"I told him I did not want the job as nobody seemed to last long in that job, and I had a family to take care of. He said he thought I would be able to handle myself satisfactorily in the job and finally told me to take a week to think things over and then come back to see him. I went back a week later and told him again that I didn't want the job. But I didn't know he had been talking with Harry Crowe and some of the others who knew me downtown and they had told him just to tell me to try my hand at the job and I would stick at it. At any rate, when I told him I still didn't want the job, he simply said he'd have to have someone downtown and asked me to go inside and help him out temporarily. That was more than twenty years ago and I'm still helping out."

He has no mistaken notions about things. He can do most anything in railroading, has done most everything, and, when occasion requires, still does most everything, but knows that as a policy that is a mistaken one. He can delegate tasks and he does delegate them. In a gracious compliment to the men under him, Mr. Siebert once said:

"One man cannot run a railroad. We sometimes say we are running it but that isn't true. We must have the co-operation and support of every man in the organization from switch-boy to president, and unless we have that our efforts to run the railroad to satisfy the public and the management are bound to fail. I have been fortunate in having enjoyed that loyalty and support in a generous degree and I owe all of whatever success I have achieved to each and every one of you."

No encomium to the man could possibly give a better clue to the underlying philosophy that is Mr. Siebert's than this statement made on one of the very few occasions on which he broke his customary silence.

B. C. Cobb Elected to Commonwealth & Southern Board

B. C. Cobb, New York, chairman of the board of the recently organized Commonwealth & Southern Corporation, has been elected a director of the Georgia Power Company; Magor Car Company; Pullman E. Patterson, Macon, Ga. Mr. Cobb also is the chairman of the board of the Allied Power & Light Corporation, and for three years served as chairman of the advisory council of the American Electric Railway Association.

Mr. Cobb is president of the Tennessee Electric & Power Company and a director of the Nashville Railway & Light Company. He is also president of the Commonwealth Power Company and the Penn-Ohio Edison Company, which, together with other public utilities, were recently consolidated with the Southeastern Power & Light Company.

Mr. Cobb was born in Boston on Aug. 13, 1870, and after leaving school was first employed by the Pennsylvania Railroad. Later he was one of the organizers of Hodenpyl, Hardy & Company. In 1928 this company and Stevens & Wood, Inc., were acquired by the Allied Power & Light Corporation, of which Mr. Cobb became chairman.

C. C. Brown in the Quarter Century Club

Chester C. Brown, auditor of the New York State Railways at Syracuse and Utica has completed 25 years of service. Mr. Brown entered the employ of the company on July 1, 1904, when, under Hague, Comstock & Walker, managers and construction engineers of the Rochester & Eastern line, he accepted a position in Canandaigua. His first job was that of freight handler. After about six months, he was promoted to freight agent at the Canandaigua office. Still later the same year, Mr. Brown was appointed general freight and express agent of the Rochester & Eastern, which position he held for about two years. Following this, he occupied the position of paymaster on the Rochester & Eastern and Rochester & Sodus Bay lines.

In February, 1907, following the change of ownership, Mr. Brown was placed in

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charge of the Canandaigua office, where he remained until 1909, when he was transferred to the Rochester office. In August, 1919, he was appointed chief clerk by J. M. Joel, general auditor, and served in that capacity until Dec. 1, 1923, at which time he was appointed auditor of Utica, Oneida and Syracuse lines, with headquarters at Utica. He becomes the 341st member of the company's Quarter Century Club.

Darius E. Peck Elected Vice-President of General Electric

Darius E. Peck, assistant manager of the law department of the General Electric Company since 1920, has been elected vice-president and general counsel of the company. At the same time Allen H. Jackson, vice-president and general counsel since 1922 and associated in the company's law department since 1902, retired from active service, having served the company wisely, ably and loyally.

Mr. Peck was born at Hudson, N. Y., in 1877. He is a graduate of Williston Academy at Easthampton, Mass., and of Yale University. He was admitted to the bar in 1901. He practiced law in New York City from 1902 until 1913, when he became a member of the law department of the General Electric Company and moved to Schenectady. Seven years later he was named assistant manager of the department, a position he held until his promotion to vice-president and general counsel.

Mr. Peck has also had considerable experience in the public utility field. In 1915 he was elected secretary, treasurer and a director of the Schenectady Illuminating Company, the Mohawk Gas Company, and the Schenectady Power Company, succeeding James O. Carr. In 1920, at the time of the organization of the Adirondack Power & Light Corporation, he was elected a director and secretary and served for several years. When the Mohawk Hudson Power Corporation was formed in 1925 he became secretary of that company, serving until April of this year. He is at present a director of the New York Power & Light Corporation.

Mr. Jackson was born in Schenectady in 1864. He was graduated from Union College in 1886 and from the Albany Law School two years later. He entered the office of his father, Judge Samuel W. Jackson, of the State Supreme Court, and practiced law in his home city until 1892, when he went to New York with the law firm of Chanler, Maxwell & Philip. Three years later he returned to Schenectady and entered into partnership with his father. This association continued until 1902.

Beginning about 1900, Mr. Jackson had his first contact with General Electric affairs, previous to his actual entry into the company's organization. It was at this period that the National Electric Lamp Association was undergoing organization at Cleveland. At the request of the late Hinsdill Parsons, general counsel of the General Electric Company, Mr. Jackson assisted in bringing about the formation of the national association. His work at that time was a forerunner to his direct employment by the General Electric Company in December, 1902, as one of its attorneys, under Mr. Parsons. Mr. Jackson became counsel to the company in 1911, and after Mr. Parsons' death in 1912, he became the head of the law department.

In 1922, the year in which Gerard Swope succeeded E. W. Rice, Jr., as president of the company and Owen D. Young succeeded the late Charles A. Coffin as chairman of the board, Mr. Jackson was made vice-president and general counsel.

Coach Company Promotes J. E. McCarthy

John E. McCarthy has been elected a vice-president of the Fifth Avenue Coach Company, New York. He will continue to serve as secretary and his title is vice-president and secretary. Mr. McCarthy's career with the Fifth Avenue Coach Company began when he started to work as a stenographer in 1914. Within two years of his entering the service he was appointed general bookkeeper. In that capacity he handled the accounts of four corporations and became so thoroughly familiar with the business that he was made chief clerk in 1918. In 1922, Mr. McCarthy was transferred to the president's office and received the title of assistant to the president. On Nov. 5, 1924, he was appointed assistant secretary of the company, and on March 1, 1925, he became secretary, succeeding in that capacity Samuel E. Morrow, who retired at that time.

B. G. Noah General Superintendent at Duluth

B. G. Noah has been appointed general superintendent of the Duluth Street Railway, part of the Duluth-Superior Traction, in charge of all departments of operation in Duluth, Minn., and Superior, Wis.

G. B. Noah

For the past two years Mr. Noah has held the position of assistant to the vice-president, going to Duluth from Chicago where, for ten years, he was connected with the Chicago Surface Lines as electrical engineer in charge of power station design and electrical testing. Mr. Noah received his technical training in electrical engineering in Chicago.

The principal departments of operation which will be under Mr. Noah's direction are: Engineering and roadway department under John Carson, chief engineer and T. A. Armstrong, roadmaster; mechanical department under R. J. Crawford, master mechanic; the operating departments in Duluth and Superior under William S. Byers, superintendent, Duluth division, and Alfred Williams, superintendent, Superior division, and schedules and publicity under R. B. Thompson, superintendent of schedules.

Herbert Warren, vice-president and general manager of the company, explains in a bulletin announcing the appointment, that "the increasing burdens of management other than operation, make the change necessary."

Preston S. Arkwright, president of the Georgia Power Company, has been elected president and member of the directorate of the Columbus Electric & Power Company. The Columbus company is a subsidiary of the Commonwealth & Southern Corporation, which, through the Southeastern Power & Light Company, likewise controls the Georgia Power Company.

Harold Smith Elected Vice-President of Westinghouse

Harold Smith, general solicitor of the Westinghouse Electric & Manufacturing Company, has been elected vice-president. Mr. Smith entered the legal department of the Westinghouse Company in 1919 and was appointed general solicitor in 1926. Prior to that time he was engaged in the practice of law in Chicago being a member of the firm, Glennon, Cary & Walker. He is a graduate of Northwestern University (LL.B. in 1905), and at Yale (LL.M. in 1906), and he also studied at the University of Chicago. He is a member of the bar of the States of New York and Illinois.

John C. Higgs, for five years chief engineer of the power station of the Jacksonville Traction Company, Jacksonville, Fla., is to be transferred to Tampa, where he will become assistant superintendent of the power station of the Tampa Electric Company. The Jacksonville Traction Company and the Tampa Electric Company are under executive management of Stone & Webster, Inc. T. J. Hunt, chief engineer of the Winter Haven Power & Ice Company, will succeed Mr. Higgs at Jacksonville.

Frank J. Miller, appointed by Governor Patterson as a member of the Oregon Public Service Commission to fill the vacancy caused by the death of Louis E. Bean, has been elected chairman, the post occupied by Mr. Bean at the time of his death. Mr. Miller was the first secretary of the original Oregon Railroad Commission, serving from 1891 to 1893. In 1909 he was elected as a member of the Railroad Commission, and later was appointed to serve out an unexpired term. In January, 1910, Mr. Miller took office on his election as commissioner, serving continuously until January, 1919.

E. D. Spicer, superintendent of the refrigeration department of the General Electric Company, has been made assistant manager of the Schenectady works. Mr. Spicer was graduated from Cornell University in 1912 with the degree of mechanical engineer. In 1924 he went to the General Electric Company in the manufacturing general department. In December of the same year, he joined the staff of James A. Smith, superintendent of the Schenectady works, and, in March, 1925, he was placed in charge of the insulator and carbon brush department.

H. W. Olcott, Jr., has been transferred to Indianapolis and promoted to the position of manager of publicity and advertising there for the Interstate Public Service Company and Central Indiana Power Company subsidiaries—a group of electric, gas, and local and interurban railways, absorbed early this year by the Midland Utilities Investment Company, with which he is now associated as assistant publicity director.

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J. K. Bruce Under New London Scale

The London County Council has decided that the scale of salary attaching to the position of general manager of the Council's tramways shall in future be £2,000 a year, increasing after four years service at that remuneration by annual increments of £250 to £3,000 a year. J. K. Bruce, who has been general manager for several years, is transferred to the new scale, and his salary is now increased to £2,500, increasing thereafter in accordance with the scale.

C. E. Eveleth Vice-President in G. E. Engineering Department

Charles E. Eveleth, who since 1927 has been a vice-president of the General Electric Company associated with C. C. Chesney and W. R. Burrows in the management of the manufacturing department of the company, has been transferred to the engineering department, and, as vice-president, will be associated with E. W. Allen in the direction of that department's affairs.

Mr. Eveleth will give special attention to the problems of the designing departments and works laboratories. Mr. Allen will direct his attention to the work of the commercial engineering, the contract service and district engineering departments.

Mr. Eveleth has been in the employ of the General Electric Company since 1899.

H. R. Cranford, the Toledo Edison Company, Toledo, Ohio, has accepted the chairmanship of a new committee of the National Association of Purchasing Agents, Inc., to be known as National Committee To Co-ordinate Activities of Affiliated Associations. The object of the committee will be to assist affiliated associations in the several districts to schedule their various activities to co-ordinate with those of other associations in the same district.

Fred N. Wardwell, formerly assistant engineer of the New York Central Lines, has joined the Rome Wire Company, Division of General Cable Corporation, as railroad sales engineer. He will be located at the division's executive office at Rome, N. Y. Mr. Wardwell has had wide railroad experience. During the past eleven years with New York Central, he has been closely identified with the electrification and equipment projects of its lines, having had direct supervision of the material inspection bureau of the electrical department. He was also technical advisor to the purchasing and stores department.

Obituary

Charles Currie

Charles Currie, former vice-president and general manager the Northern Ohio Power & Light Company, Akron, Ohio, with which he was actively connected from 1901 to 1916, died on Aug. 14 while on a motor trip in Massachusetts.

Mr. Currie was born in Toronto, Ont., on March 8, 1868. The family moved to London, Ont., and at an early age Mr. Currie went to work for the London Street Railway. Later he became superintendent of that company.

When the Everett-Moore Syndicate took over the London Street Railway and a number of other utilities in Canada and the United States, Mr. Currie was made superintendent of railways at Lima, Ohio. Later he was transferred to Cleveland as superintendent and went thence to Akron, finally becoming vice-president and general manager. When the Hodenpyl-Hardy interests took over the Northern Ohio Power & Light Company in 1916, Mr. Currie returned to Cleveland to join the Cleveland Trust Company. At the time of his death he was a director of the Northern Ohio Power & Light Company, president of the London Street Railway and a director of the Lake Shore Electric Company. Mr. Currie was 61 years old.

Gaylord Thompson

Gaylord Thompson, general manager of the Trenton & Princeton Traction Company, Trenton, N. J., died on Aug. 15. He had been ill for a long time and had been confined to his home for the past two years.

Mr. Thompson was a native of New York City. He was graduated from New York University in civil engineering. He later became affiliated with the Ohio Electric Company in Cincinnati. Sixteen years ago he removed to Trenton and was made general manager of the Trenton & Princeton Traction Company. He was a member of the American Society of Civil Engineers and the Trenton Engineers' Club.

Ora Taylor

Ora Taylor assistant superintendent of the southern division of the Pacific Electric Railway, Los Angeles, Cal., died on July 28. Mr. Taylor was 59 years of age. He went to Los Angeles 28 years ago from Knoxville, Ia. He entered the service of the Pacific Electric Railway in August, 1912, as a conductor's instructor on the western division. One year later he was appointed trainmaster of the western division, which position he held until January, 1920, when he was appointed assistant superintendent of the southern division.

A. K. Baylor

Armisted K. Baylor, General Electric commercial engineer and veteran of the electrical industry, died suddenly on Aug. 1. In 1891 Mr. Baylor went to the Thomson-Houston Electric Company at West Lynn, Mass., and moved to Schenectady, N. Y. in 1894, when the headquarters and main offices of the company were established there. In 1896 he became manager of the traction department of the British Thomson-Houston Company, later becoming general sales manager abroad. After fourteen years he re-entered the General Electric organization in the United States, and for several years was in the commercial general department. Mr. Baylor was 61 years old.

Daniel Corliss Frost

Daniel Corliss Frost, manager of the Lynchburg Traction & Light Company, Lynchburg, Va., died on July 23. He had been in a coma for several days when he suffered a second attack of a malady which had affected him since last April.

Though exceedingly modest in demeanor, Mr. Frost was widely known and held in high regard locally. He went to Lynchburg to manage the plant known as "The Spoke Works," which, after a few years' operation by the Philadelphia owners, was closed. He held several positions as manager of industrial plants in Lynchburg and was for a short time with the Chesapeake & Ohio Railway before taking the position as superintendent of the local railway late in 1902. This position he held until about a year ago when the gas company was separated and he became manager of the railway service.

He took an active interest in public affairs in his early years in Lynchburg and during the incumbency of Mayor G. Woodson Smith was a justice of the peace. He was a member of the Rotary Club, Oakwood Country Club, Sphex Club, Chamber of Commerce, a director in the Interstate Fair Association and the Commercial Savings & Loan Bank. He was interested in the collection of first editions and particularly interested in books on Virginia and Abraham Lincoln.

He attended the public schools in Philadelphia but went to work early in life with the Charles Scott Wheel Manufacturing Company, which sent him to Lynchburg. He was born at Laurel, Delaware.

Edward Early

Edward Early, assistant treasurer of the United Railways & Electric Company, Baltimore, Md., died on Aug. 2. He was 64 years of age. He was stricken with a heart attack while in his office in the Court Square Building and died soon afterward. Mr. Early was a native of Baltimore. He was educated in the public schools there. A number of years ago he entered the treasurer's office of the Western Maryland Railway and in 1913 joined the treasurer's office of the United. He was made assistant treasurer about a year later.

New Franchise Draft in Jacksonville

Austin Miller, city attorney of Jacksonville, Fla., has been requested by the public service committee of the City Council to prepare a "fair and legal" Jacksonville Traction Company franchise for the committee's consideration.

The text of the letter to Mr. Miller follows in part:

"In view of the fact that you are familiar with the former franchise, which was repealed, this committee feels that it is your province to prepare a draft of a proposed franchise that will be fair, just and equitable to the city and to the Jacksonville Traction Company. To the end, therefore, that this important matter may be disposed of without unnecessary delay, the committee requests that you prepare a franchise you think fair and legal, and that you furnish the committee with a draft thereof within the next 30 days."

Since the repeal of the former ordinance each side has made concessions, the attitude of the company toward a new grant being reviewed in ELECTRIC RAILWAY JOURNAL NEWS for Aug. 10, page 118.

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Industry Market and Trade News

Bids Received for Equipment for New York's New Subway

Final bids for steel cars, substation power and motor equipment on New York's new Manhattan subway were opened on Aug. 20 by Commissioner Daniel L. Ryan of the Board of Transportation and referred to the engineering department for computation.

For the installation of motors and control equipment, the Westinghouse Company bid $2,532,470 and the General Electric Company $2,547,070.

Bids were received for the 300 steel cars to be used from the following five companies: The American Car & Foundry Company; Magor Car Company; Pullman Car & Manufacturing Corporation; the Pressed Steel Car Company, and the Standard Steel Car Company.

These five bids were made on tabulated items and not for a lump figure. They will be computed by the board's engineering department and the total bids in each instance announced as soon as computed.

The delay in specifying the amounts entailed in the bids by the car manufacturers, it was explained, results in the fact that this is the first time in history that the city of New York has received, opened and computed bids for its own rapid transit.

Four bids were also received for installation of power equipment for substations of the new subway. These bids, tendered by the General Electric Company, Westinghouse Electric Company, Fishbach & Moore, Inc., and the Erickson Engineering Company, Inc., were also referred for computation to the engineering department.

All bids for the subway work are now in, with the exception of the one for the illumination of the new circuit.

Examination will begin before the Board of Transportation within a day or two on the reliability and experience in such construction work of the concerns involved in the bidding.

Recent Bus Orders

The electric railway industry continues to be one of the principal purchasers of bus equipment, and new orders are being placed without interruption. The Wheeling Traction Company, Wheeling, W. Va., recently ordered five 20-passenger Studebaker parlor car buses, while the Eastern Massachusetts Street Railway, Boston, Mass., ordered four Studebaker 21-passenger de luxe street car buses. The Brooklyn & Queens Transit Corporation of Brooklyn, N. Y., accepted delivery of four A.C.F. 33-passenger street car type buses, leased for a period of one year, and to the Boston Elevated Railway of Boston, Mass., were delivered five A.C.F. 40-passenger Metropolitan coaches. The Virginia Electric & Power Company recently placed an order for ten Twin Coaches of the 40-passenger urban type with the Twin Coach Corporation of Kent, Ohio, while the Denver Tramway Corporation ordered one 23-passenger A.C.F. urban coach from the A.C.F. Motor Company and one Mack 29-passenger city type bus.

The El Paso Electric Company recently placed an order for one White 54-A bus. Yellow Coaches were ordered by various bus divisions of electric railway companies, and the following deliveries were made: The Atlantic City & Shore Railroad, Philadelphia, received four Z-29 passenger buses; the City Light & Traction Company, Sedalia, Mo., one W city service type bus; the Wisconsin Gas & Electric Company, of Kenosha, Wis., took delivery of one Z-29 bus. Two Z-29 coaches will go to the Illinois Power & Light Company of Champaign, Ill., and the Wisconsin Power & Light Company of Janesville, Wis., took seven W city service type buses, while four W city service buses were delivered to the Sioux Falls Traction Company at Sioux Falls, S. D., and six buses of the same type were accepted by the Potomac Edison Company of Hagerstown, Md. An order of one bus of the same model was placed by the Erie Coach Company of Erie, Pa.

The Capital Traction Company of Washington, D. C., contemplates ordering three 21-passenger buses. Mack buses were ordered extensively also by several electric railway properties, and some recent orders follow below:

The Lehigh Valley Transportation Company, of Allentown, Pa., two model AB four-cylinder 29-passenger, city type buses; the Tompkins Bus Corporation of West New Brighton, N. Y., 24 Mack model AB four-cylinder 29-passenger city type buses; the Connecticut Company, New Haven, Conn., three Mack model AB four-cylinder 29-passenger city type buses; the Northampton Street Railway, Northampton, Mass., two Mack model AB four-cylinder 25-passenger, city type buses; the Boston-Worcester & New York Street Railway Company, of Framingham, Mass., one model BK 29-passenger parlor car bus and the Buffalo & Erie Coach Corporation of Fredonia, N. Y., has accepted delivery on two model BB four-cylinder 177½-in. wheelbase chassis.

Cleveland's New Electric Locomotives

The first of the 22 electric locomotives for use in the newly electrified railroad zone in Cleveland has been completed at the Erie, Pa., works of the General Electric Company. The locomotives, being constructed by the American Locomotive and General Electric companies, weigh 204 tons each, with 150 tons on the driving wheels, will handle the equivalent of seventeen 75-ton cars, and will have a maximum speed of 70 m.p.h.

W. B. & A. Orders Trailers

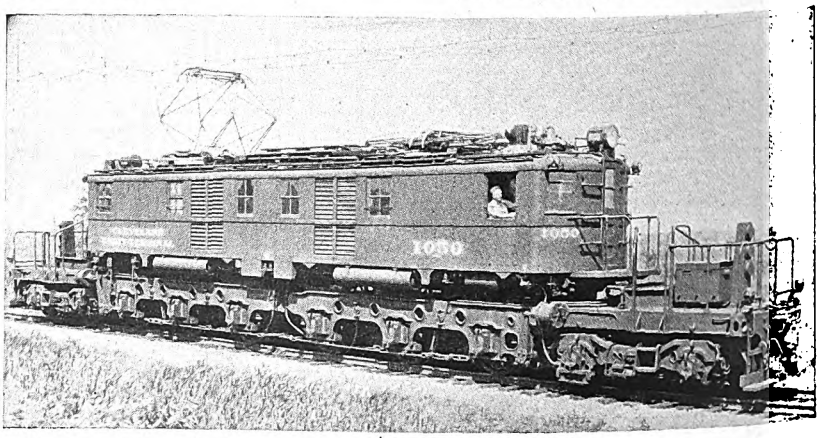
Detailed description of the nine trail cars ordered last April by the Washington, Baltimore & Annapolis Electric Railroad for service between Baltimore and Annapolis, announcement of which was made in the June, 1929, issue of ELECTRIC RAILWAY JOURNAL, is now available and is published below:

Air brakes	Westinghouse ATM
Axles	Brill A.S.T.M. A-20-27
Car signal system	Westinghouse electro-pneumatic
Couplers	Tomlinson MCB tight lock
Curtain fixtures	Excel No. 40
Curtain material	Pantasote
Destination signs	Keystone
Doors	Folding
Floor covering	N. Y. Belting & Packing Co.
Glass	3/16-in. plate
Hand brakes	Peacock
Heat insulating material	Salamander
Heaters	Railway Utility Company
Headlining	Agasote
Interior trim	Mahogany
Journal bearings	Plain
Journal boxes	Brill semi-steel
Lamp fixtures	Electric Service Supplies Company
Painting scheme	W. B. & A. standard green
Roof type	Arch
Roof material	Poplar, canvas covered
Sash fixtures	O. M. Edwards
Seats	Brill No. 201
Seat spacing	2 ft. 11 in.
Seating material	Genuine leather
Slack adjusters	American Brake Company, type J
Steps	Stationary
Step treads	Kass
Trucks	Brill 27-MCB-3
Ventilators	Nichols-Lintern
Wheels	36 in. diameter

St. Louis Car Company Builds Electric Locomotive

A combination electric switching locomotive was delivered July 16 by the St. Louis Car Company, St. Louis, Mo., to the Illinois Central Railroad for use at the Chicago terminals. The locomotive weighs 90 tons and is designed to utilize any of three different types of power. It cost $70,000, and was built in 60 days at the St. Louis shops of the car company. The new unit is 45 ft. in length and is provided with 1,000 h.p. in traction motors. It can utilize oil-electric power, trolley or third rail and storage battery.

Although the Illinois Central plans to use the locomotive for switching purposes, it can be used for road freight and will attain a speed of 35 m.p.h. Two 155 h.p. oil engines are used to drive the electrical generators. In its switching operations the locomotive will pull a 3,000 ton train, or the equivalent of 55 loaded freight cars.



Electric locomotive to be used in the electrified zone of the Cleveland Union Terminal

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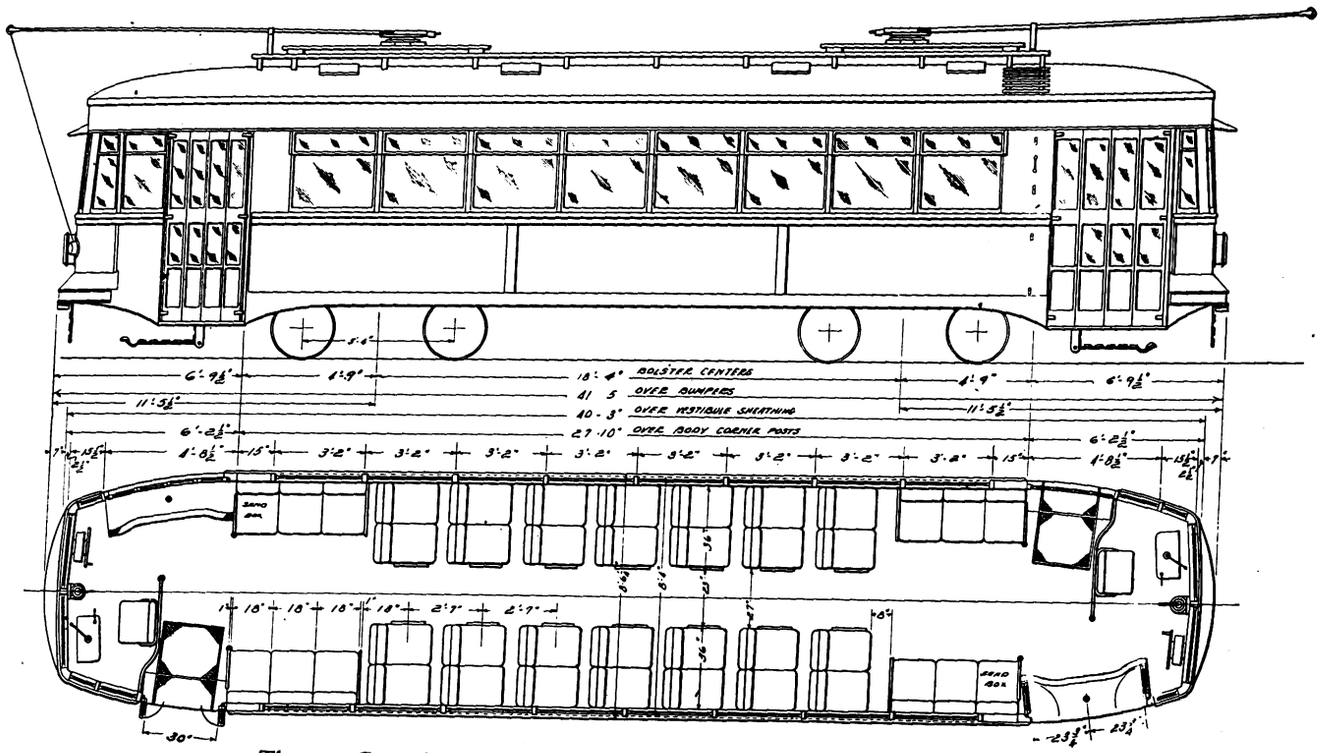

The new Greensboro cars are 41 ft. 5 in. over all and seat 40 passengers

Five Cars for Greensboro, N. C.

The North Carolina Public Service Company, Greensboro, N. C., recently placed an order for five new cars with the Perley A. Thomas Car Works, High Point, N. C. These cars are now being delivered to the railway by the car builder. They are of the double-end type, arranged for one-man service, with front entrance and rear treadle-controlled exit doors. A feature of this car is that the motorman will be seated when operating the controls. The window spacing in front of the car is so arranged that he has a clear view of the street in front of him, and the visibility is not obstructed by wide posts. The flooring of the cars is made up of 1½ in. square rubber tiles of two colors. The total weight of the car is 33,200 lb., and the length over all is 41 ft. 5 in. The length over the body posts is 27 ft. 10 in. and the width over all is 8 ft. 6¼ in., while the height from rail to trolley base is 10 ft. 7 in. An all-steel construction is used for the body. The type of car is one-man, double-end, double-truck, and the seating capacity is 40 passengers. A detailed list of the equipment follows:

Air brakes	Westinghouse
Car signal system	Consolidated Car Heating Co.
Conduit	Duratube
Control	K-75
Couplers	Car builder's
Curtain fixtures	Adams & Westlake Company
Curtain material	Pantasote
Destination signs	Hunter Sign Company
Door mechanism	Consolidated Car Heating Co.
Gears and pinions	Nuttall
Hand brakes	Peacock staffless
Heaters	Consolidated Car Heating Company
Headlights	O. B. illuminated type
Headlining	Agasote
Lamp fixtures	Dome, Dayton Manufacturing Co.
Motors	Four Westinghouse No. 510—35 H.P.
Painting	Enamel
Registers	R-11 with electric back
Roof material	Wood slats, canvas covered
Sash fixtures	Adams & Westlake Company
Seats	Double deck reversible
Seating material	Leather
Slack adjusters	American, type E
Step treads, "Kass"	Morton Manufacturing Company
Trolley catchers	Ohio Brass Company
Trolley base, form 4	Ohio Brass Company
Ventilators	Railway Utility Company
Wheels	Davis

Manufacturers!

The
CONVENTION EXHIBIT

Opens Officially at 9 a.m.
MONDAY, SEPT. 30

The Exhibit Committee desires to have everything ready and complete by
SATURDAY NOON,
SEPT. 28

At which time freight doors will be closed

Ship Exhibits Early and Be Ready by Noon Saturday, SEPT. 28

Gears on Montreal Cars

On page 818 of the August issue of ELECTRIC RAILWAY JOURNAL it was stated that the 106 new cars for the Montreal Tramway were to be equipped with Nuttall, Grade BP gears. This statement was inaccurate in that only 76 of these cars are to be equipped with Nuttall and 30 with Tool Steel gears, the latter being manufactured by the Tool Steel Gear & Pinion Company, Cincinnati, Ohio. The 25 two-car trains recently ordered will be equipped with Tool Steel gears.

Automatic Block Signals for Illinois Terminal System

The Illinois Terminal System has ordered from Union Switch & Signal Company materials for the installation of automatic blocks signals of the colored light type on about 240 miles of track between Staunton and Peoria, Ill., and from Springfield to Mackinaw Junction, Ill.

Lackawanna Contracts Let

Car and meter awards have been made for equipment for the electrified line out of New York

CONTRACTS for the construction of 141 all-steel electric vestibuled motor cars, equipped with roller bearings, by the Pullman Car & Manufacturing Company, Chicago; the construction of 230 horsepower motors and the necessary control equipment for each of these cars by the General Electric Company, Schenectady, N. Y., and for the conversion of a similar number of the latest model of the present suburban coaches as vestibuled trailer cars by the American Car & Foundry Company, Berwick, Pa., have been made by the Lackawanna Railroad. This equipment is for use on commuter trains connecting Hoboken, Montclair, Gladstone and Dover, N. J., comprising 70 miles of route or 160 miles of track, the electrification of which is now under way. The delivery of completed cars is promised, beginning in June next year. President J. M. Davis of the Lackawanna announced the placing of the contracts on Aug. 23.

This equipment can be operated in units of two cars—a motor and a trailer or coupled to form trains of two, four, six, eight, ten or twelve cars. Each motor car will be 71 ft. long and weigh 148,000 lb. complete with electrical equipment, while the trailers will weigh 113,000 lb. each, making the weight of a complete unit 261,000 lb., exclusive of passengers. Each motor car will seat 84 passengers and the trailers 78 or 82 passengers, making a total of 162, or 166 passengers for each unit.

Commuters have repeatedly declared the present coaches are the most satisfactory suburban cars the Lackawanna ever had, but the new equipment will be an improvement over that now in service. They will have the same well distributed lighting arrangement, the same ample knee room between cross seats, slightly wider aisles and be equipped with the most modern type of inclosed electric heaters.

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Two-Car Trains for Montreal

Of the 156 new cars which are being ordered by the Montreal Tramways during the present year, the last 50 are to be equipped as complete four-motor units for regular all-day service if necessary, with provision for coupling together for train operation at rush hours. Each of the units of the train is a standard new type car, uniform in size, construction and appearance, with the exception of the straightening of the vestibule platforms for the coupling equipment.

It is intended to operate the second unit as one-man safety cars in all-day regular service on lines suitable for such, but which have very heavy rush-hour traffic. At such periods the units will be coupled to the one-man cars to form the train, the operator of the one-man car taking the duties of conductor of this unit for the time being. These cars are being equipped with the recently developed Westinghouse variable automatic master control system, Westinghouse 510-A2 motors and Tomlinson mechanical and electrical coupler. An acceleration of 3 m.p.h.p.s. and a correspondingly higher rate of braking will be obtained by these cars.

Twenty-five of the units will be of the single-end, double-truck, one-man safety type, seating 54 passengers each and weighing approximately 37,600 lb. The other 25 cars will be of the single-end, two-man type, seating 42 passengers. Over-all dimensions of the two types are the same, with a length over the corner posts of 46 ft. 2 in.; width, 8 ft. 4 in., and height from rail to top of trolley board of 11 ft. 1 in. Bolster centers are spaced 22 ft. 7 in., and the wheelbase is 5 ft. 4 in. Equipment specifications, which are substantially the same on both types, are as follows:

Air brakes	Canadian Westinghouse Company Safety car equipment type E relay and quick release
Armature bearings	Bronze—babbitt lined
Axles	4-in., 4½-in. gear seat
Bumpers	Hedley anti-climber
Car signal system	Faraday, 600 volt
Compressor	Canadian-Westinghouse Company DH-16
Conduit	Standard metal conduit
Control	Westinghouse variable automatic master control
Couplers	Tomlinson form 10
Curtain fixtures	National Lock Washer Company
Curtain material	Pantasote
Destination signs	Keystone
Door mechanism	National Pneumatic Company GOF, 4½-in. M. engine
Doors, folding	Front—air operated Rear—treadle air operated
Fare boxes	Cleveland Fare Box Company
Finish	Enamel
Color scheme	M. T. Co. standard green and cream
Floor covering	Wood slat and Kass tread
Gears and pinions	Tool Steel Gear and Pinion Co.
Glass	Selected 21 oz.
Gong	12-in., foot operated
Hand brakes	Peacock staffless
Hand straps	Rigid wood hand rail
Insulating material	Three ply salamander
Heaters	Canadian General Electric Company, No. 1285, double element four circuit, 6-in. series
Headlining	5/16-in. Agasote
Interior trim	Cherry
Journal bearings	3½-in. x 7-in. bronze, babbitt lined
Journal boxes	Cast iron M. T. Company standard
Lamp fixtures	Safety Car Company, type DA comp. fixture
Motors	Canadian Westinghouse No. 510-A2, 42 hp.
Gear ratio	13-69
Roof, type	Arch
Safety car devices	Canadian Westinghouse full safety equipment
Sanders	O. W. Meissner Company, pneumatic
Sash fixtures	Metal—Robert Mitchell Company
Seats	Ottawa Car Mfg. Company, and Canadian Car & Foundry Company
Seat spacing	2 ft. 6 in.
Seating material	Rattan
Slack adjusters	American Brake Company, form E-1
Steps	Irving Co., Saf-Kar
Step treads	Kass
Track scrapers	M. T. Company standard
Trolley base	Nuttall Compay US 20-C
Trolley catcher	Keystone
Trolley wheels	Lyman Tube & Supply Company, Canadian Ideal wheel
Trucks	Canadian Car & Foundry Company Type F-790
Ventilators	Railway Utility Company Honeycomb
Wheels	Cast iron, 26 in. diameter
Fenders	HB fender
Notes	Heaters have Railway Utility Company, tnermostatic control.

Fifteen Trackless Trolleys for Salt Lake City

The last part of the first paragraph under "Recent Bus Orders Numerous," appearing on page 816 of the August issue of ELECTRIC RAILWAY JOURNAL, states that an order of eleven trackless trolleys have been placed with the Twin Coach Corporation by the Utah Light & Traction Company of Salt Lake City. This statement should read as follows:

"Seven trackless trolley coaches have been ordered from the Twin Coach Corporation, while eight trackless trolleys were ordered from the Cincinnati Car Corporation by the Salt Lake City Company, making a total order of fifteen vehicles of this type."

Details of New Bedford Cars Announced

Additional details are now available covering the twelve cars recently ordered by the Union Street Railway, New Bedford, Mass., mention of which was made in the July issue of ELECTRIC RAILWAY JOURNAL. The cars are being built by the Osgood-Bradley Car Company, Worcester, Mass., and are practically identical in design with cars ordered from the same builder by the Altoona & Logan Valley Electric Railway, Altoona, Pa., and by the Scranton Railway.

The principal items are as follows:

Air brakes	Westinghouse straight air, variable load
Armature bearings	Plain
Axles	4½-in.
Car signal system	Consol. Car Heating Company
Compressors	DH-16
Conduit	Metal
Control	Westinghouse "UM"
Destination signs	Hunter-226 RB
Door mechanism	National Pneumatic
Doors	Folding
Energy saving device	100 Amp. Economy Meters
Finish	Lacquer
Floor covering	Flexolith
Gears and pinions	Westinghouse
Glass	Plate in car body, non-shatterable in vestibules
Hand brakes	Peacock vertical
Hand straps	Porcelain rail only
Heaters	Gold Car Heating Company
Headlights	O.B. dash illuminating
Headlining	Agasote
Interior trim	Aluminum
Journal bearings	Plain
Journal boxes	Symington
Lamp fixtures	Electric Service Supplies Company, Twenty 30-volt lamps
Motors	Four 510 E, 35 hp., inside hung
Painting scheme	Pullman green and gold
Registers	Rooke
Roof type	Arch
Roof material	Wood—canvas covered
Safety car devices	Passenger emergency valve
Sash fixtures	Brass sash
Seats	Heywood Wakefield de luxe
Seating material	Monkey grain brown leatner
Steps	Stationary
Step treads	"Kass" safety
Trolley base	Nuttall lightweight
Trolley wheels	Kalamazoo
Trucks	Osgood Bradley
Ventilators	Osgood Bradley exhaust
Wheels, type	Steel, 27 in. diameter
Wheelguards	Bradley truck guard

New Des Moines Cars Received

Delivery was recently made of ten new cars purchased by the Des Moines Railway, Des Moines, Iowa. They are of double-truck, single-end design, arranged for one man operation. Individual leather upholstered seats are provided, arranged in pairs. Special attention has been given to interior decoration and lighting. Artificial illumination is provided by two rows of shaded lamps, directly over the seats. After arrival the cars were placed on public exhibition on a downtown street, where they aroused much comment as to their appearance and interior finish.

Ohio Brass Company, Mansfield, Ohio, announces the opening of its new office at 505 Insurance Building, Dallas, Tex. This office will be the headquarters of T. B. Jones, district sales manager for the company in the Dallas territory.

ELECTRIC RAILWAY MATERIAL PRICES—AUGUST, 1929

Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.
Lead, cents per lb.	6.75
Nickel, cents per lb., ingot	35.
Zinc, cents per lb.	7.15
Tin, Straits, cents per lb.	46.50
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	48 00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.17
Somerset mine run, f.o.b. mines, net ton	1.87
Pittsburgh mine run, Pittsburgh, net ton	1.80
Franklin, Ill., screenings, Chicago	1.50
Central, Ill., screenings, Chicago	1.10
Kansas crushed mine run, Kansas City	2.50

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive, ⅝ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.95
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.55
Sheet iron (24 gage), cents per lb.	2.85
Sheet iron, galvanized (24 gage), cents per lb.	3.55
Galvanized barbed wire, cents per lb.	3.25
Galvanized wire, ordinary, cents per lb.	3.15

Waste—New York

Waste, wool, cents per lb.	13.
Waste, cotton (100 lb. bale), cents per lb.:	
White	12.5
Colored	9.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	13.3
White lead in oil (100 lb. keg), cents per lb.	13.2
Turpentine (bbl. lots), per gal.	$0.57
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.15
Weatherproof wire base, cents per lb.	20.875

Paving Materials

Paving stone, granite, 5 in., f.o.b. New York—Grade 1, per thousand	$150
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.25
Cement, Chicago, in carload lots, without bags, f.o.b.	2.05
Gravel, ¾-in., cu.yd., delivered New York	3.25
Sand, cu.yd., delivered New York	2.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	14.00
Light copper, cents per lb.	12.00
Heavy yellow brass, cents per lb.	8.50
Zinc, old scrap, cents per lb.	3.15
Lead, cents per lb. (heavy)	5.00
Steel car axles, Chicago, net ton	$16.75
Cast iron car wheels, Chicago, gross ton	14.25
Rails (short), Chicago, gross ton	18.50
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.25

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ANNUAL *Convention* NUMBER

Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 73 New York, September 14, 1929 *Number 19*

Getting Down to FUNDAMENTALS

ACHIEVEMENT that is lasting can be built only on a solid foundation. A structure may serve its purpose for years but may not be fitted for the demands the future will put upon it. This is just as true in the local transportation business as in any other. Were this industry content merely to stay where it now is, the old foundation might serve. Almost certainly, however, the foundation used in the past will be unsuitable as a base upon which to build for the future, as the industry must do.

The cornerstone of the transportation structure is the franchise. Too often fundamentally unsound franchises are tolerated merely because of a time-hallowed sanctity attached to them. How best to change them to meet the needs of the future is one of today's fundamental problems.

OF almost equal importance is the fare structure. Practically no commodity other than local transportation is sold at a flat rate regardless of quantity. Determination of a proper rate structure involves far more than simply fixing the fare at a certain point. The time is ripe for a thorough analysis of the whole situation.

Similarly, a need exists for a national program of relief from burdensome taxes. While there are some isolated instances of progress toward more reasonable imposts, no concerted effort has been made toward this end. It is time to pause and take stock of the situation.

WHEN several forms of transportation are needed they should be co-ordinated to obtain best results. In those localities where electric railways formerly enjoyed a monopoly, a network of well-paved highways now provides ideal routes for bus operation. If the railways do not undertake this service, other interests undoubtedly will. The almost universal demand for rapid transit raises many technical and economic questions. Then, too, the place of the taxicab deserves careful consideration. Co-ordination implies more than common ownership of vehicles; the service rendered by each must be given its place in relation to the others.

No less fundamental in its way is vehicle design. In this age things are moving rapidly. Styles change. Much progress has been made in the endeavor to keep vehicle design abreast of the times, but the full possibilities are only beginning to be realized.

More and more the interurban railways are turning to the transportation of freight to augment their revenues. In this field, too, conditions differ much from those of a few years ago. The motor truck, properly used, can become an invaluable adjunct to the rail carrier in handling freight.

After the technical problems of providing the best possible service at a reasonable rate of fare have been mastered, the service must be sold to the public. The transportation industry must follow the example of others and merchandise its wares. Here again is a problem that demands fundamental thinking.

SOLUTION of nearly all these problems requires full understanding on the part of public authorities and the people of the community at large. Before they can be made to understand the transportation company's position, however, it is necessary for the transportation man so to study the problem that he himself has a full knowledge of the fundamentals. It is necessary to dig down deep to the basic elements. This consideration prompted ELECTRIC RAILWAY JOURNAL to select "Getting Down to Fundamentals" as the topic of this Annual Convention Number. In it these vital problems are discussed in a broad way. While no single formula is given to solve all the problems of the industry, the articles which it contains shed a clear light on the fundamentals involved. Upon the principles laid down by the authors the industry can build achievement that is lasting.

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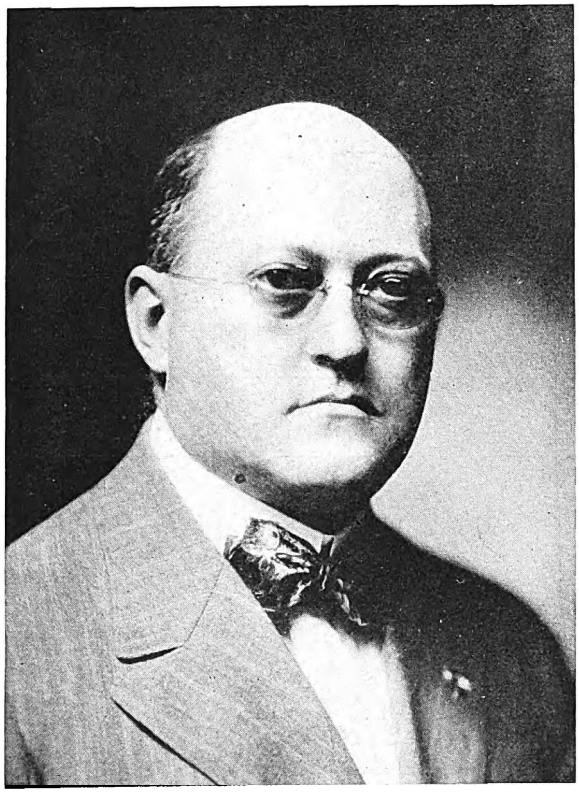

Preparing for Greater

By JAMES P. BARNES
President Louisville Railway, Louisville, Ky.
President American Electric Railway Association

IT IS not without significance that the American Electric Railway Association this year, for its 48th annual convention, returns to Atlantic City. It is there that have been born many of the new ideas and practices which have advanced us in the public service.

This year we come to a new house with a new vision. The house is larger and brighter than any we have known before. The city which is our host has matched the progress of the industry by building a convention hall in keeping with the spirit and courage of the transportation men who come to exchange their views, record their progress in the past year, and make their plans for the future.

Visitors who attend the convention surely will carry away a new impression of the enhanced facilities as well as of the magnitude and energy of our industry. They will realize that the business of carrying the people of this country has been conducted in a way that has been abundantly justified. As the visual impression obtained from this convention will transcend that of any convention of the past, so the inspiration given to those who attend it will be correspondingly higher. There is the same contrast between the old quarters in Atlantic City and the new as there is between conditions in the industry, past and present. We gave up the old quarters mainly because they were not so equipped that we could function properly. So we have given up our old attitude toward our conditions and our problems. In the past several years we have progressed because we have grown out of our old mental and physical housing.

It is only a few years ago that we had, right in Atlantic City, an animated discussion as to the advisability of entering the bus business. On all sides we were persecuted by jitneys and competing buses. We did not know just what to do. What we needed at that time was a better set of facilities for our riders in the way of cars, with buses in supplemental service. But at that time we did not all see the light. Now we have made our readjustment, and are reaping the benefits of wise additions to our facilities through supplemental bus service. Our action has demonstrated the wisdom of co-ordination as it now is being practiced generally.

Right now traffic congestion is giving us a great deal of concern. It is useless to rail at traffic congestion, as useless as to rail at the increasing use of the automobile. Ways to ameliorate the difficulties that have arisen because of it will be found. Our major problem is to adjust ourselves and our industry to a new order of civilization that is built upon new vehicular conveniences which have brought with them new traffic conditions. It has long been my conviction that the way to benefit a transportation property lies in benefiting the community which it serves. Hence, when it comes to dealing with traffic congestion, we should first of all think of the good of the community and, by serving that, reap the resulting benefits it will bring to us.

One of the greatest needs of the industry today is to get the viewpoint of the merchant. Of all our neighbors there is none with whom we should cultivate closer contact. Merchants and transportation men are interdependent to a large degree. Too often in the past each has kept aloof from the other. True, when danger threatens either one the other would extend a hand. But afterward each of us retreated into his shell. That was shortsighted. This year we are fortunate in having for one of our speakers a great Chicago merchant. If his coming results in bringing about closer relations between merchants and transportation men throughout the country that one result alone will be worth many times the whole cost of the convention.

This year the meetings will carry less burden of formality. Few if any of the speeches will be read; all will be concise. General subjects will be dealt with at the big meetings, and specific topics, of interest to a more limited number, will be discussed in group conferences. There is real meat in the program. We hope to accomplish a full day's work every day.

Following the report of the Advisory Council and the presentation of the Coffin Award on Tuesday night, there will be shown the most interesting series of motion pictures ever brought together. They will depict the progress of the transportation industry all over the world. They will give us a chance to observe and to compare conditions, and surely will leave impressions that can only be of benefit in our future endeavor.

We have found new quarters. We have brought ourselves into a new frame of mind. We have taken a new viewpoint. We have accumulated new energy. The watchword of this new convention will be "Let's Go."

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Progress

By PAUL SHOUP
President Southern Pacific Company
First Vice-President American Electric Railway Association

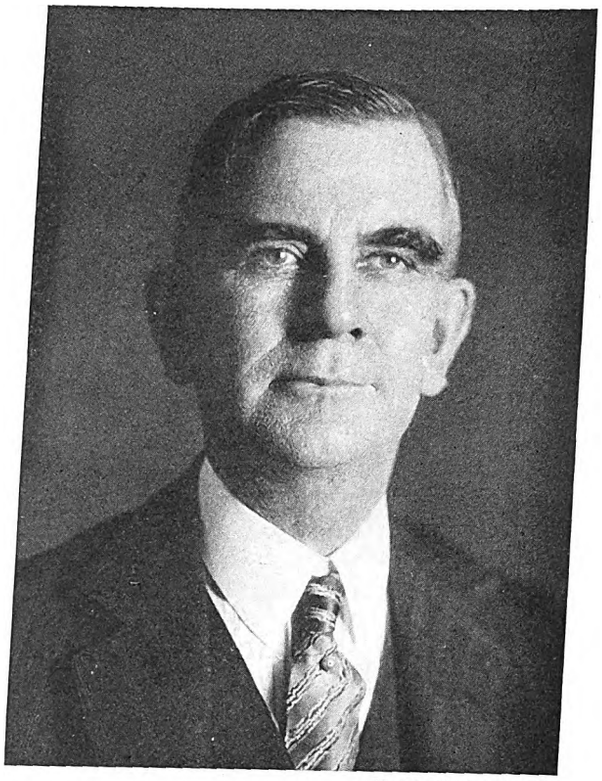

Photo by Blank-Stoller, Inc.

WHEN we of the electric railway industry think of basic problems we usually have in mind: (1) the increasing competition of the automobile; (2) community co-operation; (3) traffic control; (4) modernization of equipment and facilities; and, (5) the acquirement and retention at an equable charge of a sufficient volume of business to sustain the investments required by the industry.

Many theories aimed at the solution of these problems have been evolved and put into practice, only to be overturned and disproved. Some have met with pronounced success while other promising ideas are still undergoing the experimental tests of practical application. On the whole, however, we are justified in believing that a distinct advance has been made by the industry during the last ten years. To an impressive degree this advance has been furthered by a growing conception of the patron's desires, and by the whole-hearted effort which the industry has made to adjust itself to these desires.

That our relationship to the community is essentially a partnership to advance general development and prosperity is a fact that should be more widely comprehended. Harmful conditions, such as excessive taxation, poorly regulated street traffic, unwise competition of jitneys and various other unregulated carriers, all tend to restrict community development by limiting the ability of the electric lines to render fast, efficient and modern service.

The problem of street traffic control so that cars may operate more efficiently is being attacked in ways which give promise of satisfactory solution. Chicago, prohibiting automobile parking in the Loop, not only has increased sales for downtown merchants, but has reduced hazards of operation, speeded up street car service and increased patronage for the electric lines. In other cities the construction of pedestrian subways at busy intersections also has facilitated traffic.

Modernization of equipment and facilities, in spite of the large investments of new capital required, has been generally successful. Efforts to make the electric railway car comparable to the automobile in comfort and convenience are demonstrating their worth in increased patronage gained by electric railways which have made this admittedly daring experiment.

It may be stated that the one fundamental problem encompassing all other problems facing the industry today is that of acquiring and holding a sufficient volume of business to sustain the requisite investment.

The solution apparently is not to be found in a continual increase in fares and rates, for beyond a certain point losses in volume of business occur that would more than offset revenues derived from such upward revision of rates. Experiments have shown very clearly that no rate or fare increase will produce added revenue unless the revision is in practice accepted by the patron as reasonable for the service rendered.

If public desire and demand for service and comfort refinements is to be met to the financial advantage of the electric railways, we must look more closely into the industry itself to find the wherewithal with which to justify the required improvements.

Avenues through which further gains may possibly be made include: Reduction in inventories; standardization of equipment and facilities; elimination of non-essentials of every character; adequate equipment for peak hour movements; rigid economy of cars, mileage and intervals during sags; discontinuing expensive rejuvenation of already obsolete equipment; consolidation of departmental activities and elimination of overlapping duties and authority; conservation of time, material and effort in every channel of operation; education of employees in new methods and stimulation of constant effort to produce effective short-cuts in manual and mechanical practice, and intensive supervision of every activity, with the purpose of not only producing more effective and economical operation, but of winning the real co-operation of all engaged in the work.

Another very important step is the cultivation of better public relations so that there may be amelioration of the so-called "legal requirements" of communities, fewer demands for non-essential improvements, and a more friendly community attitude toward the industry.

At no time has the spirit of optimism which inspires and sustains the industry been so well justified as it is today. The trials and tribulations of a serious readjustment period are being successfully weathered. The outlook is hopeful and there is no reason to doubt that the electric railway is destined to win increasing recognition as an essential element in urban and interurban transportation.

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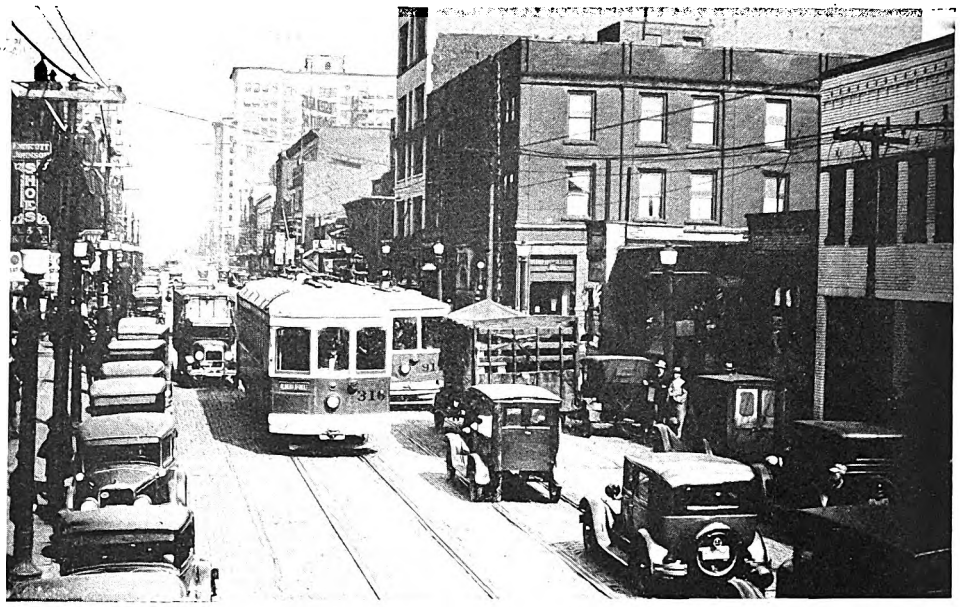

Youngstown, Ohio, has just adopted the most modern franchise ever given a local transportation agency

New Era Beginning in

Electric Railway

By

LESLIE VICKERS

Economist
American Electric Railway Association

THE transportation man does not turn to the dictionary for a definition of a franchise. To him it is the fundamental of his business, the prerequisite of doing business; it is the compass that guides him or the rock that shatters him, according to whether its provisions are good or bad.

The electric railway industry is one of the oldest of the public utilities. It depends for its existence on the use of public property and only in comparatively rare cases does it own the land over which it operates. It needs to use public streets because that is where the public of a community calls for transportation. But, originally, because of the fact that it had to place its rails in the streets—a condition not imposed on other forms of transportation—it sought a "franchise," also called a "grant," a "privilege," a "location," a "contract" or a "permit." As the public street served as the foundation for the tracks, so the public franchise served as the foundation for the street railway business.

The hopes of the early transportation men ran high. There was spread out before them the vista of a great network of urban and later on of interurban railways. The prospective profits were so alluring as to cause them to give little heed to the details of the franchises or grants under which they were to operate. Indeed, in many cases they scrambled for permits and competed with one another in what they would offer to the public body from which they sought their certificates. Thus were the first millstones hung around their necks.

A typical instance of this strenuous competition occurred in New York City, following the passage of the famous Cantor act of 1886, which required competitive bidding for all electric railway franchises. Particularly desirable territory in The Bronx was under consideration, and bidding became so spirited that percentages of gross receipts pledged in payment for the franchise ran up to ridiculous figures. The People's Traction Company finally obtained the privilege by agreeing to pay the city, in addition to the 3 per cent required for the state, 95 per cent of the gross receipts. Needless to state no lines were ever built by this company.

The terms of the grant in 1906 to the New York & Port Chester Railroad required payment of $8,000 annually for the first five years, $13,000 during the next five years and $35,000 annually for the remaining fifteen years of the period, in addition to a payment, from beginning of operation, of 5.4 cents per lineal foot of single track of all kinds for the first five years, 7.7 cents for the second five years and 20 cents per foot for the last fifteen years of franchise duration.

Companies, for instance, accepted perpetual franchises, contracting to serve the transportation needs of a city for a "fixed fare" (usually the nickel) and embodying provisions for paving in perpetuity. But cities unexpectedly extended their boundaries, frequently to the dismay of the franchise holder. The value of the nickel, in terms of purchasing power, declined to less than half its previous rate, and in the march of progress the industry discarded its horses, the only disturbers of the

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pavement. However, the railways were bound by franchises calling for a fixed fare and containing short-sighted paving provisions.

At the other extreme, and no less unfortunate and short-sighted, were those who accepted "term" franchises. Could they expect to get a reasonable return on their investment and their money back during the life of the contract? If they could all was well, but in most cases they could not and their dilemma was increased when public regulation became the vogue and their returns were strictly limited. Faced with the necessity of going out of business in a short time and accepting junk value for their property, there was no incentive to improve service, maintain equipment or seriously to cater to the transportation needs of the city. Often the only recourse was to go into politics and secure by the customary methods of that science a new lease of life. Much of the political oppression to which the industry has been subjected has come from the "term" franchise.

But no useful purpose would be served here by dwelling too long on the short term or the perpetual franchises. The former have mostly gone by the board because they did not guarantee continuous transportation service, and the latter because the perpetual alienation of the property of a body politic is now abhorrent to the present idea of social justice and civic procedure.

An Ideal Franchise should provide for:

1. **Indeterminate or terminable tenure.**
2. **Just compensation, in case of termination.**
3. **A reasonable return on a fair value through service-at-cost agreement.**
4. **A monopoly of common carrier transportation.**
5. **Relief from unfair and obsolete imposts.**
6. **City supervision or participation.**
7. **A fair share only of taxes.**
8. **The right-of-way for street cars.**
9. **Arbitration of disputes.**
10. **Flexibility of provisions.**

Franchises

The proper length of life of a franchise seems now to have been almost universally settled by the acceptance of the "terminable permit." This feature of a franchise is mentioned first of all because it is the most important. Given security as to tenure and given the assurance that the contract will be binding on both parties indefinitely while good behavior lasts, the first basic necessity or fundamental of a good franchise is secured.

Apparently the honor of granting the first indeterminate concessions belongs to the state of Massachusetts. But in that state no provision was made in the franchise for recapture by the public, and it remained for the state of Wisconsin in 1907 to incorporate a clause without which the Massachusetts procedure could never have gained universal favor. That clause was the one which makes provision for the municipality to purchase a public utility at a reasonable price, or fair valuation, or just compensation. Taken together—the right to do business indefinitely (while good behavior continues) and the right to expect a reasonable price for its property if taken over—these two provisions form the groundwork of most modern franchises, and have been accepted with almost universal approval by the advocates of municipal

In Toledo, Ohio, the Milner ordinance of 1922 has recently been amended to the great benefit of the city and the company

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as well as those of private ownership. These principles have had the indorsement of as widely varying groups as the National Association of Public Utility Commissioners, the Investment Bankers Association of America, the American Bar Association, the National Municipal League, the National Civic Federation, and numerous individual advocates of municipal ownership, such as the late Delos F. Wilcox.

The advantages of these two principles are apparent to all. They serve to do justice to the public body which issues the franchise, to those who use the services of the utility as well as those who provide them, and to that increasingly widespread group of people who invest their savings in public utility securities.

The merits of this plan, under the name of the "Standard Service Permit," are summed up in vigorous language by J. W. Dana, lawyer, of Kansas City. He says:

The standard service permit, erroneously called an "indeterminate" franchise, is merely the right to exist and do business subject to all the laws of the state during good behavior and until purchased, condemned or taken for public use—a right common to all property owners, except a very few public utilities.

* * *

The standard service permit is approved by all courts . . . all public service commissions, all investors and utility owners, all statesmen, economists and well-informed consumers and citizens.

It is economically sound. . . . . It guarantees supervision, regulation and control of utilities and assures efficient and sufficient service at minimum rates. It equalizes the cost of the utility plant between the present and future generations . . . and minimizes the depreciation and amortization charges against the consumers. . . . It secures the investment against confiscation at the end of the franchise term, invites capital into the state and encourages business. It also affords ample opportunity for municipal ownership when desired.

It is the fundamental principle underlying the right of the state and the power of a commission to regulate rates. Without the standard service permit . . . all attempts at rate-regulation are fruitless and the power of the commission is an empty form without substance, for the reason that any rate ordered would be confiscatory of the investment and therefore violative of the federal Constitution.

In certain states there is still a constitutional provision against the granting of any other than a "term" franchise. Where this is the case the uncertainty of tenure can be offset by some such provision as the following, which appears in the franchise granted on May 22, 1929, to the Youngstown Municipal Railway:

The company shall have the right, whenever the unexpired term of this grant or any renewal thereof shall be less than fifteen years, to have sole control of betterment, extension and permanent improvement. For the purpose of creating an amortization fund the company is granted the right at any time, when this ordinance or any renewal thereof has less than fifteen years to run, to charge such a rate of fare, that, after paying operating cost, maintenance, repair and renewal and the same return on the capital value as is heretofore provided, sufficient reserve may be set aside annually so that such reserve, together with the accumulated interest thereon at the rate of 7 per cent per annum, shall be, at the expiration of this grant, equal to a sum corresponding to the then capital value as herein defined, less the estimated salvage value of said property at the expiration of this grant, and during such fifteen-year period the city shall have the same power as prior thereto, except as herein limited, and any disagreement as to the rate of fare to be charged and as to the amount to be deducted for such salvage value shall be arbitrated.

The company may, during any such period of fifteen years, use any part of such amortization fund to retire any bonded indebtedness, and at such time the then capital value shall be correspondingly reduced.

Present State Situation Regarding Terminable Permit Legislation

States in Which Favorable Legislation Now Exists	States in Which Neither Constitution Nor Statutes Prevent Favorable Legislation		States in Which Constitutional Provision Prevents Unlimited Grants, and Their Limits in Years		States in Which Legislature Statutes Prevent Indeterminate Permits and Their Limits, in Years	
California	Arkansas	New Jersey	Alabama	30	Arizona	25
Colorado	Connecticut	New Mexico	Kentucky	20	Florida	30
Illinois	Delaware	North Dakota	Michigan	30	Idaho	30
Indiana	Dist. of Columbia	Oregon	Mississippi	99	(For cities under commission form of government)	
Louisiana (Cities over 100,000)	Georgia	Pennsylvania	Virginia	30	Illinois	40
Massachusetts	Idaho (Except cities under commission government)	South Carolina (Railways not specified)			Iowa	25
Minnesota	Maine	Tennessee			Kansas	35
New York	Missouri (Terminable permit legislation for St. Louis only, vetoed by Governor)	Texas (If not contrary to City Charter)			Maryland	25
Ohio	Montana	Utah			Mississippi	25
Oklahoma	Nebraska	Vermont (Perpetual)			Nevada	20
Wisconsin	New Hampshire (Franchises perpetual)	Washington			North Carolina	60
		Wyoming			Rhode Island	25
					South Dakota	30
					West Virginia	50

The present state situation regarding terminable permit legislation is summarized in an accompanying table.

If it be granted that these two provisions—terminable tenure and just compensation for the property in case of termination—form the basis of an ideal franchise, then it is possible to proceed to an analysis of the other provisions deemed necessary for the successful operation of a public utility. Foremost among these is an expression in the franchise of the right of the utility to earn a reasonable return on its value—using that term in the sense defined by the courts of today. But not only must the right to earn such a return be expressed, but a means of doing so be definitely set forth in the contract. This is best achieved by a service-at-cost arrangement, though there are other methods that may be followed and are in fact in operation in several cities. The best known and probably the earliest service-at-cost plan is that embodied in the Tayler grant of the Cleveland Railway. The same principle was afterwards introduced in Chicago, Cincinnati, Philadelphia, Montreal, Boston and a long list of other cities. Originally the service-at-cost principle was inserted into the franchises, not because of a general need for increased revenue, but because of the imminence of the expiration of franchises and of the need for reorganization. But in the last ten years the service-at-cost principle has usually been conceded as a means of retaining public transportation services and of increasing revenue. (An excellent study of the earlier service-at-cost franchises was made by L. R. Nash of Boston and the findings formed the basis of an article that was published in ELECTRIC RAILWAY JOURNAL of Jan. 4, 1919. Reference should be made to this article for comparisons of valuation, supervision, taxes and imposts, fare schedules, cost of service, etc., in these earlier franchises.)

The rising costs brought about by the war and the establishment of a new level of prices after the war placed street railway operators face to face with the necessity for increased revenue. Some municipalities, insisting on the complete fulfillment of the contracts

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entered into during much earlier days and under much different circumstances, found themselves faced with the loss of all public transportation facilities because the companies could not continue to operate indefinitely at a loss. Others took advantage of the situation to write into the new franchises a provision for service-at-cost, with a fixed and usually low rate of return to the company, and frequently on a scaled down valuation of the physical property. No longer was there any fear of the holder of a street railway franchise making too much money; the fear in the minds of the authorities was whether he could keep going at all without this modification of his permit.

While this economic situation was unfortunate in most respects, it brought two undoubted benefits in its train. The first was that it made many communities recognize the essential nature of their local transportation service and the second was that it disposed them towards fair and equitable dealings with the holders of the franchises. The result is today that in almost every city, even where service-at-cost franchises have not been granted, generous fare increases have been allowed in the interest of justice and of continued service.

The following cities have service-at-cost franchises in one form or another: Boston; Canton, Ohio; Chicago; Cincinnati; Cleveland; Columbus; Dallas; Detroit; Grand Rapids; Hamilton, Ontario; Kansas City, Mo.; Louisville; Memphis; Montreal; Pittsburgh; Rochester, N. Y.; St. Louis; Sioux City; Toledo, and Youngstown.

Negotiations are under way to provide a modern franchise ordinance in Chicago

It may be noted in passing that in the Youngstown franchise of 1929 a 6 per cent return is allowed on the present capital value and 7 per cent on all additions to capital. This is a healthy recognition of the essential part that capital plays in public service financing today and of the increasing cost of money. In addition to this there is a provision to the effect that the company may retain one-half of any excess above the permitted return after $100,000 is accumulated in the surplus fund of the company. This provision in the franchise is an encouragement to the company to operate with efficiency and economy.

Again, every franchise for the operation of a local transportation system should contain a provision for the maintenance of monopoly rights. It has come to be generally recognized that public services become costly under competition and that they can only logically be supplied through the services of a legal, regulated monopoly. It is easy to understand the fallacy of allowing two telephone companies to erect poles and establish exchanges in the same city; or of allowing two gas companies to dig up the streets, lay duplicate mains and compete for business. Likewise it is easy to understand the impracticability of allowing two street car companies to lay tracks in the same streets, or as a rule, to operate over the same tracks and compete for patronage. But the point has not been reached where the licensing powers are convinced of the fallacy of allowing any other public conveyance to compete with the established one, or of the desirability from an economic and service point of view of bringing all public transportation under one jurisdiction. But we are coming to it. Sec. 14 of the Saginaw franchise provides:

> The city agrees that . . . it will prohibit and prevent the operation of jitneys, buses and motor vehicles in competition with the service to be rendered hereunder by the grantee. The City Council shall, within the earliest possible time allowed by the Charter of Saginaw, enact such legislation as shall be necessary to provide for the elimination of all such competition. The city agrees that, during the term hereof, it will not permit or allow any jitney, bus or motor vehicle to operate in competition with the service to be rendered hereunder by the grantee.

There is no longer the same tendency on the part of local councils to grant franchise rights to bus operators to skim the cream off the business and so render the railway service more difficult to perform. The "jitney" menace, once so alarming, seems to have passed in most places. Even the newest development, the "flat-rate taxi," is looked at askance by licensing bodies, who have before them the records of disaster of this form of transportation. For "disaster" aptly describes their history. Purchased on a shoestring, operated without proper regard to the necessities for depreciation and maintenance reserves, they have nowhere established themselves as a reliable transportation service. But during all the time they have been allowed to run—usually until the junk pile claims them or the day's takings will not meet the repair bill—they have been sapping the life of the well-established transportation system and creating, at most, a nuisance value. Licensing bodies generally realize today that competition in local

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Service at cost has been adopted in Cincinnati within the last few years. The excellent results are now becoming apparent

Whenever any street in which the company's tracks exist shall be paved or repaved, the company shall be assessed only that amount which represents the increased cost of paving foundation under its tracks in excess of what the cost would be to the city in paving in case there were no car tracks in the street.

In the case such cost shall be made necessary by the construction of extensions to the present lines of the company the cost of the same shall be added to capital value; otherwise the cost of such portion of the foundation of street paving and repairs shall be paid out of maintenance, repair and renewal account.

Of almost equal importance and coupled with this provision is one which reads as follows:

All expense of change in tracks, pole lines and paving necessitated by public improvements shall be borne by the city of Youngstown and paid by said city.

Such a provision is calculated to make the city authorities hesitate before they undertake improvements which will be costly to the transportation company. Where no such provision exists the railway can be saddled at almost any time with a burden which has nothing to do with its business, and the weight of which has been felt in reduced profits of many a company. This provision makes for security and security makes for service.

Another clause of the ideal contract should relate to the use of bridges, culverts, grade separations, etc., that are the property of or in control of the city. Under some franchises public bridges, used only in small part by the car rider, are paid for in large part by him. Electric railway cars are part of the ordinary transportation service of a city, just like the trucks, automobiles and horse-drawn vehicles. The only real difference is that they run on rails, due to the fact that they use flanged wheels. Without the flanged wheels they would need no special roadbed. The electric cars seldom constitute the heaviest vehicles that use a public bridge, and it is futile to argue that the cost of construction of the bridges is greater because of their presence on them. If the railways pay for the cost of installing the ties, rails and such immediate extra foundation as may be necessary, together with the overhead wires, that is all that justice or logic can call upon them to do. But some communities seem to want them to pay for the whole bridge if they can, or bear the whole brunt of the cost of a grade separation. A modern franchise should express not only an unwillingness to do so, but the definite duty and obligation of the city to assume this burden.

Although there may be some difference of opinion on the subject, it seems that a model franchise rightfully should contain a provision regarding city supervision of a railway's services and to some extent of its finances. This seems to be necessary, for, to a greater and greater extent, a tendency is developing to make the city a partner in the enterprise, and as a partner it should have some degree of supervision. The "public be damned" policy has been superseded completely by one of the "public be

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served," and the unwise struggle between licensing bodies and transportation corporations has given place to the wise one of co-operation. The railway need not surrender its autonomy; it need not accept as an arbiter of its affairs and a director of its business a political appointee who will hinder and not help; it need not admit in even the vaguest way the right of the municipality to regulate its affairs. But there is a degree of city supervision which can be encouraged as the surest means of avoiding disputes and the quickest means of achieving such operating conditions as will allow the best service to be given.

This result is achieved under the Youngstown franchise by the following section:

> The company shall place and continue upon all of its lines cars and/or motor coaches of modern design, equipped and furnished with such improvements and appliances as shall be deemed by the city to be necessary and proper for the safety, convenience and comfort of the passengers and the public, and shall run such cars and/or motor coaches in such numbers and at such intervals of time (subject to the limitations hereinafter provided) and under such rules and regulations as the city may from time to time require, and shall cause such cars and/or motor coaches to stop at such places as the city may designate for passengers to leave or enter the same. The city reserves to itself the entire control of the service, including the right to fix schedule and routes, character of new cars and motor coaches and the right to increase or diminish service, but the commissioner may, pending the determination of any such question or questions by the Council, and to meet emergencies, temporarily approve changes in schedules and routes, but such schedules and routes so changed shall continue in force only until Council shall have otherwise directed. The right of the city to prescribe service shall not, except as by this ordinance provided, be limited in any way so long as the rate of fare in force and effect permits the company under the service prescribed to receive the full return provided in this franchise, but in case such service as prescribed prevents the company from receiving the rate of return provided herein, then and in that event the right of the city shall be limited to prescribe only such service as shall permit the return to be earned. Disagreement between the company and the city as to prescribed service interfering with such return at the rate of fare in effect shall be arbitrated in the manner herein provided.

Furthermore, under this ordinance, a city street railroad commissioner may be appointed by the Council, to be paid (after Jan. 1, 1930) by the city. His functions are set forth in the following section:

> Upon the taking effect of this ordinance the city may in any lawful manner suitable to Council designate a city street railroad commissioner. . . . The street railroad commissioner shall act as an adviser of Council of the city of Youngstown in all matters affecting the interpretation, meaning or application of any of the provisions of this ordinance and in all actions thereunder affecting the quantity or quality of service or the cost thereof or the rate of fare. He shall keep informed as to all matters affecting the cost or quantity or quality of service furnished, the receipts and disbursements, property and equipment of the company, the rate of fare and the vouchering of expenditures. . .
>
> The submission by the company to the street railroad commissioner of information concerning purchases, contracts, leases and other expenditures shall be only for informatory purposes, except in the case of transactions between the Youngstown Municipal Railway and affiliated or subsidiary companies of the same ownership. Such transactions, including the joint purchase of materials and supplies, shall be submitted to the city for approval in advance of their consumption.

Attention is drawn expressly to the first sentence of the last paragraph, which allows the retention of the full corporate rights of the company.

Some day electric railways may look forward to seeing a franchise which will explicitly classify street railways in the same category as schools, churches, hospitals, court houses and jails and which will, by this classification, relieve them of all taxation, or rather relieve their riders of all tax burdens which they bear as car riders. But this is too much to expect at the present. The best the transportation companies can hope for is that they will be relieved from discriminatory taxes and that they will cease to be used as unofficial though highly convenient tax gatherers for the cities. Who would defend today the provision of the Baltimore franchise which imposes a burden of 9 per cent of the gross of money collected on public streets by the street railways for the upkeep of public parks? The relation of the modern street car rider to a public park is a negative one—he seldom sees it and still less frequently uses it. But the man in the automobile drives through it and perhaps halts his car there to enjoy the lakes and the shrubbery paid for by street car fares. It is satisfactory to note that recent legislation in Maryland has now made it possible for the city of Baltimore to remove this anomaly.

Or who would defend the logic of having the street car riders in the capital city of the country, Washington, D. C., pay the wages of a large number of traffic policemen who direct 100 automobiles and more for every street car that they send on its way? These taxes and many others that might be mentioned are discriminatory to a degree and should no longer be tolerated. Franchises should provide that if riders are to be taxed as such, their taxation should be defensible and reasonable and based to some extent at least on benefits received. For certainly the principle of "ability to pay" does not prevail, since patrons are to a large extent drawn from classes that are unable to have their own private conveyances.

An ideal franchise in these days of crowded streets and swarming motor cars ought to contain provision for street cars and buses being given right-of-way over private conveyances. The street car provides mass transportation; traffic surveys in different cities have shown repeatedly that street cars transport approximately 80 per cent of the people who enter the downtown districts. It is unthinkable that the vast majority of the public should continue to be delayed and annoyed by careless motorists who use the car tracks and bus zones for their runways. A few cities have already recognized the rights of the car rider by either franchise provision or traffic ordinances, among them being the large cities of Cleveland and Philadelphia. In Baton Rouge, La., the franchise states:

> The cars of said railroad shall be at all times entitled to the track, and the drivers of vehicles shall promptly turn such vehicles out for the passage of the cars so as to leave the tracks unobstructed. . . .

The two larger cities regulate the right-of-way by ordinance, and all traffic policemen are instructed to keep the tracks clear of motor cars, with a resulting speeding up of street car service.

The right-of-way provision ought to be backed by a penalty, as is done in the Freeport, Ill., and Newark, Ohio, franchises, where a maximum fine of $50 is assessable for violation. Some companies, notably the Georgia Power Company in Atlanta, are attempting to educate motor car drivers to consider the street car patrons' rights. They use large posters illustrating examples of motor car drivers' carelessness and thoughtlessness in regard to street cars, displaying the posters prominently or publishing them at intervals in local newspapers. How effective these efforts are has not as yet been definitely determined; the fact remains that the sure way is to insist that new franchises protect the street car rights and back those rights with traffic ordinances and penalties.

An important provision of the modern franchises of Cincinnati, Cleveland and Youngstown is that which provides for the arbitration of matters not specifically covered by the franchises or disputes between the city

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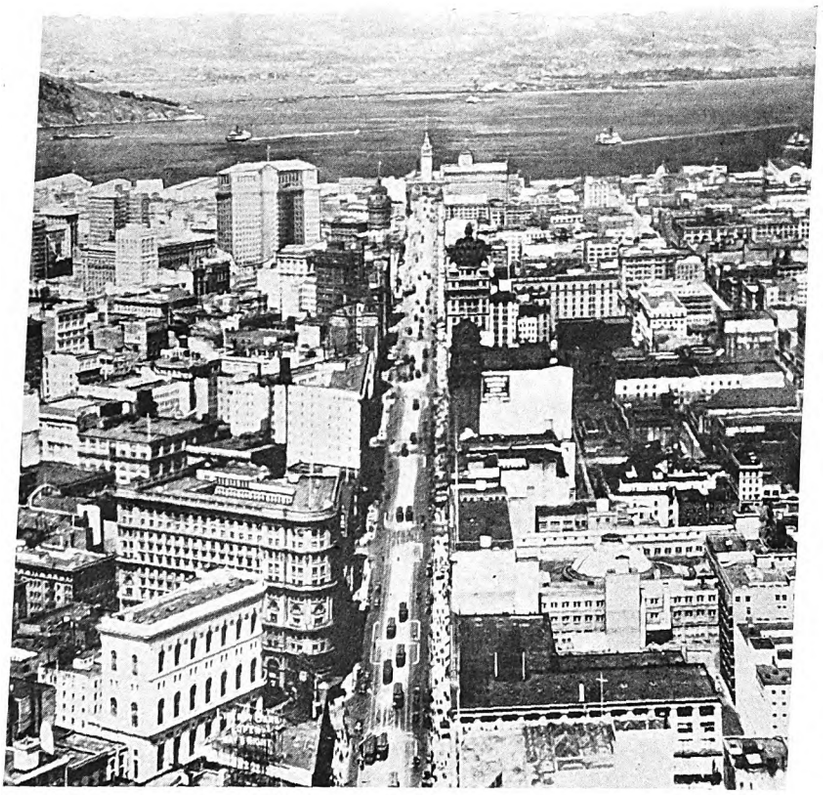
and the company. Such debatable subjects as increased fare, extensions, betterments and excessive taxation are excellent material for the consideration of arbitration boards. The most prevalent and probably the most efficient form of board is one which consists of three representatives, one chosen by the company, one by the city and a third by the first two. Provisions are included to prevent undue delay in forming the board and getting it into action. Its decisions are binding, and the board is empowered to set a time limit in which its findings shall be accepted and put into practice.

Such a provision for arbitration would do much toward removing antagonism and misunderstanding between street railways and municipalities, would prevent political manipulation by setting up definite machinery for disputes rather than haphazard or emergency methods, and would prove considerably more satisfactory than processes of lengthy argument and litigation too often practiced in the past. Arbitration is rapidly becoming recognized as the quickest, least costly and most advantageous method of settling disputes.



The four tracks on Market Street, San Francisco, are a direct outcome of the anomalous situation created by expiration of limited term franchises

Without question one of the most important features of any modern franchise should be flexibility. Railway franchises of the past and of the present are too often characterized by provisions unchangeable until the expiration of the agreement, or changeable at the expense of lengthy litigation and public misunderstanding. In the modern organization of business no such conception of a hard and fast contract, irreparably fixed for a long term of years, can be tolerated. Economic conditions change rapidly, and any industry, if it is adequately to meet new situations, must change correspondingly. Practically no other industry of major importance has had to face the inflexible contracts represented by franchises as has the electric railway industry; no other industry, with the possible exception of agriculture, has had to pay vastly increased costs of operation without being able to increase income accordingly, or, at best, battle desperately for mere existence. A franchise is nothing more than an operating agreement, and as such should be as flexible in its provisions as is possible to make it. Until such flexibility is an integral part of the agreements with municipalities and the state commissions, the industry will continue to be hampered in comparison with other business.

Without entering into a detailed analysis of franchises throughout the United States, it is almost impossible to state exactly what the trend of such agreements is. However, it is quite evident that, taking the country as a whole, a new era in street railway franchises has begun. City after city is becoming increasingly aware of the great importance of adequate transportation and is recognizing that if such transportation is to be provided the railway must be treated fairly. These more modern towns have, in many instances, already relieved transportation of unjust burdens, have granted increased fares and have shown an excellent spirit of co-operation. In less enlightened municipalities it is up to the industry and the particular railway concerned to make a real effort to educate the people, to insist upon fair treatment and recognition of the problems.

An example of the interest and attention which is being given electric railways is the recent legislation passed by the Legislature of Illinois, designed to facilitate the settlement of the Chicago transit problems. Bills were passed providing, in substance, for consolidation of all rapid transit companies, a terminable permit with purchase by the city in case of termination, a city regulatory commission, and for subways to be built by the city and operated by the company. However, since no definite franchise has yet been worked out, it is too early to discuss the final results of this legislation.

It is impossible in a limited space to give more than an outline of some of the desirable features of an ideal franchise. The foregoing is offered for the benefit of those who are interested in new franchises and the trends indicated by the provisions of more recent agreements. The chief points to work for, if franchises are to be modern and comprehensive in their scope, have been given. The writer fully realizes that some of the ideas are controversial, yet believes that most students of such problems will agree and will recognize that modern conditions make modern features necessary. In summary, a franchise should provide for: (1) Indeterminate or terminable tenure; (2) just compensation, in case of termination; (3) a reasonable return on a fair value through service-at-cost agreement; (4) a monopoly of common carrier transportation; (5) relief from unfair and obsolete imposts; (6) city supervision or participation; (7) a fair share only of taxes; (8) the right-of-way for street cars; (9) arbitration of disputes, and (10) flexibility of provisions.

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Recognition of the need for co-ordinating all facilities is shown in the plan for the new $40,000,000 Union Terminal in Cincinnati, which will provide facilities for street cars, buses and taxicabs as well as the railroad facilities

Co-ordination of

Community Transportation

a Great Economic Problem

By

C. E. SMITH

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Although the importance and fundamental soundness of co-ordination are being recognized more and more by transportation leaders the problem is still receiving too little attention

IN THE present age, when practically all business activities are tending toward consolidated effort and the advantages are so generally recognized that the results are anticipated far in advance of realization, any discussion of community transportation co-ordination may seem superfluous. It is true that local transportation facilities have been co-ordinated in many cities, but there is still much to learn about the problem. It is also quite important that there be a more fundamental grasp of the essential features of the several phases of transportation problems.

With the possible exception of the application of power to present-day requirements, no other agency of civilization begins to have the importance that transportation has, whether it be considered as a specific means of moving men and material, or in its secondary effects in eliminating distance, and thus making practicable so many of the advantages of the time. It might be thought that the desirability, not to say the necessity, of co-ordinating the various forms of transportation, and the facilities over which the movements must be made, is quite obvious. Yet, surprisingly little attention has been given to the subject, and in some instances where apparently there has been at least a measure of co-ordination it will be found that this appearance is due more to chance than to any carefully developed plan.

There are today comparatively few communities where the proper relations and fields of the various agencies of transport, or the facilities through which they operate, receive any consideration other than that applied to each individually, and then only for the particular problem which at that time has drawn attention to needs or shortcomings.

On the other hand, there is scarcely a railroad system that was built as a single entity; most of them are consolidations of numerous lines that were formerly disjointed and in many cases competitive. The benefits that followed their consolidation, and that still flow to the community, are too real for argument—none would go back to the old conditions. Surely the communities served by the Pennsylvania Railroad would prefer the service of that system as now constituted to the best service that could possibly be rendered by the hundreds of corporations of which it is formed.

The same is true of the local transportation facilities. The street railway systems in practically all large cities were formed by the consolidation of numerous lines that were formerly independent. Surely no one in any large

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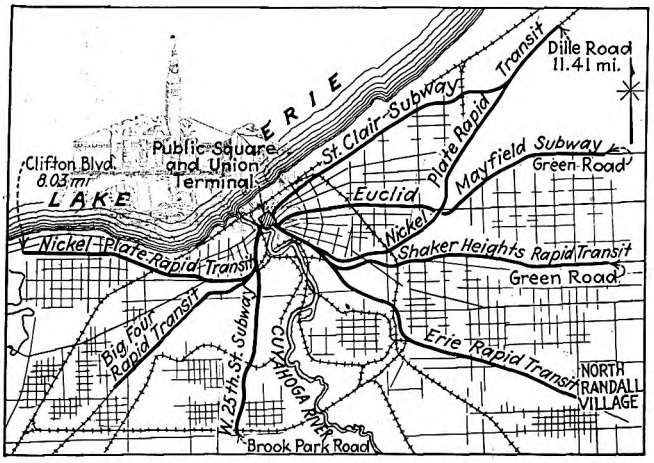


Rapid transit lines proposed in the recent Brinckerhoff report for the Cleveland Railway all radiate from new Union Terminal

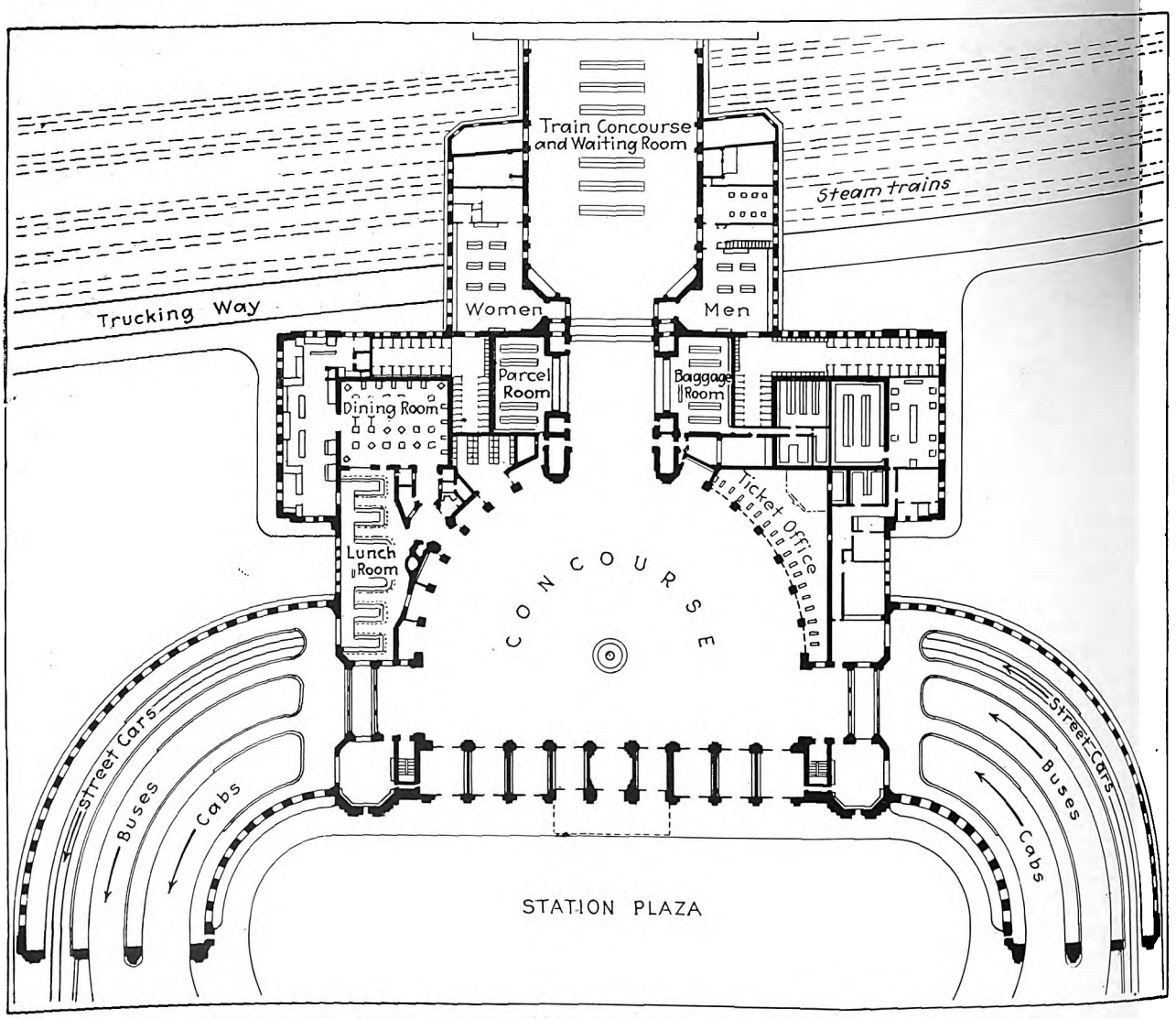
city would prefer the service that could be rendered by the numerous formerly independent street railway lines to the co-ordinated transportation provided by the consolidated systems.

Even in New York City, Washington and San Francisco, where co-ordination of local facilities has been delayed, the problem will not down, but is ever present. The co-ordination of transportation services in those cities has been given continuous attention for many years but has not been accomplished because the problem was not understood properly and because a doubt existed as to how the desired results might be accomplished.

The Chicago Surface Lines constitute one of the best examples of complete co-ordination of surface facilities without actual consolidation of the companies. However, there is further opportunity in that city for consolidating the surface lines with the elevated lines, the motor buses and future rapid transit lines. Boston presents a good example of complete consolidation of all forms of local transportation with the exception of taxicabs, and Philadelphia has gone a step further in including taxicabs in the consolidated system. In both cities, motor buses, surface street cars, elevated and subway lines are operated as one, with results beneficial to all.

In all cities where there has not been complete co-ordination of all agencies of local transportation, the problem has been one of the most important and most engaging in the community. The benefits have been taken for granted; the doubt and delay have related entirely to *modus operandi*. And yet, before the first phase of consolidation has been completed in all cities, there are signs that the fundamentals will be lost sight of merely because other agencies of transportation have become available.

The trend toward consolidation and co-ordination was



The new Cincinnati Terminal is so designed that street cars, buses and taxicabs may enter the right wing, unload and load passengers under the main concourse

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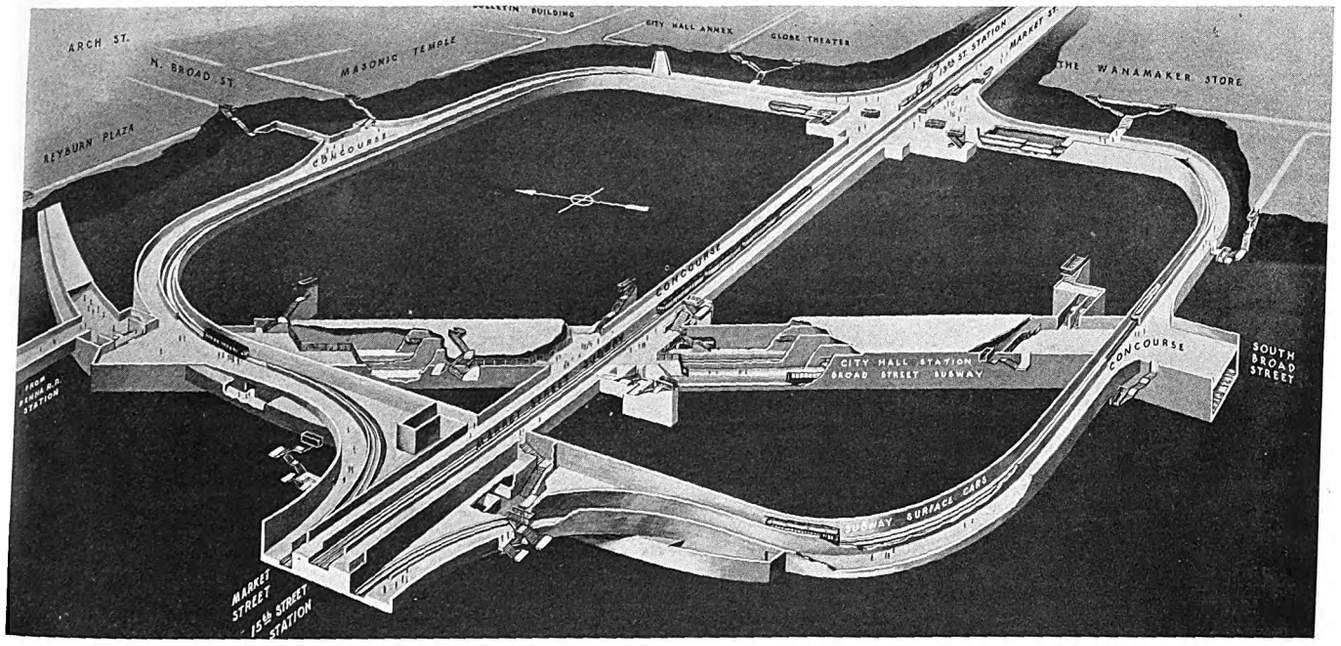
not interrupted in the progress from the omnibus through the horse car and cable car periods to electric street cars and the rapid transit lines at Boston and Philadelphia. There is no reason why the trend should change now merely because of the advent of the motor bus, nor because of the need of additional rapid transit in the larger cities.

Fundamentally the problem is the same now as when the other agencies were co-ordinated. Motor bus operation and rapid transit facilities should be tied in with all other agencies. The problem never should be considered as that of street railway *or* motor bus—it is street railway *and* motor bus. The same is true of rapid transit—not rapid transit *or* surface systems, but rapid transit *and* surface systems.

In smaller cities, the minimum and maximum size of transportation agency to a feeder and distributor. If the locations of the latter do not meet these latter requirements there results either heavy outlay in relocation, or if for any reason the desirable changes are not made the service is under a more or less serious disadvantage. It is equally important that surface systems be planned to co-ordinate with future rapid transit lines as that the rapid transit lines be planned as the trunks of the surface collecting and distributing systems. Bus lines, with no fixed property in the street, are readily shifted, but the cost of track changes will be heavy. It is not a case of "off with the old and on with the new," but the new should be added to the old and the two co-ordinated in such a way that the best and cheapest transportation can be rendered.

Rapid transit lines as and of themselves would per-



When the comprehensive Philadelphia City Hall project is completed, passengers arriving by the rapid transit lines or the steam railroads can walk underground to any of the other systems or to points several blocks distant

which may be open to argument, the motor bus is admirably adapted to furnish the entire local transportation. In larger size cities the motor bus is indispensable as an adjunct to the street railway system to serve sparsely settled exteriors, crosstown service and other auxiliary service. But the street railway will remain the backbone of the local transportation system, particularly where heavy peak loads must be handled in and out of business districts, and to and from industrial areas. Motor buses can perform their best service in collecting and distributing traffic for the faster heavy traffic street railway lines and in supplementing street railway service in a number of ways.

In still larger cities, where the traffic of all sorts gets so heavy that surface street cars can no longer perform service satisfactorily within certain areas, rapid transit lines above or below the surface should supplement other agencies and not supersede them. How essential a rapid transit system is to the city lacking such facilities depends upon many local factors, and pending its construction surface lines and buses must function in its stead. Sooner or later, however, the time comes when the economics of the situation demand the higher speed facility, thereby changing what had been the main form but little service in either city; they can perform their best service, as has been demonstrated in Boston, as trunks for the surface systems, deriving their traffic with the aid of the surface feeders and distributors. A similar solution is indicated by the observations of all who have studied the needs and future of transportation at Chicago, Pittsburgh, St. Louis, Cleveland, Detroit, Los Angeles, San Francisco and other large cities. The conclusion is no different for New York City, where all students of transportation believe that co-ordination and unification of all agencies is not only desirable but necessary. In the latter city the desirability of co-ordination was recognized by the New York Legislature and directed by statute in 1921.

The development of separate agencies of transportation leads to unnecessary duplication of investment and service, is wasteful, costly and less satisfactory than when service is rendered by one agency. Separate agencies cannot render as good service to their respective parts of the traffic as the consolidated facilities can render to the whole traffic. Unsatisfactory service and increased costs are inevitable unless there be co-ordination.

The situation as to local transportation is not different

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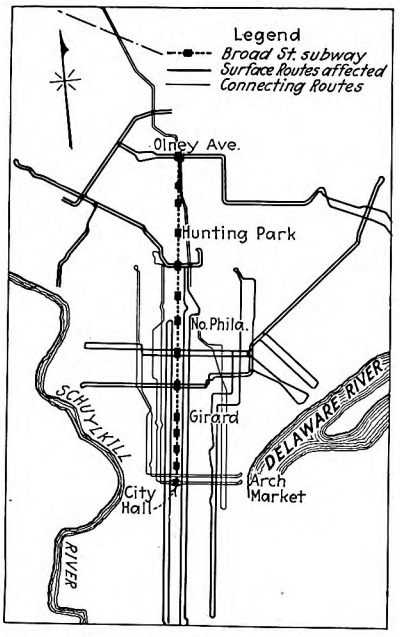
fundamentally from that of other community utilities. Who would favor more than one water system, sewer system, electric light and power system or gas system in a city? Are there any who believe better and cheaper service can be given the community by several such systems than by one co-ordinated consolidated system? The only logical answer can be given to the same question as to local transportation — there should be but one.

It is only comparatively recently that even the most advanced states have recognized the interdependence of the various agencies of transportation, and by bringing them under common regulation, have forced a measure of co-ordination by preventing undesirable competition.

Unfortunately there is relatively little recognition of the broad relationship between transportation and city growth, either in city planning or in the development plans of local transportation companies. The city planner has a very definite interest in community transportation co-ordination. One of his major problems is to plan the city so that its inhabitants can get in and out and move from place to place with the least loss of time and at least cost, and in accomplishing this to promote the orderly, symmetrical development of the city.

He can bring about a lopsided city by providing better street and transportation facilities for one section than for another. He can bring about a lopsided city by providing for a faster transit line to one district, or in one direction, than to another. In such cases, the districts favored by wider streets and more direct transit lines will build up and become congested while other districts much closer to the center, being less attractive from a transportation standpoint, will languish. Such developments having been haphazard rather than studied in the past, practically every city affords a good example of unbalanced and lopsided development. New York is probably the outstanding example. Districts far out are congested because they were favored with rapid transit lines, while attractive residential sections much closer in are practically undeveloped because of lack of transit. The same is true in a measure of Philadelphia. Chicago presents a slightly different picture because of its transit lines that radiate from the hub, giving practically all sections of the city equal transportation, although even there congested developments will be found along the suburban railroad lines, while areas between them remain undeveloped because of less satisfactory transportation.



New routing of car lines in Philadelphia to co-ordinate surface facilities with the Broad Street Subway

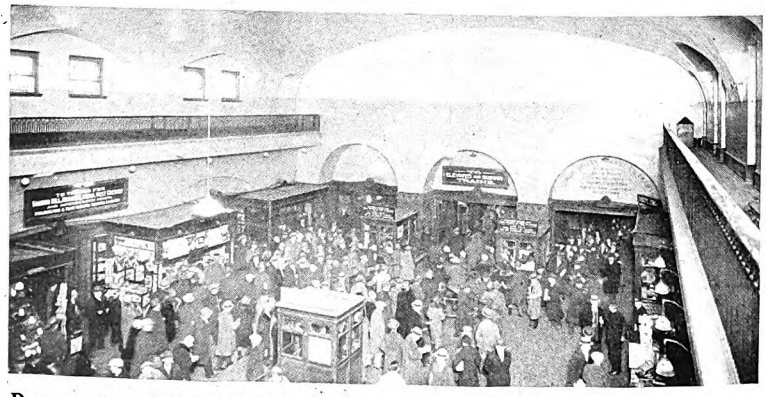
Boston is possibly the best example of systematic planning. There a more orderly development has been brought about by projecting rapid transit lines through congested districts relatively short distances in all directions; street car and motor bus lines radiate like the branches of trees from strategic intermediate points and from the ends of the trunk line rapid transit lines. The result is a fairly uniform growth outward from the hub, no untoward congestion in any direction nor undeveloped sections intervening. The same treatment and results are indicated elsewhere. But such results can only be secured by co-ordinated transportation where heavy traffic trunk lines, whether on the surface or separated, are developed satisfactorily to handle transportation where it is dense and heavy, and other transportation facilities to serve outer and intervening areas throughout the lighter traffic areas. There can be no thought of competition here. Co-ordination is the only answer.

City planners must recognize that private automobiles cannot perform all or any large part of the local transportation, regardless of the extent to which streets may be widened and parking places provided. The space occupied by automobiles that carry an average of less than two passengers each is a sufficient reason. If all those who enter and leave the business district of a large city each day could be transported in automobiles, the entire area of the business district would not suffice to hold them, nor could there be built sufficient streets to handle the number. All cities are learning that large expenditures for street widenings and new streets do not improve transportation in general in proportion to the cost.

On the other hand, few cities can afford separated rapid transit lines, as the cost would be prohibitive and the fare forbidding, except in the larger cities. Nor can the cities depend entirely upon the steam railroads to provide transportation by suburban trains.

Both these extremes being out of reach, the communities must depend upon some other form of mass transportation on the surface; the cities and the transit facilities should be so planned that the people can be transported most quickly, comfortably and cheaply, not in the interest of the transit companies that perform the service, but in the selfish interests of the people that must use and depend on the service.

When streets are widened and cut through to expedite traffic, particular and controlling attention should be given to the transit lines. Spaces



Passengers arriving in Philadelphia by the Philadelphia & West Chester Traction Company, the Lehigh Valley Transit Company or the Philadelphia & Western Railway can transfer at the 69th Street terminal to the Market Street elevated and reach the center of the city in a few minutes

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should be set aside for them where necessary so they may function properly without interference of and by other traffic. Under present conditions the movement of 50 people in a street car is subordinated to the convenience of two in an automobile. Manifestly the 50 should have 25 times the consideration of the two.

In the very large cities it becomes necessary to look beyond the limited area served by the local transportation agencies, and into the suburban areas that must be served by fast rail lines. As all railroads cannot be consolidated, this service will necessarily have to be performed by or on more than one railroad. The railroads themselves have recognized the advantages of co-ordination in handling passengers by gathering such traffic into one or more union stations, the location of which and the density of travel through which favor further co-ordination of local transit lines.

In every large city transit lines center at union passenger stations to afford quick and frequent transportation locally, although it is thought that much more can be accomplished by definitely planning such co-ordination for the quick and convenient transfer of passengers between them than by the haphazard manner in which it has grown up in the past. The most lasting impression one carries when traveling is the long walk and inconvenience of transferring between railroad trains and local transit facilities, much of which might be avoided by proper planning.

However, some good examples of co-ordination of the local transit facilities with the railroad passenger stations are indicated by the intersection of rapid transit and surface lines at the North and South Stations at Boston, and at the railroad stations at New York City, Philadelphia, Baltimore, Washington, Detroit and Los Angeles. The new Union Terminal in Cleveland, rapidly nearing completion, and the new Union Passenger Terminal of Cincinnati, the plans for which were recently made public, are also striking examples of wise planning to tie in the steam road and local facilities. This principle is further exemplified at the Grand Central and Pennsylvania Stations in New York City, both of which were controlling features in the location of the east and west side trunk subway lines there.

Just how far co-ordination of suburban service can go is a deep question. The railroads that perform that service also perform long distance passenger as well as local and through freight service, which under the spirit and letter of the transportation act must be so conducted as to preserve competition in full vigor. Signs are not lacking that something may be accomplished even here, and there is evidence that railroad men are giving more attention to this subject. At Boston, the Rapid Transit Commission has converted a railroad branch into a rapid transit line co-ordinated with the local transit system. At New York, a suburban transit system to consolidate all the suburban transit lines of the railroads under one company has been proposed, with trackage rights over the several railroad lines, and including trunk line distributing and collecting subways on Manhattan. The mechanics of such a co-ordination are quite readily understood; the question here is primarily one of economics. No doubt, facilities can be devised on which excellent service can be rendered, but can't it be done at a cost that will satisfy the patrons?

In every instance of improvement, extension and co-ordination of transportation facilities and service, property within the influence of such transportation increases in value. The aggregate amount of such increases is enormous and suggests the thought that has been given effect in legislation in certain instances that a portion of such increases should be taxed to pay for such parts of the cost as the patrons should not be expected to support.

There is a close economic relationship between the railroad terminals of a city, its local transit facilities, its street layout, its traffic problems, its property values and the trend of its development. In a comparatively few cases this fact has been recognized and due weight given the several elements in planning and in carrying out the development plans of the railroads, the local transportation companies and the city, but in the majority of instances there is little or no co-ordination, each group concerning itself only with its own particular phase of the matter.

It is, however, absolutely necessary that these interests be brought into line if the community is to have any really satisfactory transportation. Not only should it be possible completely to harmonize all the street traffic, but by virtue of such improvement a number of serious civic problems growing out of present conditions will be materially simplified if not entirely cleared.

Persons not wishing to drive into the center of Philadelphia can leave their automobiles at this large parking area operated by the P.R.T. and take the Market Street Elevated at the adjoining 69th Street terminal

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Present Trends and Future Demands Determine

City Development

By

J. ROWLAND BIBBINS

Consulting Engineer, Washington, D. C.

Area Having an Assessed Land Value of $10.00 per Sq.Ft. or More

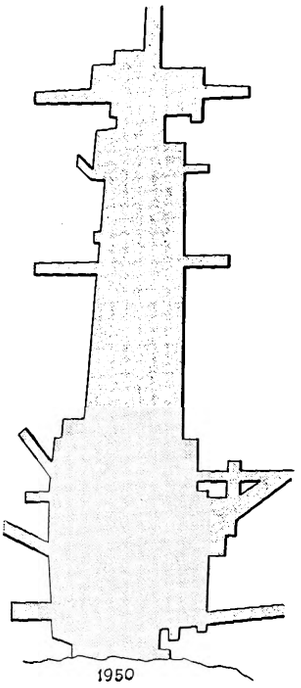
Business district of Detroit in 1926 above, and its probable extent in 1950, at right

CITY building is zooming ahead—logical or illogical, economic or uneconomic. But what about transportation and other utility services—are they keeping pace? This question is a difficult, if not impossible, one to answer, unless a thorough study of the present trends and demands is made. Much of the present difficulty in securing proper city development and adequate transportation facilities to meet the insatiable demand of population growth has been because many city governments and transportation agencies have been too inactive in evaluating these present trends and the clear demands of the future.

In the meantime, long-haul population has taken the steering wheel in hand and developed a means of private transportation, which, in Detroit, for example, appears to have absorbed about one-third of the normal fair weather riding habit, leaving the mass transport agencies to get along on the remaining two-thirds—that is, about the same passenger riding habit as in pre-war days.

But already it has transpired that private transportation has encountered its own fatal limitations through the combined effects of inadequate street capacity, the slow down of improper traffic signaling, the lag of requisite central garaging, delay in instituting equitable traffic regulations, etc. And so the demand is swinging back more and more to rapid transit, regardless of the fact that, without sufficient population density, rapid transit cannot be self-supporting under reasonable fares except by spreading the cost burden more equitably between the present and future by some amortization plan like benefit assessment. In the last analysis, however, the benefit assessment levies only upon the quick turnover of speculative builders or realtors and is relatively no burden in the long run upon stable property holdings. What this quick turnover may mean will be apparent from a study of the potential growth and land values.

Such a study was made in connection with a "Building Construction Forecast" made for the Detroit Edison Company by the writer, under the auspices of the Department of Engineering Research, University of Michigan, Prof. J. H. Cissel and N. B. Hubbard, engineer, Detroit, collaborating. The purpose of the survey was to determine whether the utility services were keeping pace with the city building, and to guide the Detroit Edison Company in planning a rational development program. A year's study of Detroit's population, commercial growth and future "central district" revealed definite laws of growth that were used as a basic approach for an economic forecast of urban building and service facilities.



Area Having an Assessed Land Value of $10.00 per Sq.Ft. or More

Study of population, commercial growth and future central district reveals dependable laws of growth and an unusual basic approach of forecasting what the city of the future and its demands will be

One of the most striking results of the "Survey Forecast" is that there is a basic per capita demand for building cubage (floor space) not only in the central office district, but also outside. This is true also of utility services for those districts. This demand is growing almost mathematically with the population, differing in "index number" according to the district, but always following a law. In the same manner, total transportation demand or "riding habit" is mounting upwards generally around the "Law of the Squares," whether by rail or rubber. This is all-important. And because of this definite trend it appears that the problem of forecast is to determine the demand rather than the means of utility supply.

New York City serves to illustrate one difficult phase of forecasting, namely, that of forced development on

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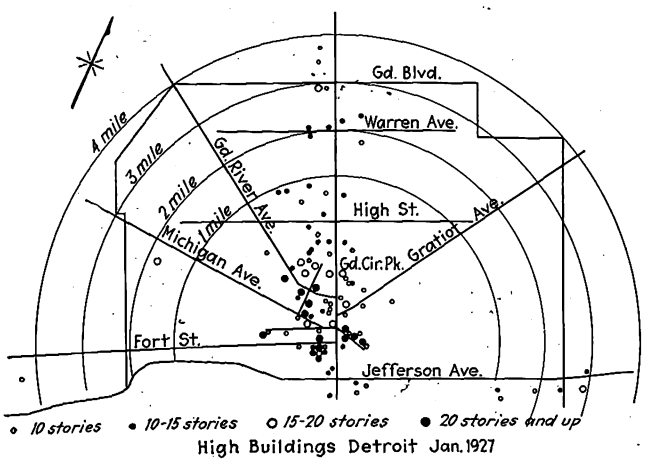
Detroit's rapid development in its central business district seemed for a while to present a problem. The development of wide surrounding areas, however, is now tending to check concentration at the center

the one hand versus under-development on the other. Scanning the horizon from the top of the Chanin Building, one sees to the south the mass-pyramid of the old financial center, devoted exclusively to offices, and abortive pyramids at 23rd Street and 34th Street. But to the north is the high pressure development of 42nd Street at Times Square and Grand Central, and further north is the rapidly rising cubage at 57th Street. Still further north are the two "mountain ranges" on either side of Central Park.

The significant factor is that in the Grand Central District there has been built more than half as much office building cubage as exists in the old financial district of lower Manhattan, but with this important difference—that the uptown offices are superimposed upon a solid retail district with a tremendous residential cubage in hotels and apartments. Here is food for thought—this new massing of both day and night population. For mid-Manhattan is no more self-contained than before, that is, within walking distance of home and office. Transportation and traffic facilities are still required and superimposed upon those of former days, with obvious results in over-saturation of both subways



Location of all buildings over ten stories in January, 1927 (one-quarter scale outside of 1-mile zone). Of 22,500,000 sq.ft. gross floor area, 12,500,000 sq.ft. is in the 1-mile zone

and suburban services. The resort to individual transportation by taxicabs only aggravates the congestion.

This economic hiatus of a city, unprepared for forced development, reveals itself in street speeds. Recent mid-day speed logs taken in Manhattan show the following results:

Fifth Avenue—8 m.p.h. south of Central Park, 12 m.p.h. north.

Park Avenue—10 m.p.h. south of Grand Central, 14 m.p.h. north.

Traffic crest speeds on the avenues—Running to 25 to 35 m.p.h.

Crosstown—Almost walking speeds, for example, 3 to 4 m.p.h. on Fourteenth Street.

The proof of the pudding is in the eating. This is hardly modern efficiency. New York is building a three-deck city of troglodytes—stores, offices and tenements—only to repeat the old accustomed drift to a new "town pump" without sufficient "watermain" facilities to supply the pump. Skyscraping, like sky-writing, is dangerous business; and for the great mass of building cubage, the economic balance between investment, rental, obsolescense and return is found to operate inflexibly and to expand the "town pump" district rather than contract it by forcing it further skyward.

Surrounding Potential Areas Preventing Over-Development at Center

Detroit's rapid development seemed to present parallel aspects but the survey-forecast has shown a possible solution. The old "town pump" will still function, but the economic vacuum of the wide surrounding potential areas (not geographically restricted as in New York) is already operating to check over-development at the center by the logical process of the law of diminishing returns, except for speculative buildings, monumental in character, which pay their way through their advertising value.

An airplane view over Detroit is striking evidence of this, showing the small central pyramid around the City Hall but also, far to the north, new cubage rising incessantly along Woodward Avenue and parallel streets. Even on Grand Boulevard, 3 miles away, there is an important center, with the largest office building in the world and other high-pressure developments close by. This Boulevard sub-center, however, has been admirably located on two widened boulevards in both directions. Here, then, is in evidence both the old and the new, furnishing one important approach to the forecast, differing entirely from conditions in Manhattan.

The specific problem in Detroit was to estimate by five-year stages, 1925 to 1950, the probable building cubage of the future so-called "business district" in 45 sub-districts or zones of different business characteristics, and in seven different building classifications. This potential central district of the future covered about 550

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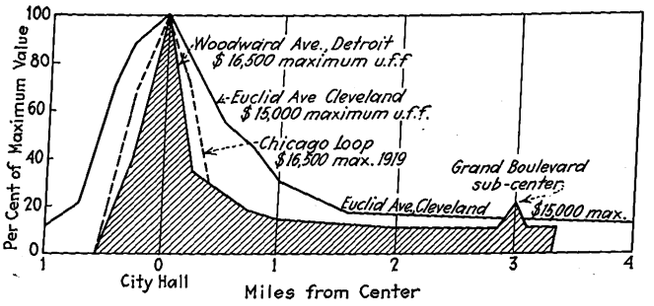
city blocks in a rectangular plot 1 mile wide and 3 miles long centering on the main axis, Woodward Avenue, already designated for Detroit's first subway trunk.

For such a dynamic industrial center, a reasonable population forecast required careful examination into the broad economic picture of the city's growth from the old historic city of 1900, proud in its conservatism, to the now revitalized industrial community with its traffic-ways carrying a motor load of nearly 400,000 automobiles, business bursting through its old boundaries, sub-centers springing up here and there, and whole communities, some of them speaking a different language, surrounding the great industrial establishments. Yet in the rapid commercial turnover of a decade it is significant that more than half the commodity value of Detroit's production now rests upon diversified industry other than automobiles and accessories. Here indeed are most evident the opposing centrifugal and centripetal forces of urban development—the "pull" of outside realty against the central realty.

Economic Relation of Land Values

Deeply imbedded in this economic struggle is the problem of taxation and of the high building or skyscraper. Already 10,000,000 sq.ft. of high building floor area exists outside of the present downtown central zone I, as compared with 12,500,000 sq.ft. inside of it (ten floors and above). Detroit's future district population, all things considered, was estimated to be 1,640,000 people in 1930 and 2,750,000 in 1950, which forecast approximates Chicago's vital experience in a corresponding industrial era. This estimate set against similar vital experience of other cities when of Detroit's present size, and taking into account their "personal characteristics," appears rational and probably conservative. It means doubling Detroit's present population between 1925 and 1950.



Comparative profiles of values along the main business axes of Detroit, Cleveland and Chicago, in per cent of maximum values

On this next question available experience and statistics are nil. So the problem was attacked *de novo* from the basis of land value. It was found that in urban experience throughout the country an astonishingly rational relationship exists between growth of land value and population, that is, land value and building cubage increase with population by economic law. Some economists question this, but New York, Philadelphia, Cleveland, Detroit and other smaller cities have followed a parallel trend. The historic trends of some 20 or 30 "key blocks" in Detroit selected for detailed examination were similar also. Thus central land values in Detroit

Michigan Avenue, Chicago, with the tallest of the city's skyscrapers in the background. The Loop District of the city, with a few tall buildings on its edge, shows the tendency toward concentration of business activity

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are increasing about as the first power of the population, and outside values as the second, third or even fourth power, according to distance.

From this fundamental economic relation future land values throughout the entire survey zone could be predicted, using reasonable judgment and local knowledge of "district" characteristics and making allowance for known land value enhancements due to city planning, major highways and projected rapid transit.

Thus more than $1,100,000,000 in land value alone will be added to this "central district" by 1950, nearly 3½ times the 1926 value. In the process, nearly 16,000,000 sq.ft. of residence land area will be converted to business. This increase in value gives some conception of the propriety of benefit assessment justified in providing transportation facilities to serve this tremendous cubage increment. It is obviously an error to assume that the same result will be produced by city-wide taxation, for if the increased tax revenue is simply "covered into the city treasury" it will inevitably be dissipated in dozens of public projects other than transportation, which is the primary source of the increased value and so vitally needful.

While there are no comparative statistics over a long period on the underlying demand per capita for stores, apartments, etc., the record of office building floor space is very clear and the analysis shows that this also follows the "goose-step" of progress not only in Detroit but elsewhere, as in Chicago and Cleveland. This is known to be true of all other utilities as well as school facilities. The ratio chart clearly indicates this absorption rate.

Determining the Permissible Load Upon the Land

Further technical studies of probable building cubage properly reflecting land value and population growth developed a rational conversion formula for all of these economic factors into building cubage. Here the experience of the Building Owners and Managers Association, architects, engineers and builders proved most effective. Questions of efficiency of design, construction methods and cost ranges, amortization rates, and last but not least the probable effect of zoning height limitations, all were deeply involved in the problem. But they all fall within reasonable economic limitations.

From the preceding it is clear that the survey-forecast is a combined picture of historic trend, economic law, engineering experience, construction practice and local judgment. Mathematics and theory alone would not suffice. The cubage forecast presents "probable building cubage." This is not necessarily "economic cubage," for it is found that some districts will be underbuilt and some overbuilt until the law of diminishing returns inevitably corrects this economic hiatus. The conversion formulas and class allocation indicate that nearly 2,000,000,000 cu.ft. of commercial buildings will be erected by 1950, or a total of more than 3,100,000,000 within this potential central district.

It is interesting that the actual gross building cubage, 1926, by detailed census was found to be as close as 4 to 9 per cent of that produced by the conversion formula, in some of the zones not yet influenced by over-building or under-building.

Economic Skyline a Measure of Peak Loads

That Detroit is attempting to do business on an economic "mountain top" of land values more peaked at the center than Chicago, New York or Cleveland is shown by land value profiles along their business axes. Cleveland has the flattest value profile—a fact worth much study by both zoners and realtors. Land value measures cubage, and cubage produces peak loads of transportation.

The final results in perspective are rather appalling in view of present traffic troubles in the highly concentrated cities. The survey indicates that the population will almost double by 1950, a 1,340,000 increase, that building cubage will almost treble, adding 1,997,000,000 cu.ft., that land value will increase 3½ times, a $1,111,000,000 increase, that the business land area will about double, adding 15,600,000 sq.ft., and that within the 1-mile circle from City Hall, building cubage will more than double.

From the net results of this survey and the 1926 cubage check it appears that forecasting, when carefully carried out with proper perspective and study, may form the finest argument for adequate city planning and zoning, at the very foundation of which lies this economic cubage. And thus the problem of building and rebuilding cities offers an immense opportunity for wise technical replanning of our transportation systems. Without it, strangulation and stagnation of business districts must ensue, possibly with tremendous relative losses in old established values. Even the new sub-centers will not function properly in this picture of vast economic growth if they are not planned ahead.

The interpretation of all this, in terms of transportation, points an unerring finger toward the necessity of looking ahead as well as "looking backwards," and of planning and research even in such apparently unrelated subjects as building and taxation. These lie at the bottom. Traffic and congestion are only present surface indications. If it is possible to visualize double the population and treble the business cubage of today in terms of peak load riding habit, which increases by multiplication rather than by addition with the population, then a true measure of future needs in city transport will be obtained. Clearly the price of neglect and expediency will be inevitable economic shifts of business and industry to other less congested cities.

MUCH OF THE PRESENT DIFFICULTY *in securing proper city development and in expanding and readjusting transportation facilities to meet the insatiable demand of population growth is because many city governments and transportation agencies have been too inactive in evaluating the present trends in the city's growth and the clear demands of the future*

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Regulation of Taxicabs

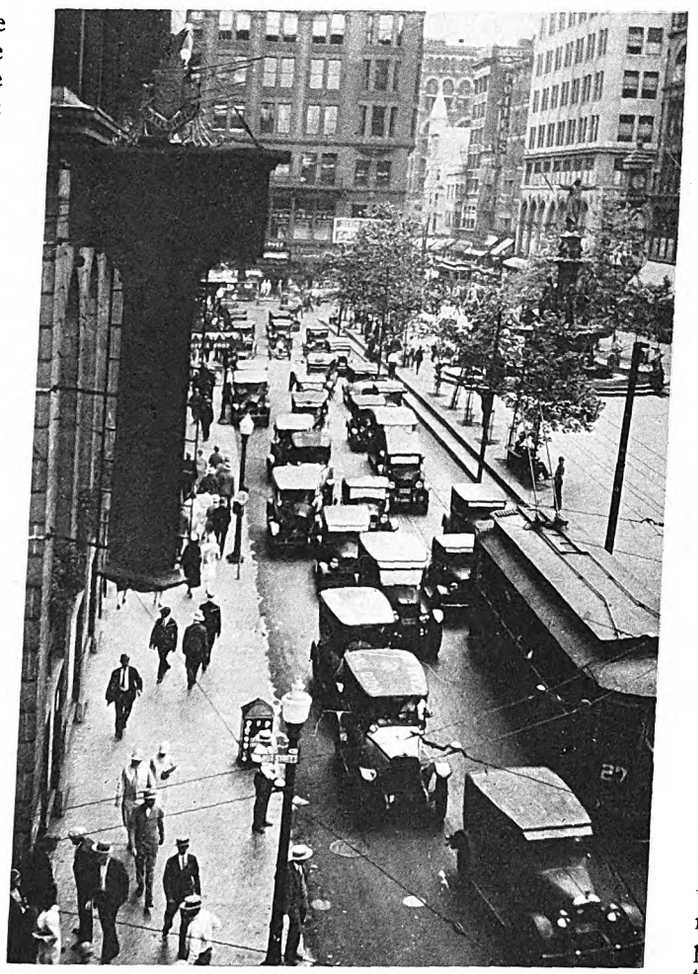
Necessary for Stabilization

WHAT is the place of the taxicab in the field of public transportation? Should taxicabs be regarded legally as common carriers? How would the electric railway industry be affected by the regulation of taxicabs as public utilities, properly classified? These questions have demanded much time and thought in the past few years, not only from the purveyors of transportation, but from the city officials as well. Electric railways naturally are interested in all forms of transportation of persons; municipalities are vitally concerned with satisfying the requirements of citizens within their borders, and existing taxicab companies are forced to consider what their place is or should be in the vast plan of furnishing the transportation required in the municipality.

The electric railways are in a business which, by its very nature, consists in analyzing public needs and producing service to satisfy those needs. Taxicab operation has its sphere of specialized service—it is not thrust upon the public, but is permitted only in response to existing requirements. No company in the transportation business can afford to ignore such an actual demand or fail to study its scope of service, or to be interested in its classification and regulatory provisions.

Primary consideration must be given to public interest in the classification and regulation of all public service vehicles. In this the public and the utility companies could stand on a common ground if they would. The public must recognize that its own interest is ultimately best served by a continuity of safe, reliable transportation, built up on sound business principles, adequately protected from losses that tend to destroy it, and able to attract capital enough to finance needed developments. Cut-rate competition, failure to make allowances for proper replacement and failure to keep adequate records of cost, lead to cycles of excellent service, followed by long periods of disgraceful conditions, operation by unfit personnel, worn-out equipment, and the use of the business as a blind for various kinds of illegal activities. The taxicab situation in American cities has been peculiarly subject to these cycles, chiefly because the welfare of the "public" has been a secondary consideration in regulatory laws. The granting of the privilege of operating taxicabs has been based too much on whether or not an individual needed a job and not enough on what the public requires, either for the best service or for its own protection.

A rather casual study of the organization of taxicab service as a whole in nearly every city shows the necessity, from the standpoint of both the public and the industry, of attacking the problem from a different angle from that by which it has heretofore been approached. In nearly every city there are some well organized companies and small operators, but the business is flooded with a transient class, who are temporarily tiding over a period of non-employment. They have no intention of developing their own business or adding to the soundness of the public interest as a whole. In a few months they get other jobs and pass out of the picture, but there are others of the same type who constantly flow in for short



Three distinct classes of vehicles offering different classes of service use the streets—the private automobile, the taxicab, and the mass transportation vehicles

By

EDGAR DOW GILMAN

Director Department of Public Utilities
Cincinnati, Ohio

Taxicabs must be recognized as individual service vehicles and transient operators denied permits by strict regulating provisions if the industry is to serve the public properly and adequately

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periods as some step out. The turnover is too great for sound operation. Such transients give the business a bad name. Their method of computing costs over their short operation is such that no organized company, operating with good equipment and responsible personnel, and hoping and intending to develop and to give the public high-class service, can meet their competition. It cannot be expected that well organized service with proper rates, capable of meeting the variable demands of the public, season by season, and even hour by hour, can be developed as long as this competition is permitted.

The foregoing should not be taken as constituting an objection to competition when the competitors enter the business in good faith with the intention to continue and develop it as a means of permanent livelihood. But in the taxicab business, particularly, such intention is many times entirely absent, and many times it is the "down and out," the man who has failed at everything else, who turns to taxicab driving as a last resort. His aspect toward himself, his business and toward the world is not such as to qualify him properly for a quasi-public position of responsibility. Yet because he is down and out, and claims the need of a job which he cannot obtain any place else, many of our regulatory laws take care of him by permitting him to drive a taxicab, instead of handling his case through a public welfare organization. Competition with the intention to continue in the business as a livelihood has its merits. However, advocates of competitive operation would be surprised, and would be overcome by the apparent hopelessness of their cause, if they could see how many of the so-called competitive operators are merely trying to force a sale rather than to maintain a competitive business for public interest.

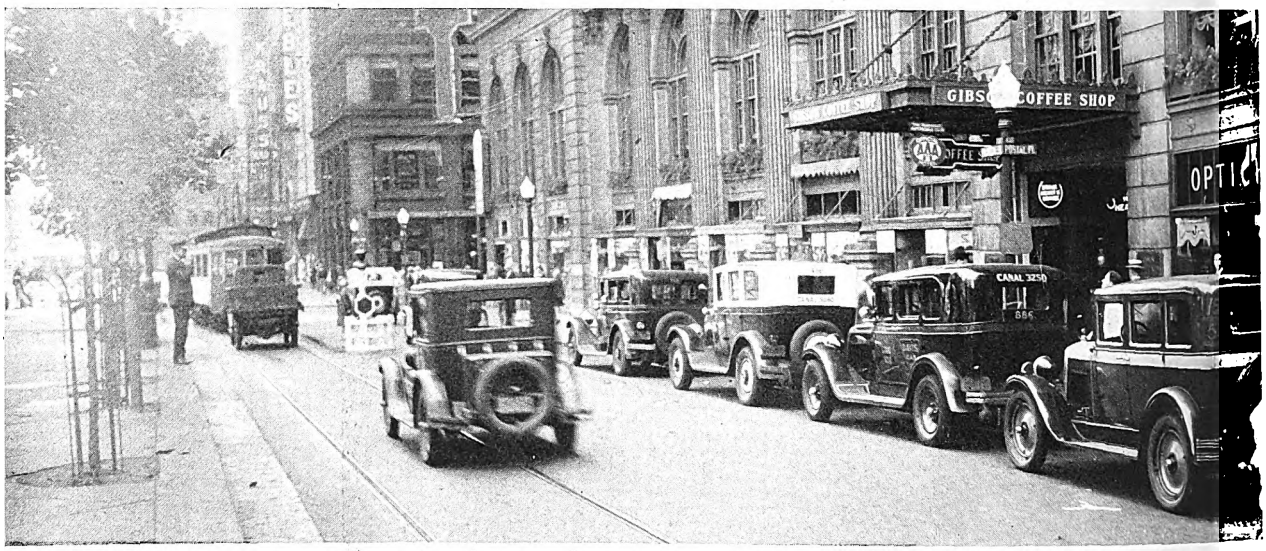
Regulatory Ordinance Passed in Cincinnati

For more than a year the Department of Public Utilities of the city of Cincinnati, under C. O. Sherrill, City Manager, has been carefully considering these matters. The studies led to the drafting of an ordinance which was passed by the City Council and became a law, effective March 9, 1929. The major change from the previous law was the classification of taxicabs and the insertion of a "public convenience and necessity" clause which definitely places the taxicab as a public utility.

Cincinnati is not the first city to have such a law, for the cities of Minneapolis, Minn., and Milwaukee, Wis., passed ordinances containing the "public convenience and necessity" clause, in September, 1928, and February, 1929, respectively. Taxicabs are now classed as common carriers in Maryland, Pennsylvania, the District of Columbia and Connecticut, legislation in the last two having been enacted only recently. Pressure is being brought to bear in nearly all states for regulations which will put this public service on a more systematic and higher basis. Prominent executives of the electric railway interests have urged that there be some organized regulation. To some extent their interest in the matter can be considered biased but to a considerable extent the unregulated operations as jitneys materially affect the rail service and in this the public interest is affected.

Regulation Requires Careful Classifications

Proper regulation of transportation as a whole requires careful definitions and classifications of the different types of service. There has been no definition of a taxicab in Ohio, either by state statute or by court decision. Definitions are frequently found in municipal ordinances, but in most cases such definitions are left open, or are based upon an arbitrary standard of the capacity of the vehicle. This is fundamentally wrong, as the classification should be based upon types of service and not upon the capacity, design or make of the vehicle rendering that type of service.



Observation in Cincinnati showed that for every hotel guest desiring a taxicab there were four or five vehicles available. This is more than is required for the "convenience and necessity" of the person desiring service

Transportation may be divided into two major classifications—mass transportation and individual transportation. Mass transportation is a service which holds itself open at all times to any number of persons. That is, anyone utilizing such service knows and expects that it is not for his individual use and that other persons who are strangers to him may also come into the vehicle at the same time that he is being transported. Mass transportation must of necessity be adapted to the requirements of the majority of persons as to route and schedule; that is, it travels along a fixed route between fixed termini and upon a fixed time schedule. The person purchasing such service must accommodate his wishes to these fixed factors. Because of these factors, and because the cost of moving the vehicle can be divided

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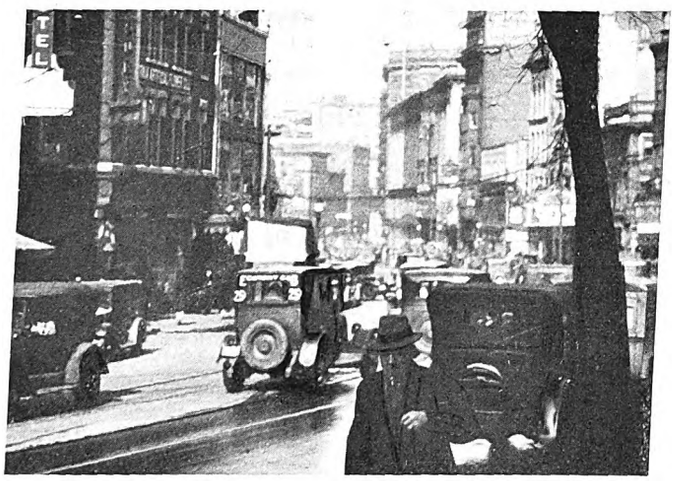
among a large number of persons, the rates for mass transportation are relatively low. Both street car and motor bus operations come under this heading.

Contrasted to mass transportation is individual transportation, which holds itself open for hire to any person as a common carrier, but when once hired must devote itself exclusively to the service of the rentor and not hold itself open for hire to any other person until the prior engagement is completed. Individual transportation does not operate on a fixed route or schedule, or between fixed termini, but is free to operate over any route or between any points and within any time that the rentor decides. In other words, during the time that the vehicle is rented it may be regarded as being as completely at the disposal of the rentor as would be his own vehicle.

Classification as an individual transportation vehicle is a fundamental distinction of the taxicab, and has been adopted as the differentiation between taxicabs and other public vehicles in the drafting of the Cincinnati ordinance. The theory discards entirely the capacity of the vehicle as a basis of classification, as it is conceivable that a large vehicle might operate as a taxicab, or that a small vehicle might operate as a public coach. The application of this classification does not mean that a taxicab cannot carry more than one person. It means that the contract for the use of the vehicle must be made by the owner with one person. The owner must not make a separate contract with somebody else for transportation until he has completed the existing contract. For example, a patron can call an individual service vehicle to carry himself and family to a certain destination and there can be no objection to members of his family or of his party utilizing such service; but if he calls a taxicab, and there is other space available, the taxicab owner cannot fill such space by holding it open for hire.



Cut-rate taxicabs, operated by irresponsible, poorly-managed companies, have caused great harm to the public, the electric railways and the legitimate cab companies

Ordinance Restricts Issuance of Licenses

Prior to the passage of the Cincinnati ordinance, the Department of Public Utilities, which is responsible for the issuance of taxicab licenses, was required to approve any license applied for, except on the grounds of character of the applicant or vehicle. There could be no refusal of the license on the ground that there were already too many taxicabs in the city, even if there were clearly more than were needed to serve that part of the public requiring taxicab service, or that the additional taxicabs would hinder the use of public streets and interfere with the existing taxicab service. This situation led to an objectionable condition in the use of public streets. Observation showed that for every person coming out of a hotel and desiring a taxicab, there were four or five vehicles ready to give him service. A check over a ten-hour period on a busy corner in Cincinnati showed 2,300 taxicabs moving in one block, in one direction on a one-way street. Of this number only 400 had passengers and 1,900 were empty. This is unnecessary from the viewpoint of the person desiring service and is an interference with the rights of other citizens in the utilization of the streets. The "public convenience and necessity" clause was, therefore, written into the ordinance, giving the Public Utilities Department the right to deny a license on the grounds that the public interest did not require its issuance.

This is concisely expressed in the order issued upon the first application for a taxicab license under the new ordinance. In this order a general policy was set forth for the government of future applications and orders. There has since been a denial of more than 100 taxicab licenses, none of the orders of denial containing any other statement than that upon investigation it was shown that public convenience and necessity did not require the granting of the licenses applied for. The explanation contained in the first order was as follows:

> This license is denied because data show that it is not required by "public convenience and necessity." This phrase constitutes a standard established by the City Council to govern the issuance of taxicab and auto-for-hire licenses. Unless "public convenience and necessity" require it, the director has no authority to grant a license, and if they do require it and other conditions of the law are met, the director has no authority to refuse to grant a license.
>
> The convenience and necessity which the law requires to support the issuance of a license is that of the public, and not that of an individual or any number of individuals. In order to qualify as a "public" requirement, a fairly general distribution of the benefits of the proposed operation must be shown.
>
> The public affected by taxicab operation in Cincinnati can be divided into two groups: (1) the taxi-riding public, and (2) the non-taxi-riding public. For the convenience and needs of the former, there should be a reasonable number of taxicabs available. Any number beyond that reasonable number will unreasonably infringe upon the rights of the second group, because empty taxicabs cruising on the streets are not rendering service of a "public nature" and are occupying time and space on already crowded streets, that might be utilized for constructive public service. If the taxi-riding public is not unreasonably delayed in securing a taxicab at the depots, hotels, in the congested areas, and by telephone in the outlying areas, then public convenience and necessity for additional cabs has not been shown. The present situation in Cincinnati does not indicate any unreasonable delay on the part of the public in securing taxi service.

Public Interest Should Govern Use of Clause

The use of the convenience and necessity clause must be accompanied by a broad viewpoint of the problem as a whole. Decisions must be made from the viewpoint of the *public* interest only; the benefits to be derived must be general and not individual. This eliminates consideration of evidence as to the necessity for work on the part of the person applying for a license. From a purely philanthropic viewpoint this seems a hardship, but if the taxicab situation is to be handled for the benefit of the public at large, this viewpoint must be adopted. There exists a requirement of the public, in the satisfaction of which certain numbers of persons can make a livelihood. Beyond the point of satisfying this need, not only would the public be interfered with by granting additional licenses, but the livelihood of those already in the business, or even of the new applicant, is seriously jeopar-

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dized. The experiences in Cincinnati in the past six months have proved this, as several of the operators, in the midst of a flurry of cut-rate methods, have gone into receiverships. Such proceedings are not in the ultimate public interest and they do not lead to continued good service at the most reasonable rates, but lead to cycles of low rates with superfluous service followed by high rates with inadequate service. The aim must be to obtain a standard of continuous good service at rates lower than those which have been charged without proper regulatory power and which will cover a proper cost of operating the taxicabs, plus a reasonable return on the investment in the business.

Transfer of Licenses Restricted

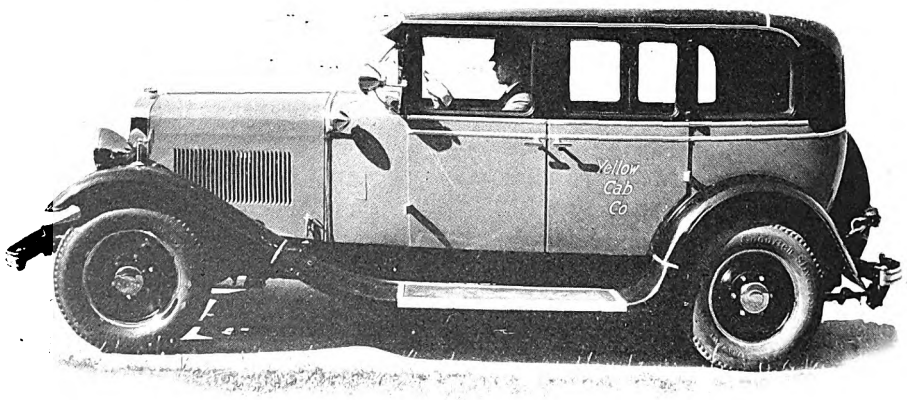
In the drafting of the ordinance considerable thought was given to the regulations governing transfer of licenses. The transfer of licenses from vehicle to vehicle of the same owner was made mandatory upon application, but the transfer from one owner to another was made subject to the convenience and necessity clause. Attempts were made to have the latter mandatory also, but if such transfer from one owner to another were made mandatory, it would create a market value for licenses. Furthermore, the license as issued is a privilege granted to a certain person or organization, and a mandatory transfer would give to that licensee the right of passing the license on to anyone whom he might elect and would deny to the city the right to determine the required qualifications of those holding licenses. Also the application of the convenience and necessity clause may require some means of reducing the number of outstanding licenses. If this became necessary in public interest, it might be provided either that the license issuing authority could withdraw existing licenses on a pro rata basis, or that when an outstanding license ceased to be used by the person to whom it was issued, it would become void. It was felt that the latter method was preferable, although it is slower in its effect.

One of the outstanding features in the city ordinance is the authority given the Director of Public Utilities to suspend or revoke licenses. This authority has been questioned as being a delegation of legislative power. However, if an official is charged with the responsibility of granting or denying a license for cause, he must be given the authority to suspend or revoke a license for causes which would have resulted in its denial in the first instance. Otherwise the entire purpose of protecting the public by licensing is nullified and the routine of licensing becomes so much paper work.

The Cincinnati ordinance provides four methods of computing rates: The taxi-meter rate, the zone rate, the hour rate and the special trip rate. Any vehicle may choose to operate either the taxi-meter rate or the zone rate, but it may not use both. In theory, at least, there should be no distinction in the regulations governing a taxicab on the streets because of its method of computing charges. In hearings on the ordinance it was urged that a taxicab charging by the zone rate should have restrictions placed upon it. This is inconsistent. Whether a cab is metered or charges by zones has to do only with how the charge for service is computed, and not with the type of service to be rendered. At the time of passage of the taxicab ordinance, there existed a general feeling on the part of the public that the zone rate method of computing charges was the cause of low prices. There is no reason why a meter cannot be set to give as low a rate as a zone, but it was felt that it would be a mistake to legislate it out of existence, that it would be better to permit its operation for that length of time necessary to show its favorable and unfavorable effects. Although only six months have passed since the passage of the ordinance, the large companies which started out on a zone rate have already changed over to the meter rate; not because the law required that they do so, but because, from the standpoint of the company, it was found that the zone rate was not workable.

The special trip rate in the Cincinnati ordinance sets aside, for certain purposes, the individual transportaton feature of the taxicab and permits it to pick up any number of persons and to operate between fixed termini. This rate can only be used for particular occasions, after filing application and receiving the approval of the Director of Public Utilities.

In conclusion, it appears that at least two things are of major importance in building up the taxicab industry to a point where it can properly and adequately serve the public at reasonable rates. First, it should be recognized that taxicabs are "individual" service vehicles as heretofore defined and that in this classification they have a scope of service that is distinctly different from that of either street cars or motor buses. The regulatory provisions should recognize the lines of demarcation and should insist on each operation confining itself to the service for which it is designed. Second, the privilege of operating taxicabs should not be granted to transient operators, but should be confined only to those operators who have serious intentions of developing their own interests to a maximum and who plan to continue in the service of the public.



Modern taxicabs, operated by courteous, reliable drivers and so regulated as to prevent unnecessary competition and cut rates, assure the public of proper service

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Concerted Effort Needed for

Relief of Tax Burdens

By

HAROLD W. GEISSE

Vice-President and General Manager Wisconsin Valley Electric Company and Chairman A.E.R.A. Committee on Taxation

In Connecticut the electric railways have benefited greatly by the gross revenue tax which has been in effect there for several years

WHEN the Special Joint Committee on Taxation and Retrenchment of the State of New York, reporting in 1922, stated that many of the electric railways of that state "had literally been taxed into bankruptcy," it had good reasons for its conclusion. It had made an investigation of a comprehensive nature and it was so impressed by the variety, burdensomeness and discriminatory nature of the taxes levied upon electric railways that it used these strong words to emphasize the necessity for immediate change. But legislative wheels move slowly and the state of New York has not yet, after seven years, granted any material redress. Indeed, a recent survey made by the A.E.R.A. staff, on behalf of the committee on taxation, brings out the fact that very little progress has been made in any state within the Union, so far as street railway taxation relief is concerned.

In one state in the East—Connecticut—the gross tax has for some years been in operation, much to the benefit of the electric railways there, and in one state in the West—California—the same system of taxation, though at a higher rate, is in vogue. The state of New Jersey also has the gross tax, but uses other forms in conjunction with it. When the California Tax Commission reported to the Governor on March 5, 1929, it made recommendations for the relief of street railways. On the basis of these recommendations, bills have been introduced in the Legislature, and there is good reason for believing now that substantial relief is in sight. In no other state has any real progress been made. It is true that the tax burdens of some properties have been reduced, but this has been due either to a recognition of the depleted value of the property, or to the fact that the very existence of the transportation system depended upon tax relief.

Almost very operator within the industry feels that he is being overtaxed as compared with other groups that are doing business within the same community. Unfor-

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tunately, it is almost impossible to obtain figures on the comparative tax burdens of various industries, for the private investigator is hampered by his inability to study the books relating to other industries, and states have been reluctant to set up special investigating committees or commissions with the power to delve into this matter sufficiently to get at the truth. But it can be safely said that wherever impartial investigations have been made, the street railways of the country have stood forth as the bearers of the heaviest burdens of taxation.

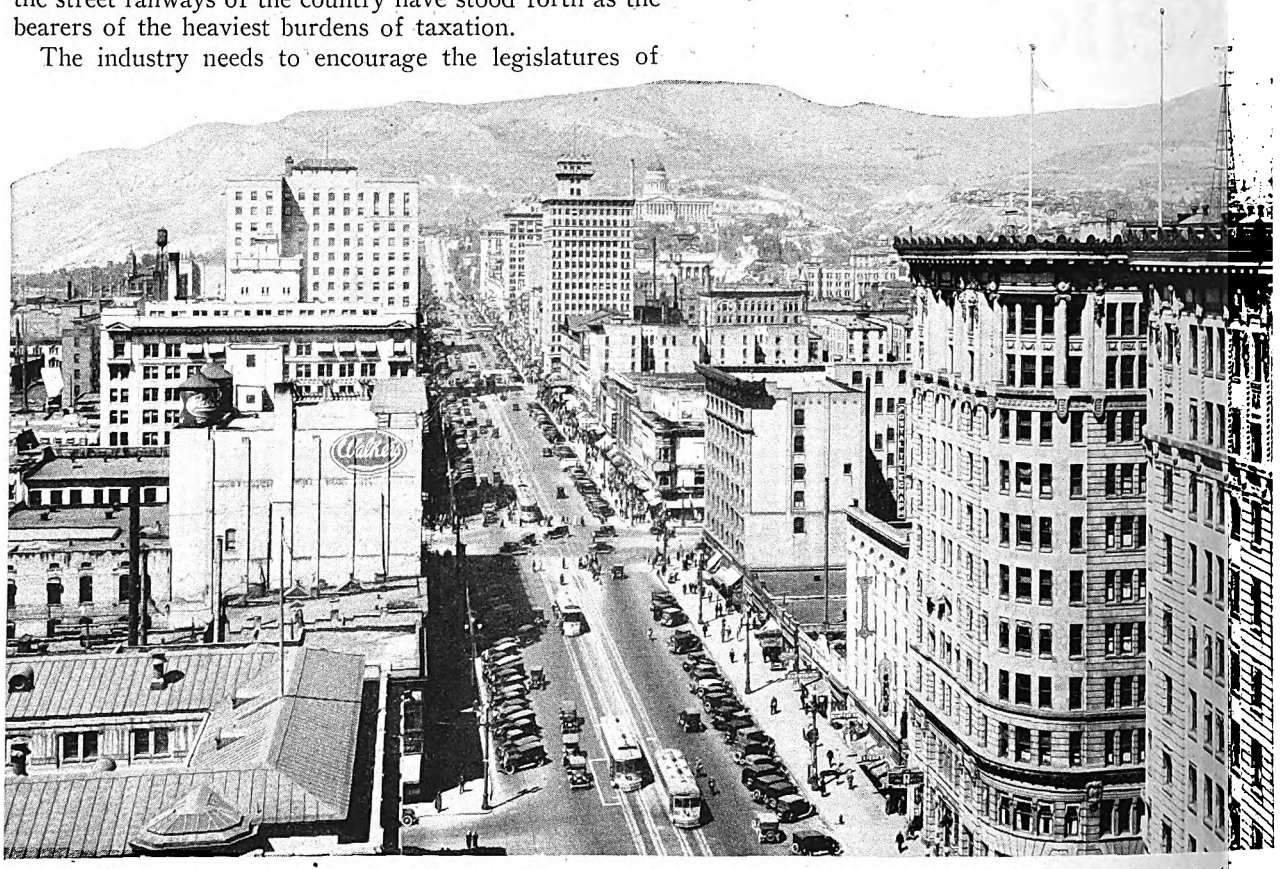
The industry needs to encourage the legislatures of the various states to set up such fact-finding tax commissions as will bring out in an official way what every one in the industry knows to be true, and, relying upon the conclusions of these commissions, frankly and openly approach the legislatures for relief. The procedure followed by the state of New York in 1922 and the state of California in 1928, is to be commended. The personnel of these commissions was such as to leave no doubt that their findings would be accepted, even though legislation was not immediately forthcoming.

Several years ago the state of Wisconsin appointed a commission composed of members of the Legislature. It opened up the subject to such an extent that it is certain its work will be carried on and changes brought about in that state. Utah has taken similar steps, and, while the findings of this commission are not yet available, it is evident that they will throw light on the need for changes in the taxation procedure.

In many individual communities partial investigations have been made, but few of them have had legislative backing and hence their conclusions cannot be given the same weight as those from the states of New York and California. One such study was made in Dayton, Ohio. Philip H. Worman of that city states:

> An investigation of the tax status of 35 mercantile and manufacturing institutions in this community shows that these businesses paid 2.08 per cent of their gross revenues and 18.96 per cent of their net revenue in taxes, whereas the street car industry here pays 11.47 per cent of its gross revenues and 43.05 per cent of its net operating revenue in taxes.

From the hundreds of letters which were received by the association staff in answer to a questionnaire sent out, it is apparent that the electric railways of Dayton, which pay 11.47 per cent of their gross revenue in taxes, represent about an average for the street railways of the country. But there are, unfortunately, many cases where the ratio of taxes to net operating revenue is more than 40 per cent. It is actually unusual to find a company which pays less than 35 per cent of its net in taxes. In a sense, most companies are working for the taxing authorities, since they pay far more in taxes than they do in dividends or to surplus.



Investigations now being made by a legislative commission in Utah promise an early improvement in the taxation situation in that state

What is needed is a new "industry viewpoint" on this matter. The railways do not need to bear these taxes indefinitely, but they will never get rid of them without active and well-organized opposition to them. Long ago the citizens of the colony of Massachusetts "got mad" about their taxes and it ended in the Boston tea party —an expression of their unwillingness to sit by and supinely accept the existing tax situation as inevitable. They adopted a forcible method of calling attention to their wrongs and revolution ensued. But this is a new age, and the only revolution that could be advocated would be one in the minds of those who determine the taxes and who have been left far too much alone to form their own conclusions without adequate knowledge of the oppression from which the industry is suffering.

The best results will not always be obtained by going direct to the legislators. Perhaps the most promising direction for help lies in the cultivation of such public relations as will align the whole group of citizens of the

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community—the car riders, the property owners and the employers of labor—on the railway's side in a campaign to give such treatment to an essential and public industry as will remove the discriminatory tax burdens from which it suffers, and allow it to prosper and give adequate service.

In most cases the man in the street, the rider on the car, the members of the Rotary and Kiwanis and other clubs, do not have the slightest conception of the difficulties under which the street railways are operating. They are, in the main, business men who are fundamentally honest and fair-minded. If they could be impaneled on a jury there would be no cause for hesitation in submitting the case to them, since it would be certain that the case would be justly treated and that the tax inequalities would be wiped off.

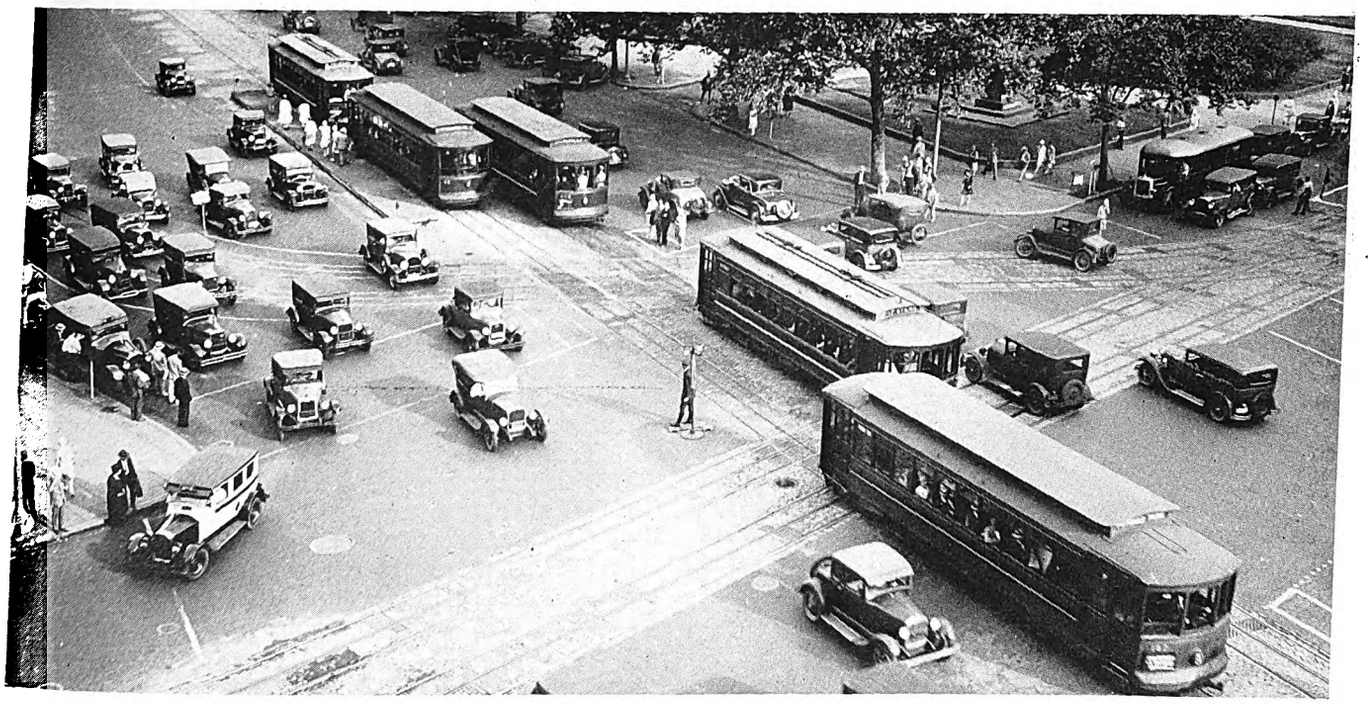
In the matter of relief from the imposts which have burdened this industry since its very inception, there is a still stronger case. But strangely enough, as the taxation committee's survey shows, very few companies have made real headway in relief from paving and similar charges which are as indefensible today as they are burdensome. It is not only unfair to the industry to go on accepting these out-of-date conditions, but it is obviously unfair to the patrons, drawn for the most parts from those classes of society which cannot afford their own private means of conveyance and which have no organized voice to speak for them. They have the right to look to the electric railway to represent them. When a street car rider contributes one-tenth of his fare to pay for paving from which he gets no benefit and the existence of which encourages automobiles and trucks to use the space between the tracks, slowing down the public conveyance, to pay for the sprinkling and cleaning of streets, for snow removal or for crossing policemen, it is time the industry took up the argument on his behalf and demanded that these absurd conditions cease.

It is quite certain that more progress has been made in this matter than has been made in relief from taxation. Many companies report that they have received some form and some degree of impost relief within the last four or five years. In a number of cases, however, where one form of relief has been obtained, another form of impost has been accepted. Apparently a good many companies have felt that their only way out of the difficulty was by a series of tradings. The danger of this procedure is evident.

The greatest progress seems to have been made in the states of Connecticut, Indiana, Iowa, Massachusetts, Montana, New Jersey, New Hamshire and Utah, where the legislatures have enacted legislation, removing all or most of the paving cost burden from street railways. A typical example is the Indiana law, which states in part:

> Whenever the track of any railroad, street railroad or interurban street railroad occupies any portion of any street or alley in any city (first, second, third, fourth and fifth class) of this state, and the Board of Public Works of any such city shall desire to improve such street in any manner provided by law, including the portion occupied by such track, such board. . . . shall, in the resolution for such street improvement, provide for the improvement of the space occupied by such track in the same manner and with the same material as the other portion of the street. . . . . Such railroad company shall enter into a contract . . . ., agreeing to pay such city any additional cost that may be incurred on account of the use of the kind of paving designated . . . . or different method of construction . . . . and shall give bond . . . . for the fulfillment of such contract.

This means that the railway pays only such additional costs as are due to the different kind of paving it may desire around its tracks, while if the same type as is provided for the remainder of the street is accepted, the company bears no cost whatever.



Street car riders pay the salaries of many of the traffic policemen in Washington, D. C.

The eventual passage of this relief act by the Legislature of Indiana was the result of the efforts of a committee, representing civic organizations of Indianapolis, investigating the financial needs of the local street railway. Their efforts were followed by the ruling of the Public Service Commission regarding the Indianapolis Street Railway. The railway had accepted an indeterminate franchise under the terminable permit law passed by the Legislature. The city demanded that the company pay its share of paving and the dispute was carried to the commission, which stated:

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By accepting the indeterminate permit, the street car company entered into a new and binding contract with the state of Indiana, and no longer could it be held subject to the requirements of any of the obligations created or imposed by reason of the franchises with the city of Indianapolis which it had surrendered.

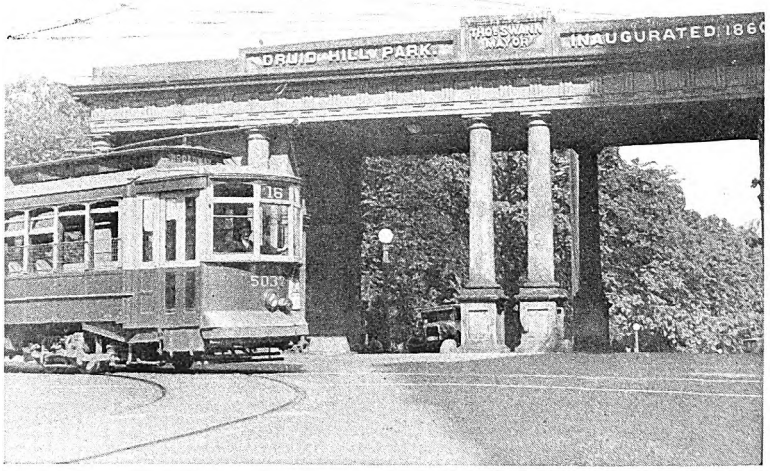
Much of the commission's decision is worthy of attention and quotation. The ruling stated:

We must accept changed conditions and solve the problems of today in the light of those changes. The days of horse and mule cars are past. Street car companies no longer have any use for an improved pathway along the line of their tracks. Passenger traffic has changed, and we are all aware that it has suffered great diminution in recent years by the private automobile, which not only causes a loss in revenues but impedes traffic by using the street car tracks, and wears out the pavement, for which the city is asking the petitioner to pay.

If this burden is to be carried by the street car company it must of course be borne in turn by the car riders through an increase in fares. This, to the commission, seems unfair. This means that the citizen who lives two or three blocks away from the car line must pay for paving his own street and then contribute his part for paving the street on which the car track is located. . . .

It is argued that the abutting property owner should not be required to pay more than it would cost to pave the street if not occupied by street car tracks. The commission finds no fault with this argument. . . .

It is not the province of the commission to say whether the paving between the tracks should be paid for by the abutting property owners, by the owners of vehicles or by the city out of its general fund; but it is certain that the street car riders as a group should not be assessed for such paving and, therefore, that the order should be held to be unreasonable.



Electric railways in Baltimore contribute to the upkeep of the city's parks

The following year the Legislature passed the bill which relieved the street railways throughout the state of Indiana from paying paving charges.

Long Struggle in Iowa for Relief

In the state of Iowa relief did not come easily. Time after time the bill met with defeat in the Legislature, till in the session of the early part of 1929, legislation was enacted in part, as follows:

. . . . shall be assessed for the construction or reconstruction of paving between the rails of their track or tracks and for 1 ft. outside of each rail thereof, in the amount the cost of such pavement per yard area exceeds the cost per yard of the remainder of paving upon such street.

When this matter was presented to previous legislatures, it has always met with defeat, but I think there is a general recognition on the part of the people, at least in Iowa, that if we are going to maintain our present railway systems, some relief must be given the railway companies in the matter of paving assessments.

In the states of Connecticut and New Jersey relief was won by persistance on the part of the operating companies. In the state of New Jersey especially, a complete educational and publicity program was worked out, which succeeded after several reverses.

In the states of Pennsylvania and New York, the electric railway associations have furthered the movement for paving relief, but so far without success.

Real progress is noted among a number of companies whose franchises have come up for reconsideration within the last year or two. The railways in Youngstown and Steubenville, Ohio; Fresno, Stockton and San Diego, Cal.; Cincinnati, Ohio; Charleston, S. C.; Portsmouth and South Norfolk, Va.; Williamsport, Pa.; and Rockford and Aurora, Ill., have all obtained measures of relief which are incorporated in their new franchises.

In most cases where relief of any kind has been obtained, the procedure seems to have been to conduct first a well thought out publicity campaign in the street cars and sometimes in the newspapers and then to lay before the authorities that impose the burden the facts of the case, with an appeal to their sense of justice and fair play for relief. While this has worked in many cases, some companies report that in spite of all they could do, they still found the regulatory bodies wedded to the idea that they were operating under a franchise or a contract the letter of which must be carried out, no matter what the consequences might be.

It is apparent that the industry has only begun the struggle for relief from these antiquated burdens. And it is certain that the fight will not be waged successfully by the street railways themselves, but by their patrons, by their fellow business men, to whose doors they carry customers, and by the property owners who must be made to realize that public transportation systems add value to their property and make it possible for business to be transacted within their city limits. While the initiative must be with the electric railway executives, the responsible and operating heads of these urban and interurban systems of transportation, they must not feel that they are able to achieve success by themselves unless they enlist the sympathy and the active help of all those organizations within the community that use the transportation systems for private or business purposes.

Taxation and paving relief must come to many properties if they are to survive and give that kind and degree of service to which the traveling public is entitled. The operating companies are quite willing to pay whatever taxes are just—and these can best be measured by the net earnings—but they do not see any valid reasons why the people who use their services should be taxed for that privilege. A good taxation system for street railways fundamentally should do justice to the railways as compared with other industries, be simple, be easily collected and, as far as possible, be definite in its amount. It should not involve the necessity of constant valuation and appearances before regulatory bodies.

On the whole, real progress has been made during the past year in the matter of impost relief, and the coming year should be one in which legislatures will seriously approach the problem of taxation, both in the interest of justice and the continuation of an essential service.

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A system of fares that takes into consideration the frequency and time of use of the service has been adopted in Houston

Fares *Should Be Put on a More* SCIENTIFIC BASIS

By
MORRIS BUCK
Engineering Editor
ELECTRIC RAILWAY JOURNAL

PAYMENT in proportion to services rendered has become the rule in almost every line of business. The so-called "American Plan" of a flat rate for unmeasured service has practically disappeared, being found only in second-class hotels and American street railway and bus lines. Even the term American Plan has been forgotten except in connection with the hotel business.

Occasionally it has been suggested that at least a part of the difficulty in which electric railways have found themselves in recent years is the result of a system of fares following, with few exceptions, a principle long since discarded by every other major industry. The central station industry originally computed its charges at so much per lamp per month, but this method was given up long ago in favor of a charge for measured service. The phenomenal success of the electric power business is in no small measure due to the ability of its operators to measure the fundamental characteristics, demand and energy, by automatic recording devices and to charge for the service under schedules which recognize differences between customers in the nature and extent of their use of service.

To obtain a satisfactory system, solutions must be found for the problems of measuring the service rendered by electric railways and of differentiating between various classes of users

Measurement of the service rendered by the transportation company and of differentiating between various classes of users is vastly more difficult than the parallel problem of the central station. Perhaps the problem is not only difficult but is impossible of solution. In fact, many railway operators have made this contention. The occasional experiments attempted in fare

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structures have not been highly successful, although there are Philistines in the industry who have felt that certain of these experiments were foredoomed to failure because of the conviction of those making them that they could not succeed.

The feeling persists, however, that the theory underlying the fare structure should be re-examined and a study made of the controlling factors, with the purpose of seeing if it is possible to determine a correct basis of fares or if the electric railway industry must continue as the sole exponent of the otherwise universally discredited theory of unmeasured service as the basis of charges.

In the past there have been sporadic attempts to determine the sound basis of rates in general terms, but the industry apparently has felt that such investigations were not worth while, probably on the theory that no scheme of rate structure would be applicable generally. However, with conditions varying as much, the electric field has made a determination of the general principles. This has been widely supported, and while the rate schedules of operating companies show wide variation, with minor variations they conform to the principle that no class of users should be served at a loss, but that those with best load characteristics should receive the benefit of their favorable position, and that the possibility of other sources of supply should be considered in fixing rates. No class of service which makes even a small contribution to net is ignored if reduced rates are necessary, in view of competitive conditions. to attach the business.

In a few instances street railways have experimented with the permit, the pass, and in many instances with reduced rate tickets, although these reduced rate tickets have usually been equally favorable to the individual riding five times a day and the one riding five times a year. The wholesale purchase of the tickets and not the wholesale riding with them has been the criterion. A few zone fares have been inaugurated, but these represent the classification of use based on only one characteristic—the length of ride—while very generally the time of day or the day of the week, is more important than the length of the ride in its effect on the cost of serving the patron.

Surveying the Problem

As a preliminary to a study of the fare structure the problem should be surveyed in an effort to discover the extent of the field which would have to be covered and the nature of the phenomena which would have to be isolated and measured. For the purposes of preliminary discussion the problems involved can perhaps be arranged in three major groups:

1. What are the characteristics of the use of railway service which fix the cost to the company of serving the various classes of patrons? This question involves the effect on cost of length, time of day and of year, frequency, speed and certain other characteristics of the ride.

2. What are the characteristics of the service rendered and the rates charged which make the service competitive or otherwise with alternative methods of transportation available to the prospective customers? These characteristics involve comfort and convenience as well as cost.

3. What are the compromises that must be made between the criteria developed under 1 and 2 in order to permit practical adjustment between the preferences of the rider and the necessities of the company? These compromises are limited to varying degrees on different properties by the limitations of personnel and equipment.

First of all, the revenue must be sufficient to cover the entire cost of the service, no matter how the charges are distributed among the various classes of riders. The cost of the service will include not only operating expenses, taxes and interest, but a sufficient additional amount to cover the depreciation and obsolescence of the property, or to set up a fund for the retirement of the capital if it is decided to abandon any part of the plant.

Granted that a certain revenue must be obtained in order to carry the property with efficient management and reasonable costs, that fare structure is best, both from the standpoint of the owners of the property and from that of the users, which will bring the most revenue from the largest number of passengers. It is only in this way that the system will be of greatest benefit to the community.

Many Changes Affect Cost of Service

Considering the two major elements of cost of service —the fixed charges and the direct operating costs—it will be seen that many elements enter into the fixed charges which are not always apparent to the user. The cost of creating the transportation system as it exists today includes not only the original expense for laying tracks, buying cars and supplying power, but many elements which, while they may have disappeared, nevertheless have not been written off.

The geographical and economic characteristics of the community determine in large measure the amount of investment necessary to provide satisfactory service, and the proportion of capital devoted to the various elements of the physical property. Crooked streets, steep hills, rivers, rocky or unsubstantial subsoil, barren districts which must be passed, all add to the cost above the minimum for constructing an adequate transportation system in a compact city.

Most of the present city transportation systems have been built up as the merger of many lines, all or part of which were competing. Often the competition was almost ruinous, and was stopped only when the stronger company bought out the weaker, perhaps at an exhorbitant price. Not infrequently the competing line was established with the avowed intention of selling out at a "nuisance value." As a rule only part of the lines so purchased have been of advantage to the combined system, and it has been advisable from an operating standpoint to abandon large portions of the duplicated facilities. Unfortunately the investment has not been abandoned so easily, but has continued with corresponding charges to the patrons.

One of the elements of cost frequently overlooked is the soundness of the investment. The rate for money is determined very largely by the certainty of the return and the security of the principal. Security of the principal, however, cannot be guaranteed merely by the existence of a good physical plant. Changes in method may make unsuitable large portions of the property which are in first-class condition. It is rather the position which the company has in its community, its ability to earn a sufficient margin over expenses to insure continued payment of charges, and the prospects for continuance of the revenue, which make the securities attractive. A long record of good earnings is one of the most valuable assets a company can have. Another is a

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record of good public relations, particularly if it extends over a period of years.

Other intangible elements of cost are the losses during the period of development. Few properties have been able to earn the full return on the invested capital from the moment operation began. All properties have had a period of a year or more subsequent to the collection of the principal during which construction was in progress and no opportunity for earning existed. The interest during construction and losses in the early years of operation are often a material addition to the amount on which the present car rider must pay. Then there are expenses in connection with building up a competent operating staff and the training of employees in all departments.

An outstanding example of unscientific fare structure is found in New York City, where a passenger can ride many miles for the flat rate of 5 cents

While direct operating costs vary in considerable degree with the actual service given, there are differences that make it difficult to assign to each ride a proportional amount of the cost. Factors which have a marked influence are the density of travel, the length of the line and the relative loading from one end to the other, the loading in the two opposite directions, the schedule speed, the number of stops, the kind of track and cars in use, the hours in which service must be given and the relations of rush and non-rush loads, the ability to fit runs efficiently into the agreed working hours, the character of riders and many other elements.

In determining a workable fare structure it may not be possible to make each rate exactly in proportion to the cost of service. Still the various elements may be considered and given weight so that the resulting fare is close enough to the theoretical figure to be substantially equitable. The flat fare has been maintained not because it is correct in principle but largely because it is easy to collect and account for. Further, it has the sanction of custom and is thoroughly understood by public and city authorities. On the other hand, the flat rate is discriminatory, as no distinction is made between the passenger who rides a block or two and the one who rides the entire length of the system.

The argument frequently has been advanced, particularly by politicians in favor of the "one city, one fare" principle, that the flat fare has done much to

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develop the typical American suburban communities. This may be true to a limited extent; but those who are familiar with European cities, particularly in Great Britain where the zone system has been used for generations, know that the density of population is far less than in the American tenement and apartment-house districts in the large cities. That the workman may and frequently does reside nearer to the factory with the zone fare is undeniable. There are districts built up around various industries where the workers live in individual or semi-detached houses under better conditions than many of those who work in American factories and live miles away in tenements. The amount of transportation service needed to supply the British workers may be less than that required under the American system, but the amount paid by the passenger is greater per unit of service rendered. Inherently there is no more reason why there should be a flat rate

Various rates of fare are in effect in the territory served by the Pittsburgh Railways, depending on the locality and class of service furnished

which is charged over an entire political subdivision such as a city than for any arbitrary area to be determined.

A variation in the flat rate that has been a source of difficulty in nearly every principal city has been the free transfer. Originally it was an outgrowth of the combination of many lines into one. The area covered by a single fare is increased largely with the transfer, which in nearly every instance has made it possible to reach any point within the single fare area. It has been argued that the additional ride made possible by the use of the free transfer is seldom taken. The patron usually rides on one or the other car only a short distance, getting the convenience of reaching a point closer to his destination than where he can ride on a single car only for one fare. The chief advantage of the transfer to the company is the stimulation of riding. Since the transfers usually are made at some central point one portion of the through ride is made against the ruling direction of traffic, so that no additional equipment is needed. There is a marked advantage in car routing since each line can be treated as a unit, and there is no necessity to provide unusual or roundabout routes in order that the passenger may ride from any point to any other for a single fare. This results in a saving in car-miles and an elimination of duplicate service. It also makes the use of crosstown lines advantageous, as they can carry a considerable portion of the riders without the necessity of bringing them into the congested district. The free transfer carries with it a number of disadvantages. The one that is most often mentioned is the opportunity for fraud. Another is the reduction in total revenue occasioned by through riding at a single fare. The transfers necessitate a considerable expense for printing, handling and auditing. Still other disadvantages are the greater possibility of injuries and damages, and slower car operation.

In some instances a variation of the free transfer plan has been made by charging a small amount for the transfer. This is a departure from the flat fare scheme which usually has been justified by the increased revenue obtained. It does, however, result in a market reduction in the use of transfers and a much greater reduction in the number issued. On the other hand, the transfer has a cash value and it is more difficult to refuse to accept one which has exceeded the time limit. The disadvantages are the same in character as with the free transfer, except that on account of the reduced volume issued they are lessened somewhat.

Determining the Cost of Individual Rides

If any system of rates other than the flat fare is to be used, it is necessary to determine the cost of the individual ride, or at least to separate the rides into various classes which can be treated as units. The larger the number of riders that can be grouped together the simpler the fare structure can be made. On the other hand, if a fare system is to be equitable every element that enters into the cost and the value of the service must be analyzed in order to arrive at a rational basis for charging. From this point of view it is preferable to make a detailed and searching analysis into all the elements and then to combine as many minor variations in cost as will result in a fare that is not too complicated to collect and to audit.

There is sound logic to the graduated fare system. As was pointed out earlier in this article, the enormous growth of the electric power industry has been in no small measure due to the system of rates by which each consumer pays in proportion to the use he makes of the service. There are several viewpoints which may be taken in analyzing the use of the transportation system. One has to do with the length of the individual ride, another has to do with the number of rides taken in any fixed period, still another considers the time of the day or of the week in which the ride is taken, and a fourth is concerned with the direction of movement as compared with the general trend of traffic.

The distance basis of charging has long been recognized as fundamental by steam railroads and interurban rail and bus lines. It is not possible to state definitely that the straight distance basis for the individual ride is

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correct, since many elements enter into the cost that are not directly related to distance. For instance, since the value of transportation depends to a large extent on the saving of time, fast transportation can be charged for at a greater rate than slow transportation. This principle has been recognized by the steam railroads in the extra fares charged on limited trains as an inverse function of the time taken for the trip.

Inherently two classes of costs enter into the production of transportation which should be given consideration in determining the rate of fare. These are the costs which are fixed regardless of the use made of the transportation system, and those costs which vary with the amount of service. The complete plant must be available for service at all times, or at least until there is a demand which requires its expansion or a change in method. The amount of track and power supply system, the number and size of the cars and buses, once determined, can be changed only occasionally and at considerable expense. The carrying charges for the system, therefore, are quite definite in amount.

The use which is made of the plant, on the contrary, can be changed quickly from a minimum of zero up to the limit of capacity. The cost of use increases with the use, although not directly in proportion to the amount. Some of the factors vary with the number of car-miles, others with the number of car-hours, while still others vary according to other factors of use.

One form of fare that has been proposed as a result of such an analysis is made up of a flat service charge and a movement charge. If such a fare is computed it is necessary first of all to determine the number of rides over which the two elements of the cost of service are to be distributed. If a property has been operated under a flat fare and a change is made to some form of measured service a trial period may be necessary in which the use of the plant under the new arrangement can be determined. If a zone system is worked out there is always a question of the proper unit, which may involve differences in fare from 1 cent upward, depending on the possibilities of collection and of keeping the various zones segregated. It may be advisable, for instance, to combine service and distance charges to permit of 5-cent zones, in order to prevent a multiplicity of fares. Even with such a rate established, there is a question of distinct or overlapping fare zones that is open to considerable argument.

As to the minimum limit for fare increments, it is questionable if units smaller than 5 cents should be used. This is a unit which is easy for making change and for collection. If it is desired to reduce the fare unit below this figure it can be done by means of tickets or tokens sold in bulk.

The principal use of tickets in the past has been to offer a lower rate for bulk purchase but not for bulk use. The advantages to the company are the reduction in number of cash transactions and the shorter time taken when the passenger boards the car. A minor advantage is the fund of prepaid fares, although a certain amount must be set aside out of this for redemption of unused tickets. The principal disadvantage is in the accounting of the several classes of tickets and the cost of handling them.

Reduction of the charge for bulk use is seen principally in the sale of the so-called weekly pass, which is sold for a flat sum, permitting the holder to ride as often as he likes during the stated period. The charge for the pass usually is based on the single fare, amounting to between twelve and twenty times the single-fare rate. This recognizes that the holder will ride to and from work each day, or twelve times, and that the additional riding will be done at other times than during the peak load. Therefore, for this additional service the charge is much less if the rider uses his ticket a sufficient number of times. The charge must perforce depend on the characteristics of the community and the opportunity for taking additional rides above the assumed minimum. A variation is seen in the Sunday and holiday passes issued by certain railways, and the one-day tickets good all over the system of other roads.

Still another class of ticket which has met with some success is the weekly or monthly permit, sold at a price depending on the readiness-to-serve charge, and which entitles the holder to ride at a fare lower than the cash fare. While the principle is more scientific than that of the straight pass, the difficulties of collection and auditing are increased.

A difficult fare-collection problem has been solved by this post-payment area in the central business district in Youngstown

A few instances are on record where local tickets are used at the ends of long lines, where there is service to spare which otherwise would not be used.

On the principle that the greatest use should be made of the plant all of these special rates are advantageous to the company and to the public.

To a certain extent the same reasoning holds for the use of the transportation plant for doing other classes of business than the handling of passengers. Carriage of mail, parcels and the like will bring in additional revenue. Some roads have gone still further in carrying freight and express matter. Although the primary purpose of the local transportation system is the passenger service, any additional use of the plant that can be made without detriment to the main purpose, and that will earn a profit above the operating expenses and incidental charges, is of benefit to the rider in that it lowers the fare or improves the accommodations.

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Relation of

RAPID TRANSIT

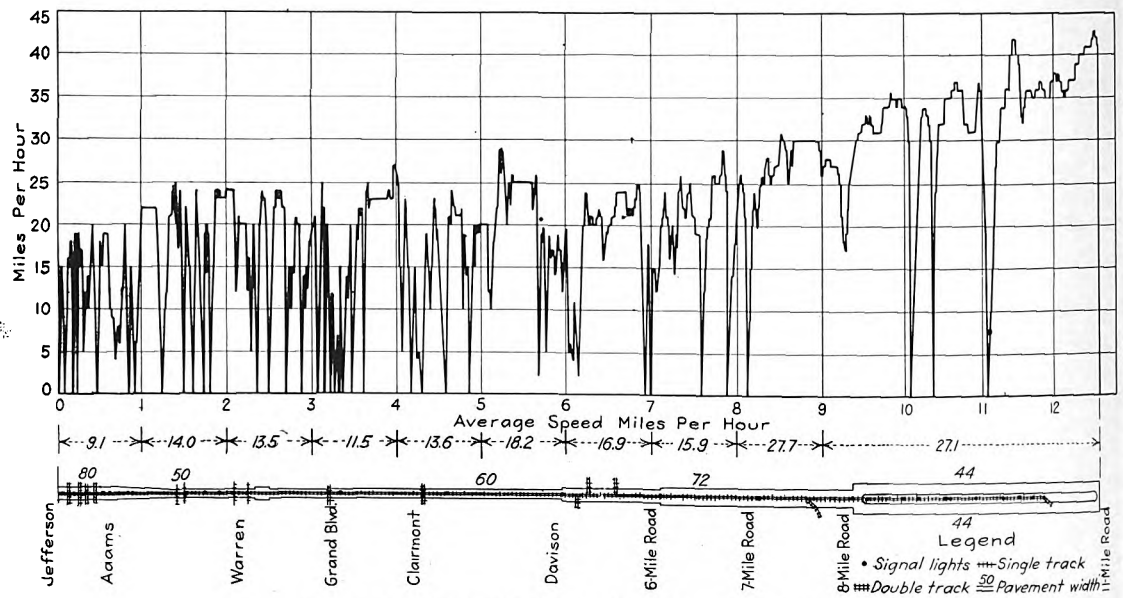
to

Community Development

By

JOHN P. HALLIHAN

Chief Engineer Rapid Transit Commission, Detroit, Mich.



Average speed of vehicular traffic on Woodward Avenue, Detroit, in July, 1929

IN THE past 50 years the United States has been changing from a dominantly agricultural country to a dominantly manufacturing country. This change has caused an increasing shift of population from the farms to the cities. Since 1880 this movement has proceeded at the rate of 5 per cent per decade. The trend of the curve indicates that the census of 1930 will show that about 55 per cent of the population is living in the cities.

Changes in manufacturing methods in the same period have had their effect on the transit requirements of cities. Mass production requires concentration of industrial workers in great numbers in comparatively small areas. Groups of manufacturing units create concentrations in a fraction of the space that would be occupied by the same number of people distributed about the other districts of an important city. A single industrial unit may employ anywhere from 5,000 to 30,000 workers. However, workmen no longer live in the neighborhood of the industries in which they are employed, but are found distributed over the whole city and its suburbs.

It is not unusual for a city to be called upon to serve and transport a daytime population much in excess of the residential population within its corporate limits. This affects revenue requirements and stimulates annexations motivated by the necessity of increasing the taxable base. The tendency of large cities is either to become larger as a single political unit, or to merge in metropolitan districts where the planning, financing and direction of the basic public services of water supply, sewage disposal and transportation are carried on apart from local political influence.

Economic Effect of the Automobile

The rise of the automobile as a transportation medium has exerted the most profound influence on all phases of community development. In its economic effects this influence in the field of passenger transportation and of road and street space requirement is only beginning to make itself apparent.

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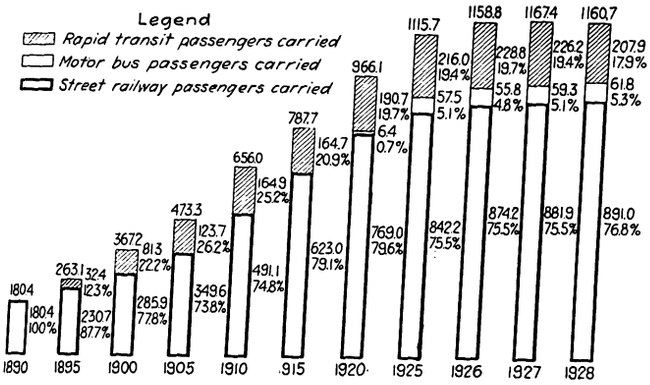
There are now more than 24,000,000 motor vehicles in use in the United States, of which 21,000,000 are private automobiles, or one to less than six persons of the population. In some localities where public transportation facilities are limited the rate of use is one automobile to less than two persons. In large cities the use is limited only by the character of the street system. In the county of Wayne in Michigan, which includes the City of Detroit, the rate of use is one to 3.8 persons, and the registration in this single county is exceeded by



Passenger traffic in Chicago, 1890 to 1928. The totals, in millions and percentages, are of street railway, motor bus and rapid transit passengers carried

only seventeen states. The curve of use of all motor vehicles drawn in relation to the population curve indicates that by 1950 the national rate of use will have risen to that of one to three persons, which may possibly be somewhere near the point of practical saturation.

According to the figures of the latest industrial census (1927) the automobile industry directly employs 4,000,000 persons and produces $3,162,000,000 in manufactured products of the total of $62,721,000,000 produced in the United States. The production in 1928 was 4,827,849, in addition to 530,899 commercial vehicles.

The Automobile as a Transportation Facility

When we come to compare the investment in this new facility with previously existing forms of transportation, a better idea is obtained of its relative value as a transportation medium. The present investment in improved roads is $7,385,000,000 and the investment in motor vehicles, at depreciated values, is $8,575,000,000, making a total of $15,960,000,000 for road and equipment for automotive transportation. This is more than half the investment in steam railroads and is equal to 2½ times the investment in electric roads. This capital investment is being added to at the rate of more than 10 per cent per annum, about evenly divided between road and equipment.

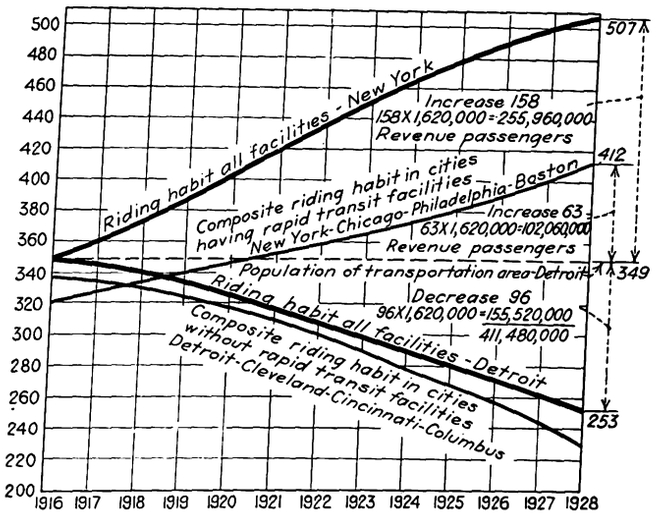
In 1928 the total revenue derived by steam and electric railroads from passenger transport was in round figures about $1,800,000,000, while the amount spent on transportation in private automobiles, estimated on a basis of 6,000 miles per annum for 21,000,000 automobiles, was $8,200,000,000, or more than 4½ times the amount spent for transportation in steam and electric trains.

On the assumption of two persons per car, there is a movement of 252,000,000,000 passenger-miles per annum in private automobiles or individual transportation, plus some 13,000,000,000 passenger-miles in buses or in group transportation. The significance of these figures lies in the fact that it largely represents new business or the development of a new riding habit, in addition to the riding habit in other facilities. During the period of the growth of this facility the use of rail transportation has greatly increased. In 1908 the steam and electric railroads together carried 8,000,000,000 passengers. Although the steam railroads have lost a considerable amount of short-haul business and the volume of electric railroad business is on a declining curve, there were 12,000,000,000 passengers carried in steam and electric trains together in 1928.

Effect of the Automobile on the Development of the Community

The primary effect of the great freedom of movement given by the automobile and the consequent greater freedom of choice in home sites has been enormously to expand the residential area surrounding the larger cities. If we accept 45 minutes from home to work as a reasonable travel time, of which 30 minutes would be actual running time on rail lines, the distance of the home from the work is limited, on present street car system speeds, to from 5 to 6 miles, whereas the same period of time via the automobiles at 20 m.p.h. permits the home to be 15 miles distant from the factory or office. An example indicating the practical utility of the automobile as a transportation unit is found in Detroit, where more than 20 per cent of the 450,000 industrial and commercial workers move to and from work under their own power.

From a sociological viewpoint this is a highly desirable change. It makes for better living conditions,



Comparison of riding habit in cities with and without rapid transit facilities, from 1916 to 1928

for the single family home instead of the tenement and for better recreation possibilities for the youth of the nation. But the community is put in the anomalous position of being obliged to provide street space for the private transportation vehicles of a daytime population of considerable magnitude that is supported by and necessary to the industries of the city, but lives outside the corporate limits and does not contribute to the city's expenditures. Its contribution to increase of road space is paid directly to the state and redistributed to the counties, but in this distribution the cities do not participate. The provision of travelways for automobiles

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within the city limits must be met from the city's own resources.

The population of cities within the corporate limits is constantly moving outward from the center as residences are absorbed by business expansion. This movement proceeds silently, irresistibly, and does not attract public attention, but it is of great economic importance. It is attended by increase in population density in zones contiguous to public transit facilities and by material change in currents of travel. It can be followed by observation of the annual school census and the location of building permits. It is materially affected by the position and carrying capacity of the rail transit facilities and the amount and arrangement of street space available for the use of automobiles.

Unquestionably the majority of people prefer to live within reach of public transit facilities. The ownership of an automobile by the family does not fully satisfy the daily transport demands of its different members.

The average fare on urban railways is now reported by the A.E.R.A. as approximately 8 cents, and for that price the passenger may ride to any point reached by the city system. According to the National Automobile Chamber of Commerce, the average cost of operating an automobile is less than 7 cents per mile. If we assume an average distance of 5 miles from the rail terminals to the center in a large city for an average trip from the outskirts to a destination in any part of the developed area of the city, then the motorist pays 35 cents in his private automobile for the same ride (except for the factor of exclusiveness) that he can get on the rail facilities for 8 cents, making a differential of 54 cents for the round trip. This can only be justified on the basis of greater speed or by the value of the personal convenience obtained through use of the privately owned car.

It is the assumption of automobile users that much time is saved by the use of the automobile in city travel as compared with travel on the rail facilities. Recent studies of the average movement in the morning and evening rush hours, however, do not support this assumption. On Woodward Avenue in Detroit, from the Six-Mile Road to Jefferson Avenue, the average speed of motor traffic in the rush hours is 13 m.p.h. The corresponding average speed of the street cars between the same points at the same hours is 10 m.p.h.

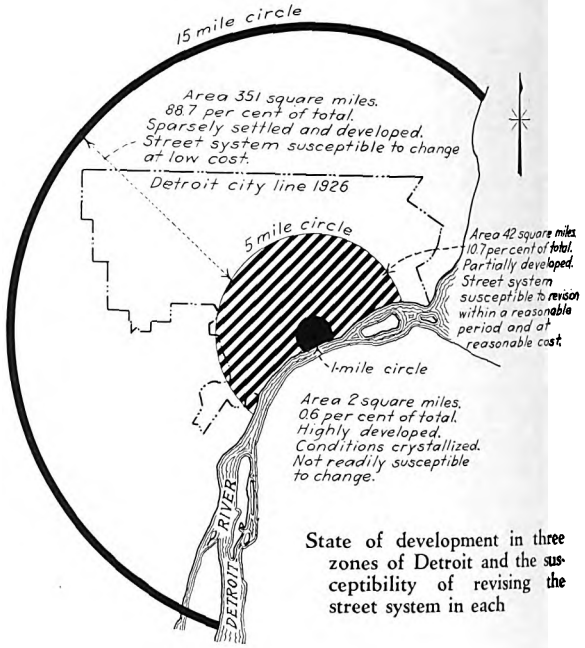
The economic ideal of balanced use of transit facilities would seem to be for the suburbanite to use his car to the terminus of the urban rail facilities, garage it there for the day, and use the urban facilities for movement about the city. The traffic burden would be materially relieved and the motorist would save time, effort and money. For this purpose high-speed motorways would be required in the outer areas, cheap garage facilities at the rail terminal, and a co-ordinated system of rapid transit, surface rail and bus lines giving a diffusive, city-wide service within the sphere of business and industrial activities.

Change in Form of the Transportation Plan

When transit facilities, developed on a plan of lines radiating from a common center, become saturated there are several remedies that may be employed. The most obvious is the addition of other transit lines leading to the same center, but this stimulates building development in the same limited area and hastens the saturation of the relief lines. A second remedy is to expand the center by through routing of arterial lines and by introduction of concentric belt lines operating independently as elements of transfer, collection and distribution for the radial lines. In addition, new through lines are required, designed to serve primarily the new currents of travel set up by the expansion of industry. Such lines bypass the congested center but reach it by transfer to other lines serving it directly.

Whether the system is expanded by one or all of these methods, the result is a definite change in form of the transportation plan as the city grows. The radial, or star-shaped plan, with its primary idea that every passenger must be carried through the business center regardless of his destination, gives way to the gridiron plan offering diffusive service by passenger transfer.

An interesting and instructive example of this evolution is furnished by Chicago, which has a rapid transit system of 72 route-miles which center upon a loop within the central business district. The Surface Lines, in general a gridiron layout system of 1,082 track-miles,



State of development in three zones of Detroit and the susceptibility of revising the street system in each

equivalent to 541 route-miles, have 26 lines which penetrate the loop on more or less radial routes. Bus transportation was introduced in 1917, and in 1925 carried 5.1 per cent of the total business. Since 1925 the relation of the three facilities in per cent of total business has been as follows:

	Per Cent of Total			
	1925	1926	1927	1928
Rapid transit	19.4	19.7	19.4	17.9
Surface lines	75.5	75.5	75.5	76.8
Buses	5.1	4.8	5.1	5.3

A total of 75 per cent of the business of the rapid transit system enters or crosses the boundary of the Loop, while only about 14 per cent of the business of the surface lines moves to and from that district. If motor bus passengers are included, then approximately 28 per cent of the total city transit business enters or leaves the central business district. Approximate figures of commuting business indicate a total of 80,000,000 passengers per annum, all of whom are delivered to the Loop, equivalent to about 6½ per cent of the city transit

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business. (Figures furnished by E. J. McIlraith, staff engineer Chicago Surface Lines.)

The total passengers carried in 1928 by the city transit facilities were 7,000,000 less than in 1927. The Chicago Surface lines, offering a city-wide service by means of universal transfer privileges on a gridiron system of interconnected lines, gained 7,500,000 passengers. The Elevated Lines, routing in and out of the center, lost 18,000,000 passengers in 1928 over 1927, part of which may have been due to a raise in fare from an average of 8.3 cents to a straight 10-cent fare.

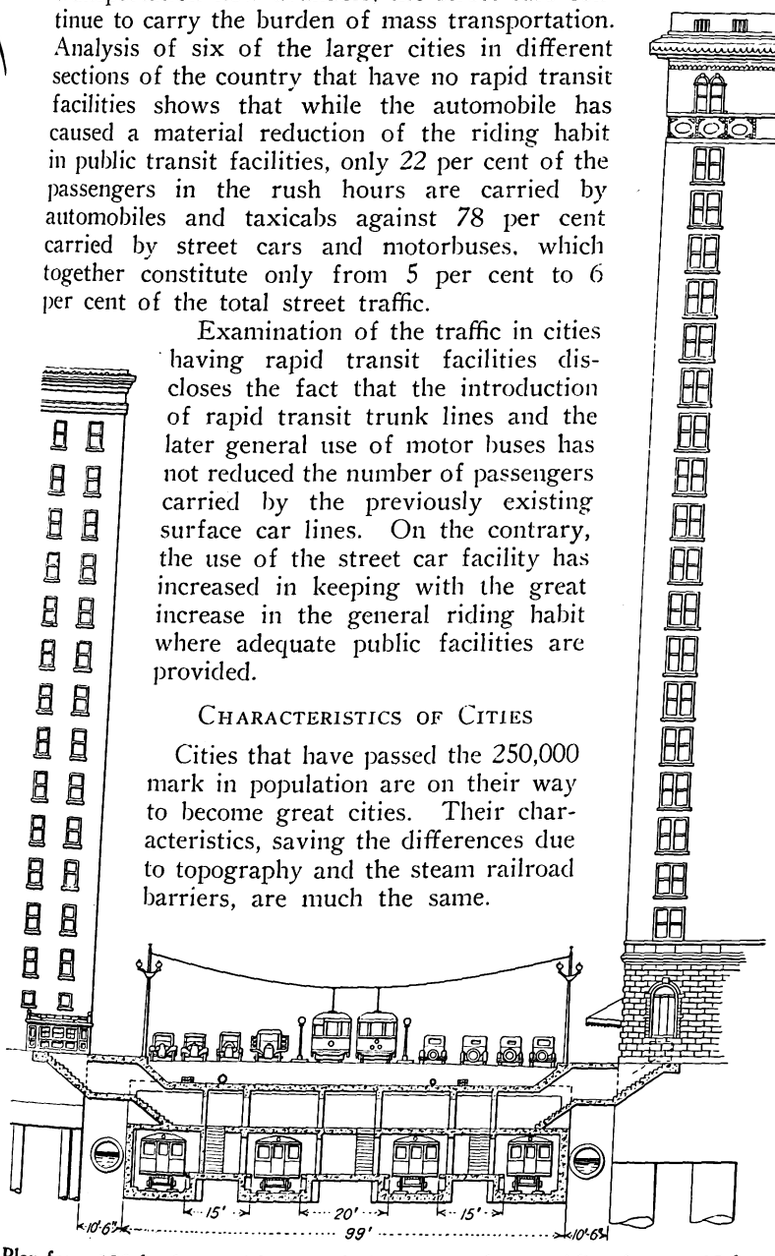
It would appear from these facts that there must be full co-ordination of transit facilities on an equalizing transfer basis in order to obtain the full advantage of the change in form of the transportation plan, and further, that the rapid transit trunk lines should be designed as through lines, with as many crossings of surface lines as will best facilitate such co-ordination in the future as well as in the present.

It is a significant fact that with all the automobile transportation now available, the street cars continue to carry the burden of mass transportation. Analysis of six of the larger cities in different sections of the country that have no rapid transit facilities shows that while the automobile has caused a material reduction of the riding habit in public transit facilities, only 22 per cent of the passengers in the rush hours are carried by automobiles and taxicabs against 78 per cent carried by street cars and motorbuses, which together constitute only from 5 per cent to 6 per cent of the total street traffic.

Examination of the traffic in cities having rapid transit facilities discloses the fact that the introduction of rapid transit trunk lines and the later general use of motor buses has not reduced the number of passengers carried by the previously existing surface car lines. On the contrary, the use of the street car facility has increased in keeping with the great increase in the general riding habit where adequate public facilities are provided.

Characteristics of Cities

Cities that have passed the 250,000 mark in population are on their way to become great cities. Their characteristics, saving the differences due to topography and the steam railroad barriers, are much the same.



Plan for a 120-ft. thoroughfare, 90 ft. between curbs, providing for two 15-ft. sidewalks, eight lanes of motor vehicles, two safety zones and two street car lines on the surface and two express rapid transit tracks, two local rapid transit tracks and two main sewers underground

The relation of the different zones of development to each other and to the total area of the present city and to its probable future area may be visualized by reference to a diagram illustrating the development situation in Detroit which now has a population of 1,500,000 in an area of 139 square miles. By 1950 Detroit expects to have a population of 3,000,000 in an area of approximately 395 square miles. The present highly developed business district in Detroit, within which changes in street space are impracticable, embraces 2.2 square miles and constitutes less than 1 per cent of the area of the city of 1950.

The area of moderate development within which changes are possible at reasonable cost within a reasonable time is approximately 42 square miles and constitutes 11 per cent of the future area, while in the remaining 88 per cent of the area any desired change may now be instituted and carried out at a fairly nominal cost.

The relation found in Detroit between the central district and the outer areas is more or less characteristic of most American cities. Full advantage of the opportunities offered by this relation must be taken when the community is faced with the problem of developing a modern street system.

The imperative necessity for adequate street space for automotive transportation brings with it the opportunity of bettering the position of the surface rail facilities and of providing adequately and economically for future rapid transit requirements. No community can afford to create the space desired for automotive transportation on every street any more than it can afford to put a street car or bus route on every street, nor is it necessary to do so. An entirely different kind of street plan is demanded, in which the skeleton of the plan is designed for heavy traffic needs and the intervening areas are left to their natural development.

Because it is an essential element in the transportation scheme and should be utilized in full measure, automotive transportation (private automobiles, buses and commercial trucks) ought reasonably to have available through streets of capacity for volume traffic at intervals not exceeding a mile in each direction. The thoroughfare created to serve the volume requirements of private automobile traffic must at the same time serve all other city transportation utilities. The economic width to satisfy all these needs must be ascertained.

Economic Width of Transportation Avenues

Traffic experts agree that a major thoroughfare should have a loading and discharging lane at the curb, a lane for right turns, a lane for left turns, and at least one through lane. The street car must have a lane. The sum of the one direction requirements, viz., a loading lane, three travel lanes and a street car lane produces 45 ft. for the half roadway or 90 ft. for the full roadway. The addition of a 15 ft. sidewalk on each side for pedestrians produces a street 120 ft. between building

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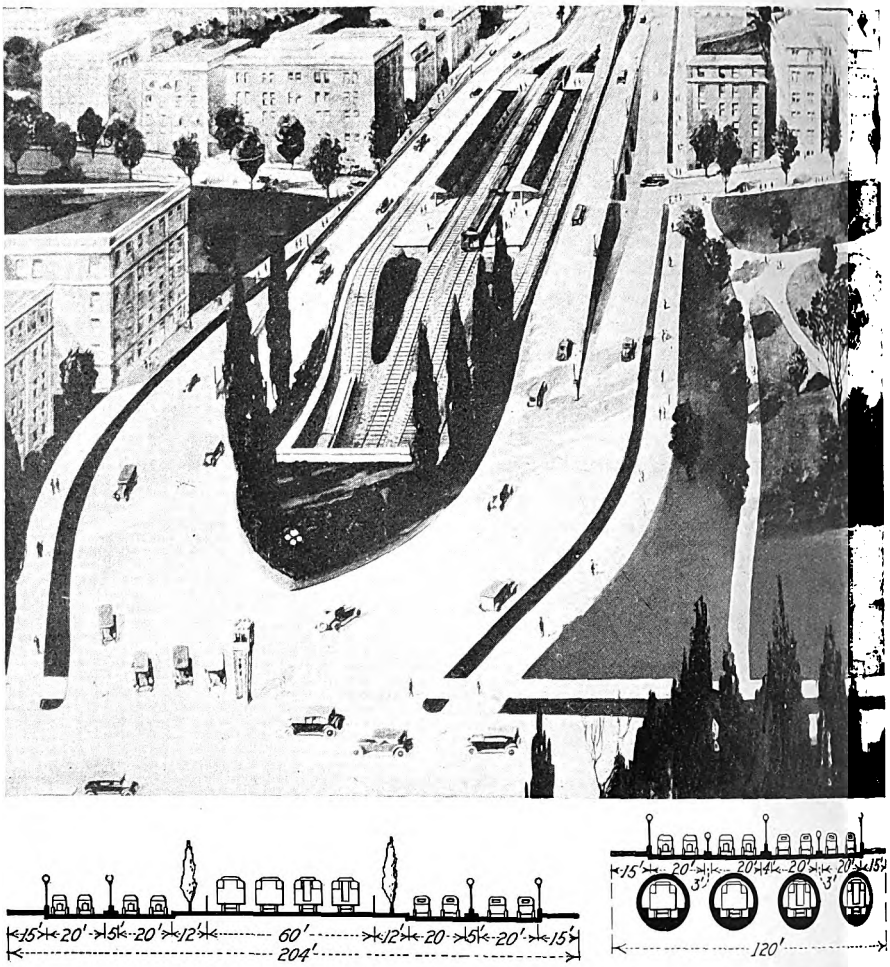
lines. This width will satisfy the utility requirements. If used in the future as a two-level street with rapid transit tracks underground, it will afford room for four tracks with adequate station platforms and will effect great savings in underground construction over the cost in a narrower street by reducing the amount of underpinning of adjacent buildings.

In making provision for the free circulation and volume requirements of automotive traffic on the street surface, the community will also better the efficiency of the street railway facility. The movement of equipment on the street surface is regulated by the interference of other traffic but there is a wide difference in degree of interference on a wide street and on a narrow street. An instance of this difference in efficiency between narrow and wide streets is found in Detroit, where the system speed is 10.2 m.p.h. and where three of the principal lines are on streets of 72 ft., 100 ft. and 120 ft. widths respectively. At the time the comparison was made, operating conditions were similar.



Transition from a 120-ft. major thoroughfare with four rapid transit tracks underground to a 204-ft. super-highway with the rapid transit tracks in a private right-of-way on the surface

On the 72-ft. street, a radial meeting the gridiron system at an angle of 60 deg., the line speed for a twelve-hour average between terminals was 10.6 m.p.h. On the 100-ft. street, a 30 deg. radial, the line speed was 12.05 m.p.h. On the 120-ft. street lying at right angles to the main street system, the line speed was 14.4 m.p.h. A 36 per cent betterment in speed between the 72-ft. and the 120-ft. street and a 20 per cent betterment between the 100-ft. street and the 120-ft. street have a very definite money value. A system speed of 14 m.p.h. for surface cars would assist in pushing farther into the future the necessity of underground construction for rapid transit trunk lines.

The cheapest form of rapid transit is that of surface rapid transit, where the trains operate on the surface in an exclusive right-of-way. The width required on the surface for a possible four track line with adequate station platforms is 84 ft. Combination of this requirement with the 120-ft. requirement for motor traffic in the form of a 60-ft. street on each side of the central reservation produces a street 204 ft. wide between building lines.

After the acquisition of right-of-way, the development of such a transportation avenue, or super-highway, would proceed in accordance with the needs of the adjacent territory. It would be first developed by a 20-ft. roadway on each side adjoining a 15-ft. sidewalk, later by expansion toward the center until a 45-ft. roadway was created, having a loading and discharging lane and four traffic lanes. Such a development is already in satisfactory operation in Detroit. As the development progresses the central reservation is used by interurban rails to be gradually pushed outward by extensions of the rapid transit rails occupying the underground section of the two-level 120-ft. thoroughfare in the inner city.

When the rapid transit rails occupy the central reservation, an exclusive right-of-way is developed by half-elevation of the rail station structure at half-mile intervals and corresponding half-depression of the cross-street. At the same time an express motor roadway is developed by lifting the two adjacent lanes of the 45-ft. roadway on each side of the rails to the elevated station level of the rail structure, leaving a two-lane local roadway meeting the cross-street roadway at the underpass grade. Access from the local to the express motorway would be afforded at several points between stations where both are at the same level. Underpasses for pedestrians would be provided at necessary points.

The differential in construction cost between a two-track line on the surface and a similar line in an underground structure amounts to $2,500,000 per mile, and to nearly $5,000,000 for a four-track line.

The territory surrounding a large city would be adequately served with main routes 204 ft. wide at 3-mile intervals, offering rapid transit and express highway facilities and with intermediate roads 120 ft. wide at mile intervals, both connecting with a system of 120-ft. thoroughfares at mile intervals or less within the developed section of the city.

The economic by-product effects of acquisition of

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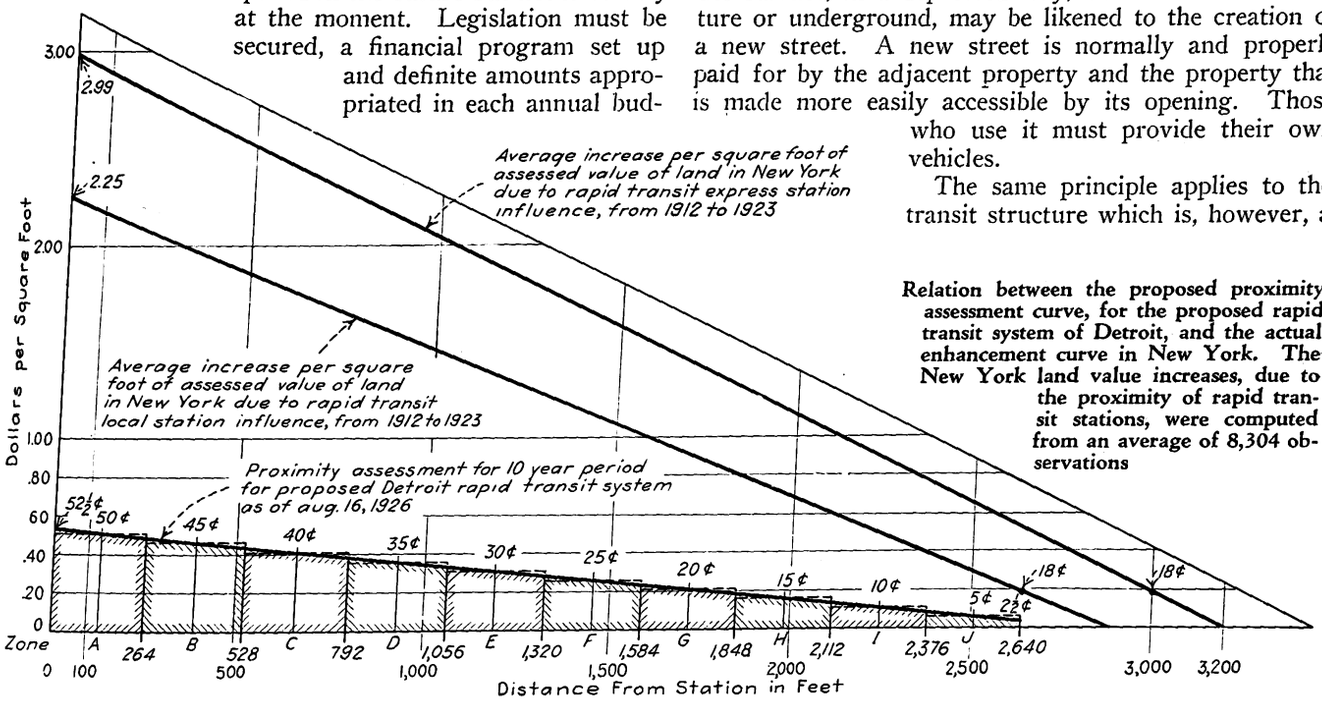
ample space for transportation streets on predetermined locations in advance of the expansion of the principal community in a populous region are very far reaching. They extend into every form of public improvement, providing through routes for water mains, gas mains, power and communication conduits, and trunk sewers. Residential districts are automatically protected from intrusion of through traffic, and land values are stabilized through the practically permanent definition of the character and use of the streets.

Notwithstanding the immediate and potential economies attendant upon advance preparation for transit needs, any community undertaking the task may expect to encounter many difficulties in carrying it out. The public mind is slow to realize the many advantages attendant upon getting an early start and continuously working toward an objective that is certain to be required in the future but not necessary at the moment. Legislation must be secured, a financial program set up and definite amounts appropriated in each annual budget to carry out the foundation work of revising a street system. The community should be able to see to the end of its general plan before selecting routes for the permanent construction required for rapid transit lines.



Relation between the proposed proximity assessment curve, for the proposed rapid transit system of Detroit, and the actual enhancement curve in New York. The New York land value increases, due to the proximity of rapid transit stations, were computed from an average of 8,304 observations

Financial Plan to Distribute Cost Equitably

When it becomes necessary to initiate the construction of rapid transit trunk lines, public opinion must not only be crystallized on a route plan but as well on a financial plan that will equitably distribute the cost. Heretofore it has been the practice to make the rider carry all the capital charges for construction as well as the charge for maintenance and operation. The inequity of this practice has been long evident, and study of the economies of transit financing has been stimulated by the fact that the cost of construction has so increased that the carrying charges for the whole cost can no longer be met within the limits of a reasonable fare.

It is not difficult to determine how the benefit from a rapid transit system is distributed. There is ample evidence in the assessor's records in New York, Chicago, Philadelphia and Boston to show that the "lion's share" of the benefit from a transit facility is enjoyed by the property along the line and within the service area. It is reflected in the great and continuous rise in land values in the area directly served over and above the rise in land values in other sections of the city.

The amount of this special benefit over a ten-year period has been shown to be from three to five times the entire construction cost. It has, moreover, the peculiar merit of being the only benefit conferred by the transit facility that is immediately realizable and capable of being converted into cash at the will of the land owner, while the benefit to the rider is available only by his use of the facility, and the benefit to the general taxpayer is confined to his share in the increase of the city's assets and to his standing as a potential rider.

Rapid Transit Structure a New Street

In its effect upon property the construction of a transit facility on an exclusive right-of-way, whether it be on the surface, in a depressed way, on an overhead structure or underground, may be likened to the creation of a new street. A new street is normally and properly paid for by the adjacent property and the property that is made more easily accessible by its opening. Those who use it must provide their own vehicles.

The same principle applies to the transit structure which is, however, a street of much greater capacity than an ordinary street. If occupied by a two-track rapid transit line it is capable of delivering 60,000 persons per hour to any parcel of land along its course in excess of the number that can be brought to a similar parcel of land on an ordinary street that is without the facility. This increased accessibility to a greater number of people is the measure of the excess benefit conferred upon the property along the transit line over and above the benefit to other property in the city. The full benefit attaches to the property immediately adjacent to the stations and decreases as the distance from the station increases.

Effect on Land Values

The most illuminating evidence on this subject is given by Avery W. Schermerhorn, real estate agent and appraiser for the Board of Transportation of the city of New York, in a report presented in 1926 on the effect on land values of the construction of the dual subways. The following salient points are from a report which followed the examination of 8,304 parcels of land:

It was found that the average increase in assessed value of land in districts similar in character to those covered by the 8,304 points, but where there had been no rapid transit, averaged only 6 cents a square foot in ten years, whereas the net increase in

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value at local stations averaged $2.25 a square foot and amounted to 18 cents a square foot a half-mile away from the station.

At express stations the net increase in value amounted to $2.99 per square foot and the influence of the facility extended to a distance of more than 3,000 ft.

Benefits from the older subways in New York have steadily increased for a period of more than 25 years and the greatest centers of present value coincide with those of most intensive rapid transit facilities.

Studies were made to determine what has been the effect on assessed value both for land and buildings in the older portions of the city of New York traversed by the new rapid transit system now under construction on Eighth Avenue.

Although construction of the new system was not more than 25 per cent completed, the effect on even the older developed portions of Manhattan already served in part by rapid transit lines has been astounding.

For example, in a zone extending 800 ft. to the east and west of Eighth Avenue in the Borough of Manhattan, through which a new subway is being built, from 14th Street to 40th Street, a zone which has on its outer boundaries an elevated railroad on Ninth Avenue to the west and a modern subway on Seventh Avenue to the east, between Oct. 1, 1924, and Oct. 1, 1925, land values increased 45 per cent and land and buildings together 57 per cent, while land in the entire Borough of Manhattan increased only 18 per cent.

It is manifest from the New York evidence, which is fully supported by similiar examinations in Philadelphia along the line of the Frankford elevated, and in Boston along the subway lines, that it is totally inequitable to load the cost of the permanent way as well as the cost of equipment, maintenance and operation upon the rider. It is equally inequitable to put all the cost of the permanent way upon the city at large, while the property within the zone directly served receives an enhancement in value many times greater than exactly similar property paying the same proportionate contribution under the general tax.

It would be easily possible to determine the benefit to each parcel in the benefited zone with reasonable accuracy by recording the rise in value during the construction period and deferring collection of assessments until the line goes into operation. Perhaps the most equitable method of assessing the locally benefited property would be to distribute it in equal amounts on the whole district over a ten-year period, and determine the annual amount to be paid by each parcel by the relation of the assessed valuation of the individual parcel to the total valuation of the district. The assessment would then reflect the annual rise in value on each parcel due directly to the facility. The community should, however, define the proportions of cost to be paid by the rider, the city at large and the district locally benefited, before initiating construction.

The benefit shown to attach to property by reason of proximity to a rapid transit line attaches also, but in a lesser degree, to property contiguous to a street car line. The rapid transit committee of the A.E.R.A. has estimated the capacity of a single street car track at 13,500 passengers per hour in one direction, and of a single rapid transit track at 60,000 passengers per hour, or 4½ times the street car capacity. Something like the same relation exists in the value conferred on property. No such value is conferred by a bus route for the reason that, while it may be established over night, it may also be taken away quite as easily.

It would be imprudent and uneconomical for a community to undertake the creation of a system of transportation thoroughfares within its corporate limits without a definite plan for extending the system with the expansion of the community into the surrounding territory, and a definite understanding with the authorities of other communities affected. Except as it affects the public convenience, it is of relatively less importance for a community to get under way with the construction of its rapid transit trunk lines than it is to see that the routes its rapid transit system will occupy in its outer area are defined in advance and the right-of-way secured, so that the greatest possible amount of trunk line mileage may be of the most economical character.

The progress that has been made in the Detroit area in carrying out its regional plan may be of interest. The Master Plan, providing for super-highways at 3-mile intervals, 120-ft. roads at mile intervals and major thoroughfares at approximately ¾-mile intervals within the city, was proposed in 1924. At the end of 1928 more than 600 miles of frontage right-of-way or more than a third of the entire right-of-way required, had been secured, 80 per cent of which was dedicated without cost. The value of the right-of-way already secured is, at present prices, about $25,000,000. Immediate relief has been given to motor traffic by construction of new pavements on the new highways to the value of more than $10,000,000. In the same period 36 miles of major thoroughfares within the city have been widened or condemnation proceedings started to that end.

When it finally becomes necessary to initiate the construction of rapid transit trunk lines, the comprehensive plan of major thoroughfares offers a choice of routes to fit the immediate needs of the city with the certainty that extensions are already provided for and may be made on a scale of decreasing expenditure.

Vital Facts on Community Transportation

Automotive transportation is not necessarily a competitor of rail transportation, but an effective aid and ally.

The automobile, with its instant availability, great mobility and distance-reducing qualities, has met the demand for diffusion of population and has pointed the way to a diffusion of service.

The transportation scheme of the future must be broadly designed to fit each element in its proper field so that each feeds to and profits by the operation of the other.

It is a matter of vital interest to the electric railway industry, which has $6,000,000,000 invested in the use of streets, that in the rearrangement of the street system of cities its opportunity for service is not restricted.

It is the function of the community, its responsibility and its duty to create an adequate street system on which the transit facilities of the future may rest. The electric railway industry, with its great opportunities for educating the public, can do much to promote a clearer understanding of the task and make the way easier for its accomplishment.

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An Essential to

Successful Merchandising

Is CONFIDENCE *in the Goods*

By

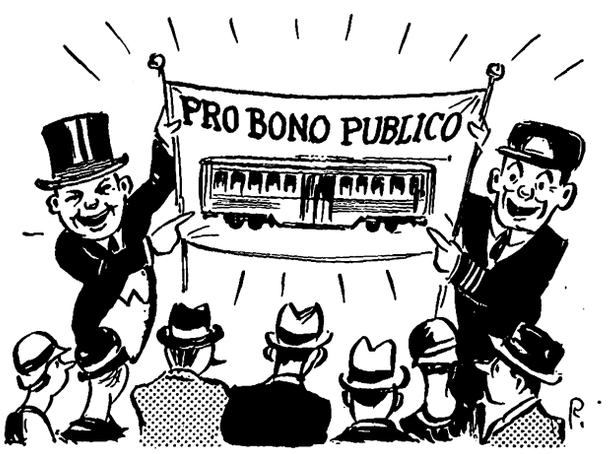
F. A. CUMMINGS

Vice-President in Charge of Transportation
Eastern Massachusetts Street Railway
Boston, Mass.

The public relations department of an electric railway not only must tell the story of the company to the public in an effective way, but must see to it that such a story can be justified by the facts. Confidence of the employees can be obtained best by making all of them real partners in the enterprise

RESPECT of the communities in which they operate can be obtained by the street railways, and it can be earned and deserved as well, if they will muster up enough courage to tell the people they serve just what they are doing, what they intend to do in the future, and what kind of support it is necessary to obtain from the public in order that satisfactory service may be maintained at reasonable rates of fare.

After having been in the thick of things for more than ten years, and seen the rehabilitation of a street railway which in 1919 was carelessly described as a huge junk pile, and by that fearless critic, Peter Witt, as a property "awaiting the arrival of an auctioneer," the writer has an abiding faith in the sense of justice of the great American public. As a result of this experience, I believe that at least 90 per cent of the people in this country are willing to give the street railway a square deal. The difficulty is, that over a long period of years they have been thoroughly saturated by political hokum hostile to this business. In various instances, several of us in the public relations departments have been only voices in the wilderness, making frantic efforts to catch up with and overcome the Legion of Lies.



Tell the people just what you are doing and what you intend to do in the future

As a matter of fact, the propagandists have been at work for many years. Most of the damage had been done before street railway managements woke up and began to realize that if they were to avoid having their properties destroyed through false statements and slander, they must perforce set up within their organizations departments to combat these attacks with the truth. These departments have become generally known under the heading "Public Relations."

The establishment of public relations departments was a step in the right direction, it is true. In all too many instances it was only one staggering, solitary step. What did many of them amount to? I'll tell you—less than nothing! Heresy, you may say. Well, if so, make the most of it!

Let me explain what I mean. The public relations department usually was not allowed to tell the true story publicly. Instead of choosing a good healthy, experienced, courageous newspaper man, fired with an ambition to make good on his own, and thoroughly sold on the justice of his cause, too many street railways turned to hiring relatives or friends of executives or academic persons for their public relations experts. Sometimes, even, radicals have been employed, in order to stop their attacks. Street railways which have built up public relations departments in this way have got just the kind of service they might have expected.

In passing, I might say that one of the greatest liabilities in the attempt to merchandise transportation is a public relations department which is too "high hat" with the public and too much "yes, yes" to the management. If the management hasn't enough confidence in its public relations department to give it a free rein, then it is time either to close up the department or change its personnel. It should be necessary to establish that degree of confidence which will, at least on some occasions, allow

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it to go ahead and experiment, even if the management is doubtful whether the results will help or hinder.

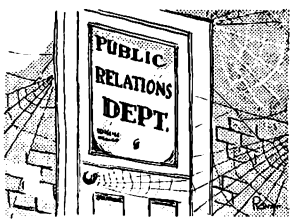
Sell your service instead of the cars

Taking a leaf from the book, on the property with which I am connected we have ventured into so many new and untried fields that they could not be enumerated within the limits of this article. In whichever direction we have turned, the public relations department has been consulted. That its personnel has not changed in nineteen years has been due, I believe, principally to the unswerving and sympathetic support it has received in numerous aggressive campaigns in uncharted fields, where there were no precedents to follow nor warning signals to help. On the other hand, there has always been a crusader's belief in the righteousness of the cause.

Has a street railway a good story to tell the public? If so, where and when should the story be told? In the newspapers, of course. Editors everywhere are willing to give columns of space to street railways, providing the articles submitted have real news value. On the contrary, they soon detect advertising or propaganda which is dressed up in the form of news.

Straight advertising should be paid for at advertising rates, and run as such. It is futile to attempt to pass it on as news matter. When street railways advertise, and they certainly should do so, it should not be spasmodic and should appear not only when the company is in trouble, but regularly all the year around. The major factor should be the daily newspaper in the home town. No other medium can compare with the front page of the daily newspaper.

Circulars, billboards, magazine advertisements, dashboard signs, and a variety of other mediums do considerable good, but they should be considered as supplementary to the regular newspaper advertising.



Many public relations departments amounted to less than nothing

Of course, the company must have something worthwhile to sell. If the sales force does not know how, or refuses to deliver high-grade and properly priced service to the public, no amount of money spent for advertising will bring the desired results. If the management expects to continue running a street railway, it must have smooth rails, up-to-date cars, schedules that are fitted to the volume of business, and platform men who are courteous. One of the worst advertisements for a street railway is a trolley car that needs paint. A regular painting program is just as essential, if not more so, than a systematic overhaul of the equipment. I say this because I believe it is the dress-up of our show windows. To the street car it really is what rouge and lipstick are to femininity, only more so.

If we are running a street railway in a community and the development has grown away from the lines upon which it is running, with the result that the street railway's business was not keeping pace with the industrial and building developments, especially in the hinterlands, we should not hesitate but should become "bus-minded." When this thought strikes us, we should not remain in executive session with ourselves too long, but should act on the inspiration, and perhaps in this direction may lie the solution of the problem which is now testing the best brains in the transportation field. With competition as keen as it is today among transportation agencies, the customer demands doorstep service. The company that cannot carry him in de luxe fashion from the spot where he is to the spot where he wants to be in quick time, and at a price which does not dent his purse too deeply, need not attempt to explain the reason, but should try to furnish the service demanded.

Now as to salesmanship and salesmen of the service. In recent years an impression has been built up that the only salesmen of the transportation companies are the uniformed employees who deal directly with the customers. Nothing could be further from the truth. Every person who draws pay from the company ought to be included in the sales force. The instinct of self-preservation should be enough to teach the employees this. Of course, there are selfish ones, but a simple and easily understood educational campaign can be conducted to convince them.

Use the newspapers to tell the story

On the Eastern Massachusetts Street Railway, in order to show the necessity of enrolling everyone in the sales campaign, on the walls of offices, carhouses and repair shops, this legend, printed in big type, has been posted:

> **Are You For Your Bread and Butter?**
>
> *If so, don't be afraid to defend the street railway from unjust attacks. To hold our jobs we must be one great big family, all for one and one for all. If we all pull together and do our best nobody can ever do us any harm.*
>
> **We Are For You; Are You Also For Us?**

Of course, nobody would dispute that the direct contact men, who meet the customer face to face where the money which keeps us in existence is exchanged for the ride we have to offer, are the most important cogs in the whole machinery. They can make or break the company. The white collar office workers, beginning with the president, know this. All too often, they do very little about it. In their wisdom they compile a voluminous rule book for the trainmen, and, figuratively speaking, fling it at them, saying in substance, "Go out and run the cars or buses and be sure not to break any of these rules, or God knows what will happen to you."

I will admit that this last assertion is going to bring a storm of protest, especially from executives of some street railways which have spent thousands of dollars in salesmanship campaigns among the platform men. I would request that they do not get too excited until I have the opportunity to do a little explaining of what I mean.

What rouge and lipstick are to the flapper paint is to the street car

Instruction in salesmanship, to be effective, must be simple, honest, straightforward and intelligent. It must be conducted by someone whom the men can understand, and in whom they can have confidence. Big words shot from off the heights, no matter how nice they may look in print, nor how well they may sound on the tongue of the speaker, never did and never will

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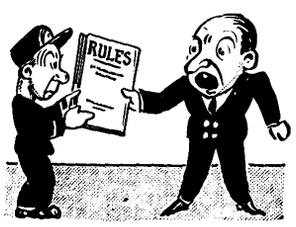
accomplish as much as language of the kind used by the men themselves, and delivered to them with as much informality as possible, consistent with dignity, by someone whom they consider one of their own.

Street railway managements which are always trying to explain to public authorities why they cannot do this or that or the other thing, or are making futile efforts to obtain rights to which they are justly entitled, might well turn their attention first to their own misnamed "family group." By this, of course, I mean the employees. Before the attempt is made to convert anyone else, it is necessary to sell these men on the merits of the street railway's case. One of the worst enemies of the street railway is the employee who uses the mouth which the street railway feeds, for the purpose of whining and complaining and misrepresenting the street railway to the public. The next worst enemy is that employee who takes his pay regularly, but listens to others condemning the street railway without ever uttering a whisper in defense of his meal ticket. I believe that no other industry in America could survive such vicious attacks as have been made upon street railways almost everywhere in this country.

A good salesman must have confidence in his goods. No street railway platform man can possible be a good salesman unless he fundamentally believes that his street railway has a soul to save, is entitled to the respect and confidence of the customer, and that, most important of all, the customer is not being overcharged for service rendered.

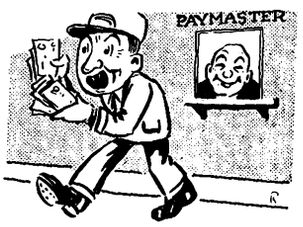
How many of the platform men know much, if any, more than nothing at all about the business which the company is conducting? What proportion of them really believes that carrying a passenger in either a street car or a bus is worth all the company is charging? How many of them know that certain reduced rate tickets are carrying the passengers for less than cost? How many of them really believe half of what they hear about the company's struggle for existence? Every street railway man, of course, has his own answer to this question. By and large, we venture to say that an alarmingly large proportion of the platform men in this country are in woeful need of the right kind of instruction along this line.



Too often they compile a voluminous rule book for the trainmen and "fling it at them"

Policemen and firemen are subject to periodical inspection of their uniforms. So should be the street railway platform men. No car or bus operator can be a good salesman who is untidy in his personal appearance. The smile and "good morning" which he gives the customer, along with other marks of courtesy, are too obvious to need writing about.

Perhaps some companies may find it profitable to award prizes or to adopt similar methods to provide special incentives for salesmanship. There is, however, nothing to compare with "putting it in the pay envelope," an expression that appeals almost universally to the platform men. To obtain the highest degree of skill and salesmanship, they must be convinced that they are obtaining the highest possible wage and working under the best conditions, consistent with giving the owners of the property a chance for their lives in the matter of dividends, or, as our public pleaders would say, "a fair return on the investment."



Nothing compares with "putting it in the pay envelope"

Subject the platform men to periodic inspection of their uniforms

Some people believe that slogans are overdone. They never can be. Dramatization is what the transportation business needs, and in some places it is being obtained in larger measure than ever before. Street railway technical heads who have devoted most of their lives to engineering and financial problems could do worse than to make a study of that most artful and elusive thing, mob psychology. As a matter of fact, haven't street railways suffered from too much technology and too little psychology? Today's slang becomes tomorrow's polite English. Those who frown upon slang merely because it is the orphan child of legitimate language apparently are not aware that the success of some of the world's greatest business enterprises is founded, at least in part, on slangy slogans.

Say it with slogans

To carry this dramatization of the business still further, a street railway executive must break away completely from all orthodox moorings of the past. He must be willing to make experiment after experiment. He must do this with the suddenness and sublility of a department store manager who cuts prices down from $1 to 98 cents. The fact that Uncle Sam does not produce a coin between a nickel and a dime throws most street railways into the ticket field, or else makes the use of metal tokens necessary. This gives all sorts of opportunities for bargain rates and bargain sales of transportation.

As an example of ticket rates, on the Eastern Massachusetts Street Railway lines we have a $1 ticket good all day on the date of issue. It may be used throughout our system, which covers more than 600 miles of rail and 175 miles of bus routes. During the past year, without putting on an additional car or bus to take care of this business, we obtained revenue from it which exceeded $100,000. Our cash fare for any ride, long or short, is 10 cents for a whole division. However, in each of our divisions we have a $1 punch card ticket, the number of rides obtainable in this way varying to conform to the receipts and expenses of the division for which it is issued.

While we are not pretending that this company is living in a bed of roses, it has enjoyed a fair share of the recovery of the street railways from the post-war period of despair. This has been due, in the greatest measure, I believe, to our willingness to try anything once, to deal fairly with the public, to speak openly and unreservedly to public officials and employees, to work unceasingly for the upbuilding of the morale of our organization, to pay a living wage, and finally, but paramount in importance, never failing to meet our problems courageously, and to insist that we be given what belongs to us.

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What Executives Think *About the* Fundamental

A symposium of opinion on transportation economics, franchises, co-ordination of facilities, vehicle design, employee relations and other live topics

Further Rehabilitation Is Industry's Great Need

Full recognition by financial interests that a complete change has occurred in public transportation affairs, and that electric railway corporations are now sound institutions from a credit standpoint, which will make available the relatively small amount of new funds required for the further rehabilitation of the transportation plant, seems to me to be the outstanding necessity of our industry.

All executives now know where we are going and how to get there, and only this final push is needed to enable us to arrive.

L. S. Storrs
Executive Chairman
United Railways & Electric Company
Baltimore, Md.

Railway Problem Is Twofold

Generalizations about the merchandising of transportation do not get us very far. We know that much electric railway riding is of the necessity type, since holiday and pleasure riding have greatly decreased. Our problem is to give the best possible service to the necessity riders, who form the backbone of the business, while at the same time catering as far as possible to the non-necessity "prospects."

We must recognize at least two fundamental facts, namely, that people do what they do largely because they want to do it and not because it is the best or most economical thing to do, and that the vehicles operated by the electric railway cannot compete with the automobile in those particular characteristics which make the latter supremely attractive. Is not the chief charm of the automobile a sense of proprietorship and independence, even when it is only partly paid for and when it is at the mercy of general traffic? There is little use in arguing with the private automobile owner about how much it costs per mile to run his car. How, then, can we get some business from this man? It can be done in two ways, I believe. One by what we do for him when we get the chance, and the other by what we say to him.

On these occasions let us prove to him, for example, that the electric car or bus is more comfortable than he thought; that the men and women who serve him with transportation are at least as well-mannered and considerate as store sales people; that in a public service vehicle he can read in comfort. Then, by word of mouth and in print we can convince him that his own best interests are conserved when he uses the local transportation service and his own automobile in such proportions as give him the best over-all service.

Any live commercial concern is on the alert to find special business that it is equipped to handle. Thus, one merchant picks up a stranded stock of goods at a low price for cash, and puts it on the market at an attractive figure. Another develops a new line of goods and cashes in on it before his competitors sense the situation. So in our business there are often large groups of people who need to be moved comfortably and conveniently over a special route. We should get this business. We have the facilities to initiate such business too, by showing organizations of citizens what their railways can do to help them have a good time. In general, we can convince our clientele that we are wide awake.

Edward Dana
General Manager
Boston Elevated Railway

Employee Confidence a Valuable Asset

Because public service is largely personal service, too much attention cannot be given to the personnel of a street railway organization. Throughout the country it will be found that where executives are concentrating attention on their personnel service, complaints are no longer a problem.

The one thing that is certain to make for a better personnel and at the same time better service, is understanding. An instructor teaches the new trainman to understand his equipment and how properly to operate it, but as a rule he hits only the high spots when he undertakes to tell him about the quality or brand of service which the company aims to supply.

The employee must get this fuller understanding of the company's policies and problems from his superior officers. All of his superiors, even up to the president, should indicate to him from time to time that they are interested in the brand of service which he is producing. Rules and regulations are necessary, of course, but heart-to-heart talks with some degree of regularity make these rules and regulations almost secondary. Tell the employee your problems from time to time. Have him see them as you see them. Have him understand these problems as you understand them, and you have the solution of them well under way.

It is needless to add that the spirit of the organization is directly reflected in the service to the public. If employees are to be courteous to the public, there must be a spirit of satisfaction and contentment within the organization. Courtesy can be

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forced under some conditions and for a short while, but where it is demanded from early morning until late in the evening and day after day under all sorts of conditions, it must come from a peaceful mind which can be maintained only when the employee is happy in his job.

To keep the employee happy in his job is largely a matter of keeping him informed. Tell him from time to time about the progress of the business to which he is devoting himself. Let him know that there are no secrets about it, but that there are problems to be solved in which he is as vitally concerned as you. There is no satisfaction like confidence.

W. E. WOOD
President
Virginia Electric & Power Company
Richmond, Va.

Improved Performance Is Aim of Car Design

DOUBTLESS every effort should be made by progressive railway properties to improve their schedule speeds on both old and new equipment. This may be accomplished when purchasing new cars by endeavoring to secure lighter equipment, by a careful study of scientific principles involved in the construction of trucks and bodies, and by elimination of all unnecessary equipment which might be regarded as frills helpful in meeting automobile competition.

Higher running speeds are also desirable, together with faster acceleration and braking. I would like to emphasize the desirability of obtaining a low center of gravity. This in itself will permit higher speeds with safety and will encourage passengers to use the service by a greater ease of entrance.

The ultimate objective should be to have the car only one step from the ground, even though this might involve putting the motor apparatus overhead rather than under the body. Such a design would give surface operation one of the advantages of rapid transit operation, by making it possible for passengers to walk directly from the safety zone platform into the car. Another fact deserving of careful consideration is the advantage of large units which have a considerable reservoir of capacity for peak operation.

J. H. ALEXANDER
President
Cleveland Railway

Education of Trainmen Needed

OF ALL THE FACTORS involved in merchandising and providing satisfactory transportation service, none is more important than the courtesy or lack of courtesy of the operator. He is the company's representative to the public, and should be a good salesman as well as a cashier. There is only one way to improve the attitude of the trainman toward his work, and that is by education.

J. H. HANNA
President
Capital Traction Company
Washington, D. C.

Standardization of Car Design

EQUIPMENT MODERNIZATION represents the greatest need in the street railway industry today. The public has become thoroughly automobile-minded, and because of this it expects a comparable service from its mass transportation facilities.

The work done in recent years on experimental cars has demonstrated that a vehicle can be made which will enable the street railway industry to offer effective competition to the automobile. The operating companies, however, are faced with a problem in financing the purchase of such vehicles.

The industry must do its part to bring about the desired results; that is, to co-operate with the manufacturers in the production of a car at a price within the reach of operating companies.

In my opinion, the most constructive step which the industry can take in this direction is to agree on and adopt general specifications as to car design and limit its specifications to desired rates of acceleration and braking, and free running speed as well as to other general factors such as weight and capacity; in other words, the industry should set up only general standards for the manu-

Substituting Invention for Convention

IN DEALING with any problem of the street railway industry, I instinctively find myself confronted with the phrase "invention versus convention." There seem to be many factors which are fixed by habit or convention, and one of the most difficult barriers to overcome is the mental inertia in the minds of the public, the passengers and especially of the employees, We must break down the old ideas of the 5-cent fare, the paving charges of horse-car days, and the idea of being content with such business as comes to us rather than seeking to increase our patronage.

To my notion, invention should be substituted for convention. We must invent ways and means of overcoming obstacles and making our service more attractive than any competitor's service. Better tracks, less noisy cars, more conveniences, more courtesy, and better public relations are all factors which make for progress.

I value those employees most who by their initiative can invent new ideas in these directions. Imagination to invent, and courage to experiment, are valuable assets in any organization. If our franchises, taxes and fares were fixed years ago, the chances are very great that they do not suit modern conditions. Inventing ways to change them makes the work fascinating.

C. H. DAHL
Assistant General Manager Winnipeg Electric Company
President Canadian Electric Railway Association

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facturer and depend on him to develop a vehicle which will not only meet these standards but be attractive to the riding public. The results of adopting such a policy would permit the mass production of street cars, with a consequent lowering of price to a point where the operating companies would be enabled and stimulated to purchase modernized equipment.

T. FITZGERALD
Vice-President
Pittsburgh Railways

The Small City Is a Difficult Problem

SUPPLYING MASS TRANSPORTATION to cities of 75,000 and under is one thing that has not had the attention its importance warrants. It may seem foolish to think one class of cities has problems any different from any other class, but a moment's reflection will serve to convince you that there are fundamental differences in operation in communities of the small city class which demand a method of treatment different from that of the larger cities.

Because of these fundamental differences, the problems facing the small city property deserve special attention, not only from the operators but from the trade papers and the association. By such a study the best possible practices may be formulated and presented to the small city operator, who often finds himself facing situations without either adequate staff or the necessary finances to combat it.

During the past year the Traffic and Transportation Association had a committee devoting its time and efforts to a study of the small city problem. While much of interest was developed, the committee could not formulate a comprehensive report because of lack of detailed information.

Inasmuch as the situation that is affecting this group of properties is critical, it is to be hoped that all those interested in small city properties will assist the association during the coming year in furnishing comprehensive information which will enable it to help.

This group of properties carries approximately 12½ per cent of the population of the United States and is the largest single group in the industry.

A. C. SPURR
Vice-President and General Manager
Wheeling Traction Company

Co-operation the Secret of Good Employee Relations

PROBABLY the one best answer to the question of how to improve relations between the employee, his management and the public may be found in the very simple, yet magnetic word "co-operation." From the knowledge gained through our own experience, as well as that which history relates, we find that the greatest success in any venture has always been attained by those who had a full understanding of the word "co-operation." We cannot overestimate the value of an efficient welfare division in the establishment of the best relationships between the employer and the employee.

It is our belief that the *esprit de corps* of our employees is greatly strengthened by an active interest from the general welfare standpoint. Through a systematic method of home analysis, intermittent workers are reported to the welfare division by their supervisors and a complete investigation of home conditions is made.

Arrangements are then made to provide the necessary medical care, legal assistance, or any other help that may relieve the employee of difficulties or troubles existing in his home. This creates a sympathetic activity between all the men, and embraces moral and physical tendencies which help to establish a confidential relationship by which our welfare division may obtain the true status of each man's difficulties.

DEL A. SMITH
General Manager
Department of Street Railways
Detroit, Mich.

Revenue Possibilities in Bus

WITH THE PRESENT ERA of industrial prosperity, it would seem advisable at this time to examine our own industry with the thought in mind of placing it upon the same sound financial basis enjoyed by other industries. In making this comparison we are at once confronted with the fact that the electric railways have not kept pace with the general price trend as regards the sale of their product.

The public will pay a fair fare if the service rendered meets with its approval, because in its final analysis the matter of service is first.

The public has accepted the motor bus as a harbinger of a change which is taking place in the transportation industry. The installation of new motor bus routes has provided an opportunity for securing reasonable tariffs. Certainly, operations with this relatively new unit should be conducted at a profit; consequently, the inauguration of such service should carry with it a tariff which will insure the financial success of any such operations.

With adequate and satisfactory service of this new unit it is possible to establish a tariff which will produce satisfactory returns, at the same time meeting with the approval of the traveling public because of the place the bus now has in the mind of that public. Once a fair tariff for bus operation is firmly established, many companies will materially improve their condition as substitutions of bus lines are made for non-paying car lines, and extensions into new territory are made by bus instead of rail.

J. F. JOHNSON
General Manager
Community Traction Company
Toledo, Ohio

Bus Design Will Determine Its Future Use

IMPROVEMENTS DEVELOPED in the design of buses, as in street cars, will determine the extent to which buses will be used in community transportation. Under present conditions the buses serve more satisfactorily and more economically where patronage is relatively light; the street cars when riding is heavy.

The greatest development which could occur to increase the economic usefulness of the bus would be the invention of a storage battery which would give at least a 300-mile radius of operation. This would permit the use of electric motors and central station power, in addition to the present advantages of the bus. The usefulness of the street car could be most improved by the perfection of a braking design by which the rate of braking could be made equivalent to that of the best brakes applied on private automobiles.

Further improvements in noise reduction will also be necessary in order to make street car riding more attractive to the public. The development of these improvements will be a large factor in determining the extent to which buses and street cars will be used in the future.

W. W. HOLDEN
Manager Traction Department
San Antonio Public Service Company

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Industry Advanced by United Effort

NOT SO MANY YEARS ago the association was not united as it is today. But the men at the helm were not discouraged. They did not lie down on the job, but took hold of the affairs of the industry and started it along the course they had charted, a course which leads to success. This has not been the work of any one man, but has been accomplished through the united efforts of all. Perhaps a few have been somewhat more outstanding in their efforts than others, but all are working so wholeheartedly that Herculean tasks have been performed. I am confident that we will carry on in a way that will spell success.

FRANK R. COATES
President
Community Traction Company
Toledo, Ohio

Give People What They Want

EVERY MANAGER should surround his congested mass transportation area with a circle and denominate it "Metropolitan Area." Outside that area he should draw another circle, and that outside area should be denominated the "Outer Metropolitan Area." Beyond that, if necessary, a third area should be inclosed, called the "Interurban Area." The two outside areas should be served with buses, which accomplishes the following:

First, it relieves the metropolitan area of a large number of cars, allowing greater speed in the inner circle; second, it brings into the inner circle, through the medium of express service from its circumference, patrons in the outer circle with greater speed, more comfort, and with a tremendous saving in time; third, it allows for greater flexibility in service.

If there should be instances in the inner circle where there is not sufficient traffic density, then buses should be substituted. Transfer from bus to trolley is in most cases ridiculous. The auto brings luxury, comfort and speed.

That is what the people want. That is what we are giving them here by means of the bus on the plan as defined above. Wherever these three results can be attained the substitution should be made. The truth of the statement and the success of the undertaking have been proved here, and in each case where the plan has been started the gross has increased materially. The place of the bus is hardly a debatable question today.

A. R. WILLIAMS
First Vice-President and General Manager
United Electric Railways
Providence, R. I.

Co-ordination of Taxicabs Advantageous

IF THE TAXICAB is classed as a public utility and properly regulated one or more competitive lines of taxicabs should be taken over by the street railway company and co-ordinated with other transportation facilities.

By the street railway taking over its strongest competitor, competition would be eliminated to a large extent and a number of operators forced off the streets. The matter of transporting the residents of a community is a business in itself, regardless of the means by which this service is conducted.

A company which has had the experience of conducting a street railway business for a number of years can handle any other means of transportation which can be co-ordinated with its central business. Much more efficient service can be provided under this plan than is possible by an independent with only one isolated means of transportation.

The public would be more efficiently served, and at a lower rate of fare, by co-ordinating under one management these transportation agencies which logically fit into each other.

W. H. BOYCE
Commercial Manager
Pittsburgh Railways
President Transportation and Traffic Association

Franchises the Foundation of the Industry

UNREASONABLE franchise conditions are among the principal causes for unsatisfactory conditions in the industry. The franchise is the foundation upon which the whole structure of a railway utility is built, since it usually stipulates the taxation, the fare structure and service requirements.

Companies which desire to continue operations must set their franchise house in proper order. The only way to do this is to inform the public frankly of the changes which have taken place during the past ten years and what is necessary for any company to operate a high-class satisfactory utility which the public can now demand.

There is no reason why a franchise must terminate, as the public is well protected at the present time by public service commissions. The fare stipulation need not be included in franchise requirements because, under modern conditions, the rate of fare cannot be raised beyond a certain limit without losing more traffic and revenue than is compensated for by the increase in fare.

The franchise should give the utility the monopoly of providing transportation in the community, including rail, bus, taxi service, and even local water service by ferry if such exists. If the public realizes that the money invested and spent in providing and maintaining pavement is really taxation on the utility and consequently the car riders, there is hope of relief from such an unjust burden.

H. E. WEYMAN
Vice-President and General Manager
Levis Tramways
Levis, P. Q., Canada

Traffic Congestion a Serious Civic Problem

REGULATION of street traffic presents one of the foremost problems to all large American cities, and consequently is one of the chief problems facing electric railways. Transportation companies are often the only organizations in the community which combine expert knowledge and an intense interest in the proper solution of the problem. These factors combine to place an obligation upon the transportation company to assume leadership in solving the problem.

The fundamental cause of all traffic congestion is the inherent selfishness of all human beings. This human impulse can be brought under control only when the sentiment of the entire public is aroused to the point where sensible regulation of all traffic and parking is demanded and enforced.

Street railways will be criticized, but they should not be swayed from their purpose of building up the proper public sentiment. We can and should exert a strong influence. First, we should see that our own operations, our track layout, our route and schedules, are such as will permit the most efficient service with the least possible interference with the movement of other traffic. Then we can co-operate with other transportation agencies, public organizations, civic authorities, newspapers and others in-

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terested in working toward adoption of a sensible plan.

Co-operation of other agencies should be sought actively and obtained. If it cannot be obtained, street railways should work single-handed in the interests of the industry and in the interests of the communities served.

F. L. BUTLER
Vice-President in Charge of Operations
Georgia Power Company
Atlanta, Ga.

Bus as a Street Car Supplement

AS A SUPPLEMENT to street railway service the bus is fast finding a place in the public transportation field. High depreciation and high operating expenses are problems that still must be solved, however. The future will probably bring out a further expansion of the bus. In cities not large enough to support rapid transit facilities, buses very likely will be used to give fast express service to outlying communities, which in my opinion is the logical manner in which they should be co-ordinated with street railway service.

J. L. ALEXANDER
General Manager
Houston Electric Company

Lighter-weight Cars Needed

ONE of the most important factors in merchandising electric railway transportation is modern, up-to-date equipment. The railway's problem is to secure an up-to-date, light-weight, double-truck trolley car that is within the price range of the large capacity bus—"a six within the price range of the four," so to speak.

I believe that if the car builders are to hold their own against the replacement of street cars by buses, they must develop a light-weight, double-truck trolley car seating 40 people, and with a total weight of not more than 18,000 lb. This car must be built for a price, and not necessarily to last for more than ten years.

Examination of our miscellaneous property accounts shows that 74 per cent of them are affected by the weights of rolling stock, and more than 40 per cent of the operating accounts are directly involved.

Times are changing, and the industry is now suffering from cars that were built too heavy and last too long.

A. J. BOARDMAN
Vice-President in Charge of Operations
Eastern Massachusetts Street Railway
Boston, Mass.

Freight Revenue Can Be Increased

FREIGHT REVENUE on most interurban electric railways can be materially increased. But to do so capital expenditures must be made in order to increase their scope of operations, and make improvements in their service. In most instances these expenditures should be for commercial switches; steam and electric railroad connections; reduction of curves, particularly in cities; and purchase of more equipment, including more powerful motors or locomotives.

Keen competition of steam railways and motor trucks, together with urgent demand of manufacturers and wholesalers and retail merchants who carry all stock, makes it absolutely imperative that electric railways schedule fast trains, make immediate delivery, and provide dependable service. Adequate facilities must be available to get this service.

There is plenty of freight business to be had, of both carload and less-than-carload type. If well-located electric lines will improve their facilities and service as mentioned above, and supplement it with consistent advertising and personal solicitation, they can increase their freight business considerably.

H. A. NICHOLL
General Manager
Union Traction Company of Indiana

New Bus Designs Increase Usefulness

DEVELOPMENTS in the design of the urban bus with increased motor power and greater carrying capacity have increased the field of its usefulness. It never has and never will be used for wholesale substitution of street car service, as it can return a profit only when used on comparatively short lines. In many American cities a great many street railway lines can profitably be replaced with buses.

New sections of cities where transportation facilities are needed can be tested out best with tentative service of bus lines.

The bus is an alternative vehicle in city transportation and should be operated under the same conditions and at the same rate of fare as the street cars. It should be an essential part of the proper transportation system.

The development of street cars with high motive power in proportion to their weight, and which permit quick acceleration and utilization of this acceleration through automatic control, removes the chief disadvantages of street cars in modern traffic. Street cars and buses can now be made similar in appearance, in seating arrangement and in operation, so that complete co-ordination between the two types of vehicles is possible.

R. N. GRAHAM
Manager of Railways
Penn-Ohio System
Youngstown, Ohio

The Bus Not a Substitute for the Street Car

THE FUTURE of the bus in the field of community transportation is wrapped up in the development of the bus itself. There has been much improvement in the motor bus in the past few years and quite apart from what was supposed to be its chief appeal—that is, an opportunity to "ride on rubber"—it has taken its place in the scheme of efficient and economical transportation by its increasing dependability and its reduced cost of operation.

With the reduction in the cost per passenger the field of the motor bus is widely increased. In many cities, and Cincinnati is one of them, the public has been slow to accept the substitution of buses for street cars. This has been found to be largely because of a desire to secure the ride for the cheaper fare charged on street cars, although the feeling of permanency of a rail line as against a bus line may have had something to do with it. This has probably been due to special conditions, such as quicker time, avoidance of congested parts of routes or type of sections served.

The reduction of operating costs per passenger on the bus, with the possibility of a smaller fare differential, will tend to widen the field of the bus in cities where its progress has been slow. Its place in the city service will be twofold: As a feeder in this territory in regular service alongside rail lines; or in de luxe service alongside normal rail lines but at a much higher rate of fare. There will, however, in my opinion, continue to be only a few of our smaller cities in their entirety and a few places in our larger cities where there can be a real substitution of motor coach for surface rail line unless the motor coach is developed much beyond its present limitations.

WALTER A. DRAPER
President
Cincinnati Street Railway

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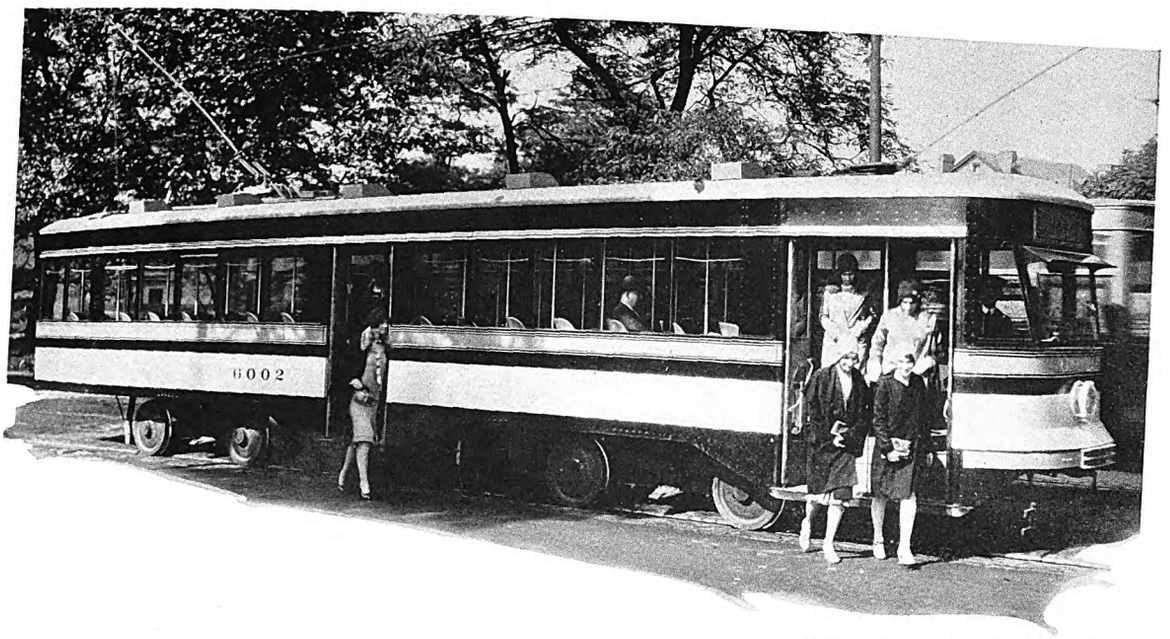

The new Pittsburgh car is the product of the Osgood-Bradley Car Company. Particular features are the extremely low body weight of 14,000 lb. obtained by the extensive use of aluminum, the high acceleration and braking rates and the pedal control. Individual bucket type seats accommodate 38 out of 42 seated passengers.

New OBJECTIVES *Govern* Vehicle Design

By

CLIFFORD A. FAUST

Assistant Editor

ELECTRIC RAILWAY JOURNAL

GROWING realization of the necessity to meet the present-day standards of public transportation service has been apparent through the past year. Obviously, it is responsible for the interest that is being taken in the improvement of electric railway cars and buses. Putting the situation briefly, the industry is making an endeavor to obtain vehicles of a character such that they may be used so to improve the service that the patronage of the public will not only be retained but will be increased materially. At the same time that it is endeavoring to develop equipment which will enable it to offer the most attractive possible transportation service, the industry is planning to furnish it at a minimum cost to the consumer.

These objectives are apparent. To state them is merely to reiterate what has been said in the industry over and over again during the past several years. Nevertheless, they merit analysis—analysis with the object of defining more closely, as experience increases, the fundamentals of transportation with which the industry is dealing, the objectives toward which the developments are leading, and the methods by means of which it will be possible to reach these objectives.

It seems a fair statement of the present-day transportation situation to say that the American public is now automobile-minded. Not any more is this a smooth-sounding generality. Today it literally is true. With the automobile in nearly every family—and many families have more than one car—ownership and use of the automobile have become so universal all over the country that public transportation service is compared, automatically and unconsciously, to that possible with the private automobile. This is true both from the standpoint of performance and from that of attractiveness. In fact, the term "automobile performance" is being used quite frequently in describing just what it is the electric railway man is after in a program of improvement for his street cars.

Considering the problem from the point of view of the investor who is planning to place his funds in electric railway securities, the objective in vehicle design is the development of types of equipment which will give reasonable promise of justifying the investment of new money for the purpose of replacing old cars or buses. If the industry is to avoid moving backward, such an investment is justified and will be made if through in-

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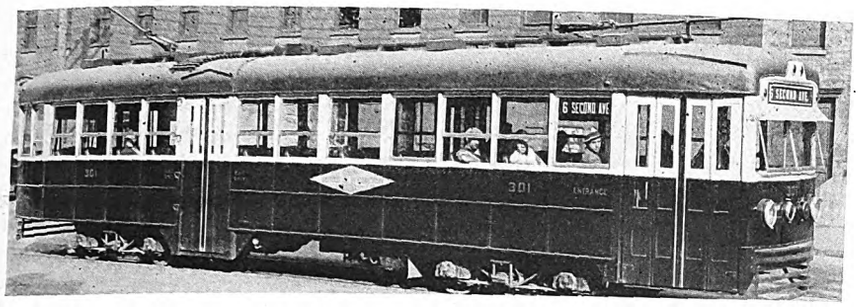


The aluminum sectional construction, letterboard elimination, continuous roof line, single-pane windows and magnetic rail brakes feature this car, built for the United Traction Company of Albany by the Cincinnati Car Corporation

where they want to go. Schedules must be designed to take advantage of the possibilities due to improved operating characteristics of the new equipment. Schedules must be held to by the operating force so that the service is regular. The company must obtain the confidence of the community and the friendship of the public which it serves. The deportment of the operating forces toward their patrons must be courteous and helpful. Without these essentials, development of equipment alone will be futile.

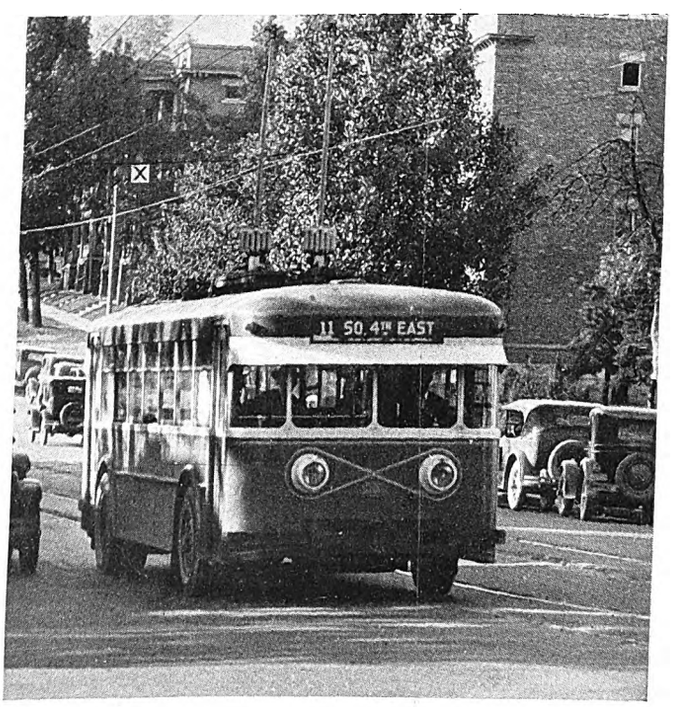
How the Objectives Are Being Met by Car Designers

So much for the objectives. Consider first the progress being made in development of electric railway cars. During the past several years, and most particularly during the last year, considerable experimentation has been under way. This has led to much progress in the effort to work out specific improvements in design to meet these objectives. Sample cars have been built embodying the fundamental principles outlined above, and these cars have attracted favorable comment from operators.

More attention than ever before has been given to improve the general appearance of the street car. The purpose of the designers has been to create a vehicle which not only will be in keeping with its surroundings in the modern city street, but which will be an outstanding and desirable element. They have come to realize that the mere appearance of the vehicle creates definite psychological reactions in the minds of the public, the prospective patrons of the service. So attention has been directed to the balance in the general proportions, to lines and colors, to the curves of the roof, to the proportions of windows, to the shape of the front and rear ends, and in fact to innumerable details that a number of years ago were given scant attention, if considered at all.

So, likewise, attention has been given to the riding qualities of the vehicle and to noise reduction and smoothness of operation. These factors have been found to influence not only the design of the vehicle and the running gear, but also the motors, the control and the braking system. An analysis has been made to break down more specifically the significance of the term "automobile performance" in an effort to increase the attractiveness of the street car ride.

There has been an insistent and growing demand for high rates of acceleration and braking. It is now conceded that the street car must have a get-away that will beat the automobile. With this object attained the car will no longer be classed as an obstruction in the street and an obsolete form of transportation. The slow acceleration of many street cars has resulted in more adverse comment than any other feature by those who are of the opinion that the street car is doomed to go. As experimentation has progressed and experience has increased, it has been recognized that smoothness of acceleration and braking is a most important factor in achieving high rates of starting and stopping. This is to some extent psychological and to some extent physiological. The passenger is not aware of the rapid



The most extensive recent installation of trackless trolleys is in Salt Lake City. It is being watched with interest by transportation men the country over.

At left—Versare electric coach of the Cincinnati Car Corporation in service on the Salt Lake City system. It is of duralumin construction and weighs 16,000 lb. It seats 43 passengers.

At right—The Twin Coach trolley buses, also used in Salt Lake City, resemble the standard 40-passenger buses produced by the same manufacturer.

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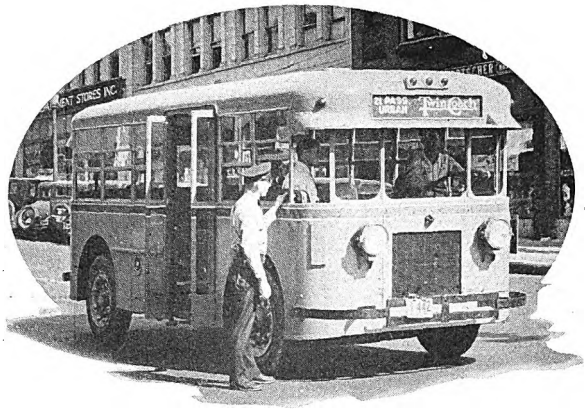
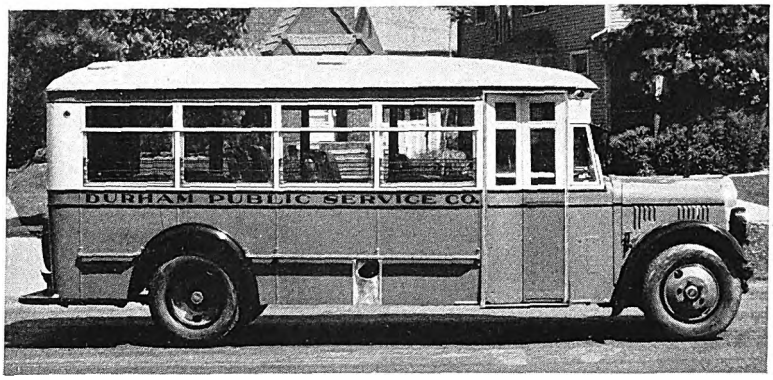
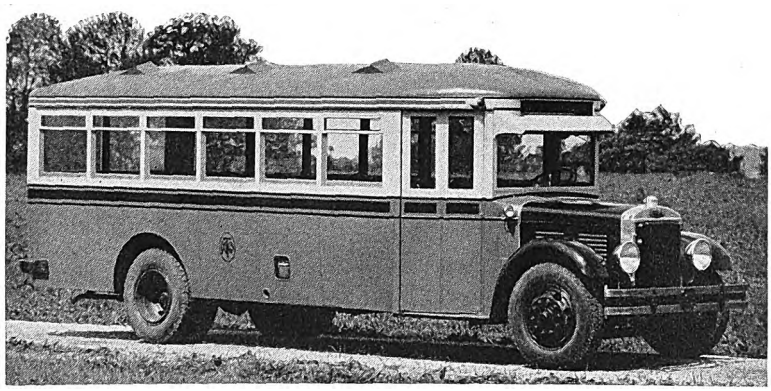
Four Recent Developments in Small Capacity Buses



The 21-passenger "Baby Twin Coach" has been designed to meet the need for a small unit which will give higher schedule speeds than standard buses and at lower operating cost.



Another example of the trend toward the 21-passenger size for light service is this White bus with Bender body built for the Durham Public Service Company.



This 21-passenger Mack for the Montreal Tramways was brought out during the year.

The Dodge Brothers parlor coach is a small capacity bus which has featured the current year's development by this manufacturer.

acceleration or braking if it is accomplished without roughness or jerking. As a means to this end, high-speed motors have been developed, along with gear ratios between the armature shaft and the driving wheels much larger than have been possible with older designs. Control equipment has been improved correspondingly, and the number of contact points has been increased greatly above what has been standard for a great many years. There has been reawakened interest in the development of regenerative braking, in track brake systems, and in the adaptation of automotive-type air brakes to the electric rail vehicles.

As there has been an increased interest in mechanical improvements and in exterior appearance, so has there been greater attention to interior design and appointments. In many instances seats have been made almost luxurious. This development has been carried to such an extent that there seems to be an adequate basis for questioning whether the practical limit in this direction has not been exceeded. As was to be expected, the tendency toward the use of circus colors and expensive and obviously impractical trimmings has been considerably modified in the direction of good taste and practical utility. At the same time designers have not lost sight of those worth-while features that would tend to make the street car a more desirable vehicle in which to ride.

Weight Reduction Considered Essential

Reduction of weight as a means of effecting operating economies is still receiving consideration. It is not felt that the ultimate has been reached by any means. There has been an increase rather than a reduction in the amount of attention given to possibilities for the use of aluminum and its alloys, both in the car structure itself and in equipment and fittings. Based on the results of a number of experimental units, some of which now have been in service for several years, it appears to be probable that aluminum will be used widely in car construction.

First Cost of Cars Too High

Possibly one of the most significant trends during the past year has been the attention given to first cost. The conviction seems to be growing throughout the industry that the first cost of cars must be reduced radically, and that designers must make every possible effort in this direction. A corollary of this idea is the suggestion that cars be built for a service life approximating ten years, rather than the twenty or more years that has been standard for a long time. Accordingly, the cost of new units must be considered from this point of view. Many operators have pointed out that obsolescence of transportation vehicles may be expected to become a matter of increasing importance and that designers must take it into account seriously.

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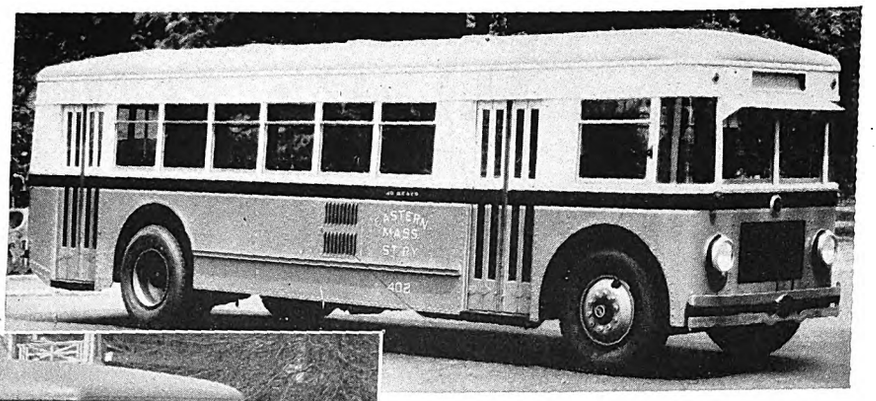
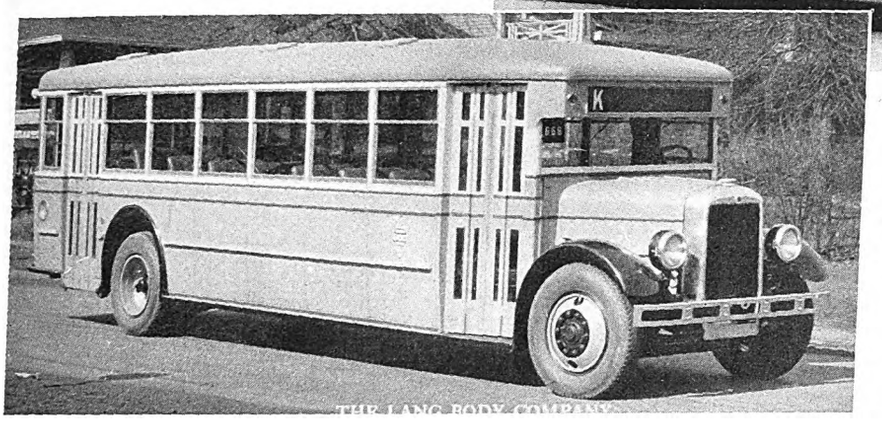
Thus, as might be expected, the industry approaches the 1929 convention of the American Electric Railway Association with the question of car development even more aggressively in the foreground than it has been during the past several years. Several new and radical developments are promised for the car exhibit at Atlantic City. One change in trend from the last Cleveland convention is to be regretted. The efforts at the development of a city-type four-wheel car, which aroused a great deal of discussion at the 1928 Cleveland show, will be less prominent this year. However, at least one design of this type has been promised. The other manufacturers seem to have concentrated on a medium size, double-truck car.





Two developments in the line of large-capacity buses during the past year

At top—One of the 40-passenger buses built for the Eastern Massachusetts Street Railway by the American Car & Foundry Motors Company.

At left—A 39-passenger Yellow Coach with Lang body built for the Cleveland Railway.

Many Improvements In Buses

Buses are undergoing a transformation almost as radical as that taking place in the design of cars. There appears to be a definite trend toward the use of a large capacity bus, with about 40 seats, for heavy city service. Several manufacturers have brought out designs of this type during the year. The opposite trend, also quite marked, is toward a much smaller bus, of about 21-passenger capacity. This design is favored for de luxe service and on light lines where the cost of operating larger units is prohibitive. In contrast, there is correspondingly less demand for the 29-passenger bus, which in past years has been favored. It now appears that this size, which was adopted when bus design was less advanced, is too small for mass transportation and too large for economy where loads are light and normal high speeds are demanded.

In the detail of buses many improvements have been made. These are principally in the nature of refinements for the comfort and convenience of the passenger. Ventilation has been given increased attention, particularly to obtain proper temperature control without the danger of contaminating the air with fumes from the exhaust. Window-opening mechanisms have been improved and simplified. By placing the steering column farther forward it has been found possible to increase the seating capacity of certain types of buses with no greater length.

As to appearance, there has been a general lowering of the center of gravity. Combined with a short, high radiator, this has resulted in a more pleasing design, and has brought the latest vehicles more in line with the current models of passenger automobiles. Braking apparatus has been improved, a feature that is of immense value from the standpoint of safety, particularly when the bus is used in congested traffic.

The reawakened interest in the trackless trolley, which has been one of the outstanding features of the equipment situation during the past year, should not be overlooked. The present trackless trolley is a far cry from its predecessor of a decade ago. Many transportation men are watching with interest the performance and financial results that are being achieved in those cities that are experimenting with the trackless trolley.

Thus it is apparent that experimentation and development to produce better transportation vehicles are still going forward. Many progressive operators, however, do not feel that the improvements, particularly in the design of electric rail cars, have reached the stage where the industry has available modern equipment that has stood the test of actual operating experience.

The thinking public, as well as the transportation industry itself, is just as much convinced as it ever was that a modern and efficient transportation system is of vital importance to the continued development of the American community. In the last analysis, therefore, the major objectives in the design of vehicles are those which will permit the street car and the bus to perform their functions in the mass transportation agency in such a manner as to meet those standards of speed, attractiveness, style and convenience which have become adopted by the automotive-minded American public.

Among the developments of the year is this Studebaker 25-passenger bus

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Buses an Essential

in Regional

By

CHARLES B. COOKE, JR.

Senior Engineer Ford, Bacon & Davis, Inc.
New York, N. Y.

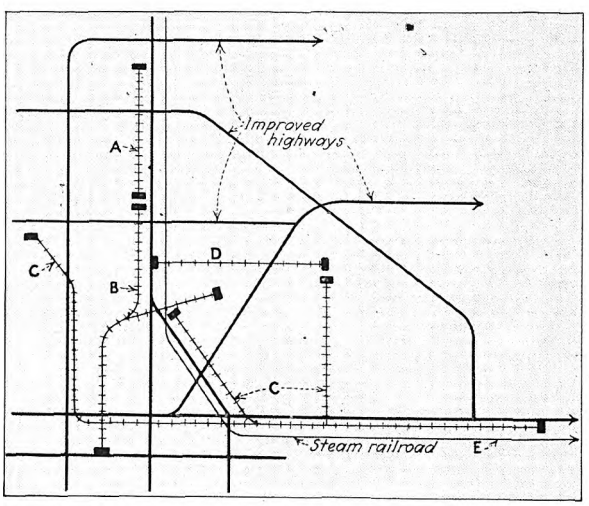
NEW travel lanes offered by networks of public highways superposed on districts served in the past solely by rail lines have brought about many sweeping changes in the local transportation situation. Shifting centers of population and new types of vehicles have changed the character of transportation from that to which the people have been educated over a period of many years. The district plan of electric railway and related bus services must be made right in its physical and corporate line-up, before individual links can win any lasting success. The motor bus, straddling the boundaries of rail territories, will precipitate the entry of electric railways into comprehensive regional systems. Only by far-seeing joint action toward this end can individual lines or systems expect to block dangerous invasions, arrest traffic losses due to bad co-ordination and increase business through offer of more salable service.

THE PERSPECTIVE

To place the bus in fair perspective with the future of the industry it is necessary to get down to first principles, starting with a view of two root causes of electric railway troubles and considering the effect on these causes of the position which is being gradually taken up by the bus in local transport work. It is true enough that well-planned properties are not even approaching obsolescence from purely physical viewpoints. This is, however, only true to the extent that their physical capacities for efficient, salable service are not being undermined by internal factors which obstruct co-ordination of the physical, corporate and financial elements of the railway business structure. Competition of the private automobile has come to be the standard explanation for unsatisfactory traction showings but as there is no profit in explanations it is better to look within the body of the industry itself for the means of correction.

In recognition of the fact that the industry must resort in some measure to new tools to live in an automotive age, it is generally admitted that the bus is here to stay and because of this fact its effect will be increasingly to force major adjustments in the physical layouts of the older systems. Abilities of the primary agents—the railways—to foresee the character of adjustments needed and apply corrections on a scale commensurate with the size of the problem, will determine whether their security ratings will advance, be stationary or decline.

Regardless of the strong points favoring railways as carriers in cities of 100,000 and over, the fact remains that many of the companies can only make inferior offerings to investors. The business cannot compete successfully with other classes of enterprise in public favor and cannot even be expected to "come back" until its mechanical position in the transport structure is brought in line with conditions which have to be met in "selling the service." The survival test which has been evolving during the last fifteen years, while furnishing a fine proof of worthiness of the railway as a basic facility, has also been elementally a contest between fixed and flexible methods of meeting the need for transportation.



District formerly served solely by four electric railways, A, B, C, D, still separately controlled, and steam railroad, E. Territory now is overlaid with improved highways. Each railway has its own bus company. This kind of situation calls for unified control of lines and the consolidation of bus operations

The inability of well-managed properties, as a class, to do more than maintain a "status quo" can be traced mostly to the fixed or inflexible set-ups of their physical services and capital structures. These organic faults prevent companies from coping with inherent conditions of their business and are thus in fact the seat of practically all their difficulties. The automobile and the bus should be regarded as new factors to be met by a change in the conditions which can be controlled, rather than frowned on as more or less uncontrollable causes of the trouble itself.

With the above in mind, it is intended here to outline the physical place won by the bus in the transit structure and its potentialities for bringing about changes in control and operating plan of systems where present faults in their line-up cause failure to meet public convenience or result in overall costs of service higher than the economic fare.

Essentially, electric railways have fixed and distinct physical limits which were set in days long past to meet service requirements since vanished or modified. The corporate and financial mechanisms through which the

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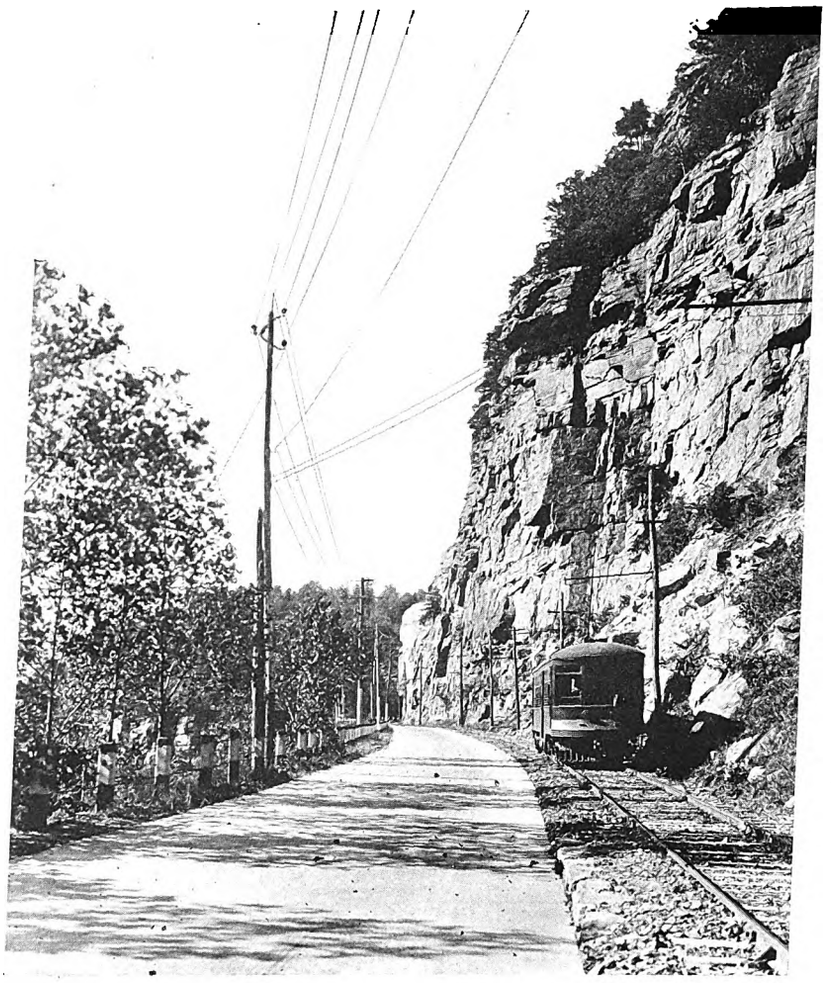
ssen Factor

in Co-ordination

Under the pressure of new conditions affecting their business, electric railways must use buses properly to protect territory and capture new service areas, making major adjustments in their physical layouts to secure needed co-ordination



Hard-surfaced highways paralleling many rail lines which formerly enjoyed a monopoly, have caused sweeping changes in the transportation situation

industry was built up sectionally and systematized physically are well understood and need no comment here.

Systems put together in the consolidation era probably represent the best and most that could have been accomplished under the conditions then. While the process of unification was sound in principle, as present hindsight views the situation, poor lines were put or forced into certain systems that should have been left out and lines were left out that should have been included. Urban systems often acquired lines penetrating far into foreign or outlying territory. Again the picture is further complicated by the lines which should never have been built at all or those in the twilight zone just managing to live, lacking only a right hook-up with neighboring properties to show economic justification. Past mistakes in the assembly of systems or distortions thereof born of circumstance are, to be sure, water over the dam. However, the industry must find ways to live under its own basic conditions. The bus furnishes at once the tool and the opportunity for getting around the defects anchored into the set-up of railway systems or bringing them to a head for cure by reorganization.

Many of the difficulties in the present transportation situation are the result of the division of ownership and control among too many corporate groups. This multiplicity of private interest is frequently found in territorial situations which economically call for unit control of all transport facilities engaged in the same general classes of local service. Examples of good properties, showing a decline in earning power traceable more or less to collisions between the interests of non-affiliated transportation agencies, can be seen in many places. Such areas form "transportation districts" from which maximum traffic revenue can best be cultivated at lowest cost through single control of all facilities in it, lined up to meet changes in the direction and flow of the demands for service.

The demand of people today is for prompt, uninterrupted movement. Transportation agencies operating under multiple control in a unit district usually do not offer "through" and co-ordinated services having the quality of directness most needed to attract patronage. They can, therefore, absorb only a small part of traffic flows set up by shifting centers of population. The balance goes to the automobile unless it is possible to have recourse to the use of the bus where this can be properly applied to meet the demand for "point to point" service. While the mechanical position of many of the railway systems is not organically adapted to supply special qualities of service to which people have been educated by the automobile, they can well form the backbone of a co-ordinated system which will fill all the legitimate needs of the community they serve. Looking at the principles involved it is also clear that correction of this mechanical position will require, first, the working out of unified controls covering all local transportation lines serving a given traffic area so as to increase the quality of directness via rail routes, and, second, broad-gage use of the bus to satisfy needs which cannot be met by fixed rail routes. In short, there must be regional planning for public transportation as well as for other civic features of the modern community.

As the financial and physical stabilities of the public services are founded on the principle of a protected right to do business, it is important to bear in mind the basic difference in the principle of railway and bus franchises. The railway franchise is fundamentally a right granted to install and maintain private property in the public do-

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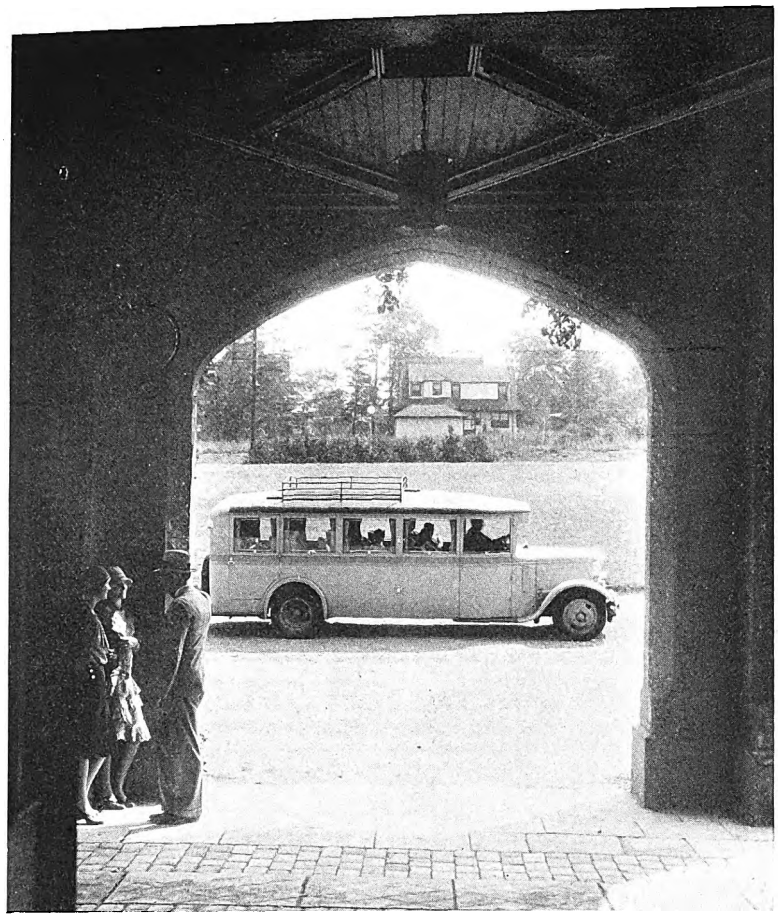


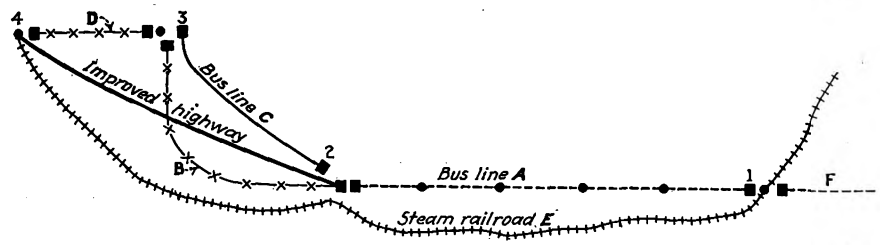
New business can be developed by extending bus lines into suburban districts to feed the rail lines

main, while the bus franchise is merely a right to use the highway with no question of vested interests involved. Franchises originally granted to electric railways were, in type, usually fixed term or perpetual; in some cases where neither of these proved satisfactory indeterminate forms were developed. Due to past experience with trolley franchises and in the face of rapid expansions of motor highway systems, with no regulations of their use by interstate carriers, the state authorities have granted only short term rights to bus operators, with renewals usually assured to legitimate interests giving fair service. Intrastate bus franchises are therefore substantially indeterminate, which is as nearly correct in principle as can be worked out at this stage, bearing in mind the complex public viewpoints which state commissions have to consider in keeping their regulations balanced with practical considerations.

The safeguards which state commissions have thrown about the rail carriers to hold down direct competition have been nothing more than a makeshift—a gesture, if you please, and a warning to the railway people to get busy with buses on their own account. Where applications for road rights are denied on the pleas of railroad lines, these denials, in the long view, are only a sop to precedents which are gradually being dimmed by newer conditions and weakened by pressure of fresh public demands. Where bus rights are granted subject to restrictions against lifting traffic in certain zones to protect established carriers, the same rule holds sway. Transportation people and the commissions themselves know very well that restrictions do not work and are not satisfactory from the viewpoint of either public or carrier interests, as permanent regulatory measures. They are merely being suffered by patrons and bus operators (rail or independent) until conditions force a new line-up through affiliation and adjustment of interests that will remove artificial barriers to the natural flow of traffic. The American public will be served in the way it wants and will not be herded to this or that form of travel, under the pressure of learned argument and regulatory rules. Neither is the public much persuaded from the line of its desire by sentimental appeal based on the conceded values of rail service rendered in the past. All of these things have little weight in comparison with the personal wishes, comfort or convenience of those who ride.

The absence of interstate regulation, broadly viewed, has not been an unmixed evil because it has forced rail interests to widen their horizons, and depart from conceptions of service or profit strapped down to their roadbeds. By the same token the service capacities of the bus (which the railways need to cope with the private automobile) would not have progressed as fast as they have if their development had been repressed and guided under the domination of rail interests, of necessity more concerned with guarding the old than advancing the new. The result of all this has been to bring major rail transportation interests into the bus field and so begin the release of both classes of service from deadlocks which for a long time have retarded the start of co-ordinated transport.

The confined local applications of the buses up until about three years ago were not such as to excite much interest among the steam railroaders. With, however, the rapid assembly of bus lines into regional and semi-national groups and their apparent ability to attract long-haul traffic, many of the leading roads have gone aggressively into the bus business and are fortifying their position through purchase of stock interests in going companies. It is to be expected that they will continue steadily to expand their bus interests in this way. They are doubtless finding out that bus territorial positions can be won at comparatively low costs per mile of route and per dollar of gross, and are beginning to reap some of the benefits derivable from "co-ordination."



Multiple Control of Facilities Has Left This District Open to Invasion by Competing Buses

A is an independent bus line; *B*, an electric railway; *C*, a bus line controlled by *B*; *D*, an electric railway independent of *B*; *E*, a steam railroad, and *F*, a bus line controlled by *E*. Traffic on electric railway and bus lines is stationary or declining due to physical transferring required at terminals and lack of unified control. Bus line *A* is a logical adjunct to electric railway *B* to secure long hauls through 1, 3 and 4.

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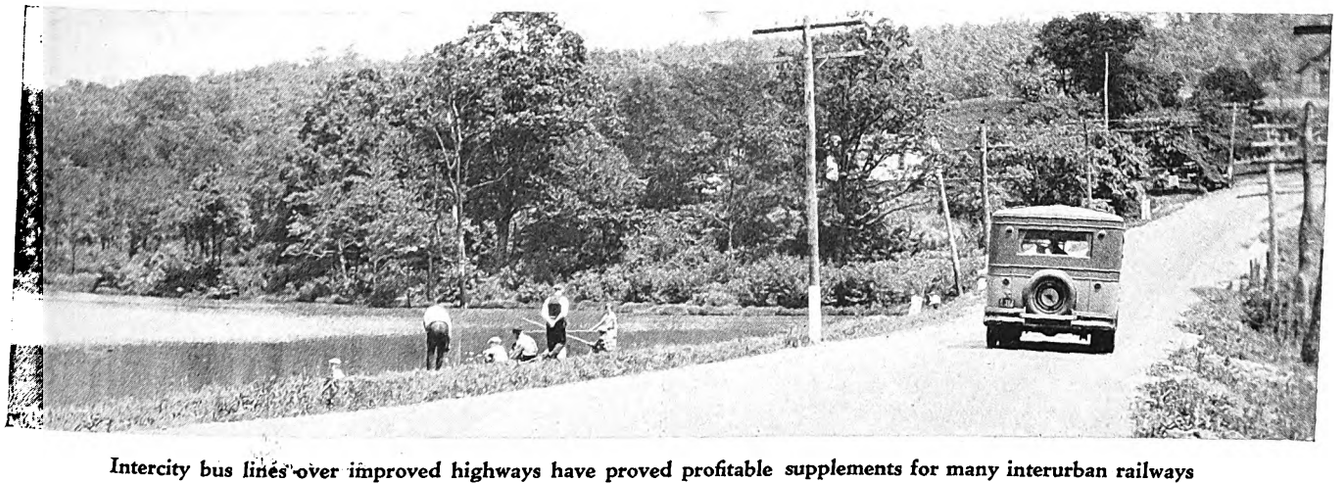
The bus lends itself to service on routes without rail service

Under the oblique pressures of all these new factors bearing in on the business, the traction company not armed with buses properly applied to protect territory and capture new service areas, is practically helpless. There are not, of course, many companies wholly in such a position today but many are near the danger line mainly because they have applied the bus with conceptions of its use confined to their immediate rail territory. From the standpoint of the self-interest of any particular property this is wrong in principle and will not work in practice as a defensive measure. Due to flexibility of bus operations and multiplicity of opposing but legitimate interests controlling them, a given rail territory can never be permanently protected by intensive application within limits defined by rail-heads of the particular system. A railway can usually work out lasting protection and improvements of position only by capturing the full transportation territory in which it is located. This often extends far beyond the present rail-heads and depends upon relative location of motor highways, other public carriers, out and in-lying population centers and the flows of traffic.

It is not so much a question of "buses or bust" as it is a question of "co-ordination or bust"—by co-ordination meaning not only the right use of each method of transport but also the right unification of independent trolley lines where these cover territory needed for protected development of a well-rounded system.

It happens too often that companies approach their co-ordination problems in piecemeal fashion, basing conclusions on technical and frequently incomplete comparisons of costs of trolley and bus services, which are after all only one factor in the problem and not always the most important one at that. Rail executives who understand these problems and are able to execute should be the first to see that their main chance for operation at a profit can only come out of a broad-gage survey and treatment of their situation *as a whole*. This may or may not involve study and working out of property and territorial consolidations with other interests, but if this is required to provide correct mechanical positions for electric railways in the regional plan, therein lies the hope and the opportunity for every property that can contribute to a co-ordinated set-up that is physically right.

This, then, is what all electric railways can do as the first phase of a real life insurance policy—survey and study their territorial situations *as a whole* with horizons raised above the terminal rail-heads, plan for them *as a whole,* and act on them as far as possible *as a whole* in conjunction with other trolley and bus lines concerned with stabilizing and bettering themselves in the only way possible under modern conditions of the business.



Intercity bus lines over improved highways have proved profitable supplements for many interurban railways

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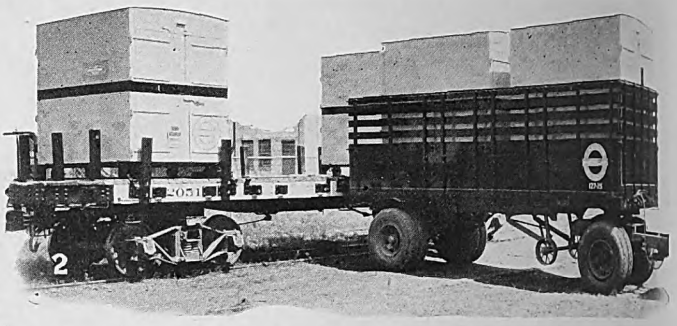
Types of

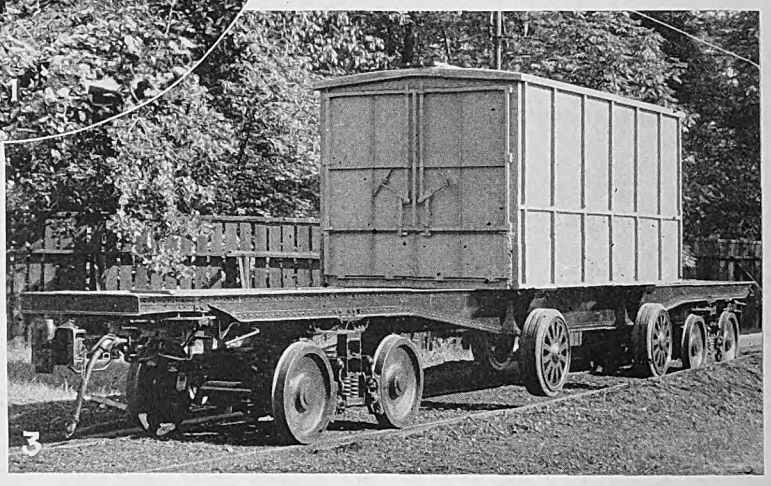
Freight Containers

Now In Use



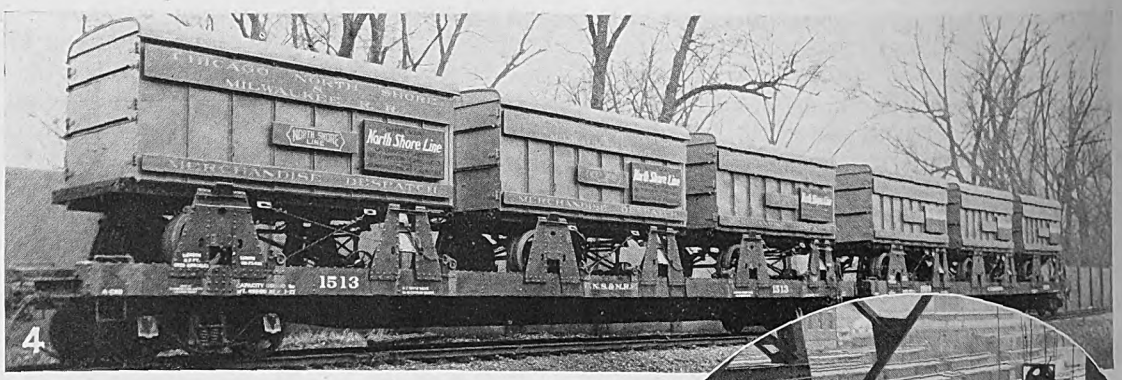
1. Ramp upon which trucks of the Chicago, North Shore & Milwaukee Railroad haul containers to the elevated track lead.

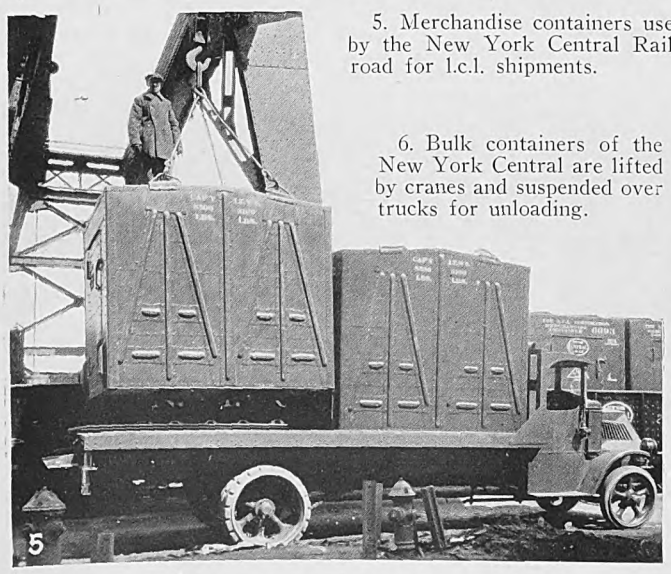
2. These containers of the Eastern Michigan Railways are mounted on rollers to facilitate their transfer.



3. Railway flat car carrying experimental Bonner Railwagon entering ramp. The front wheels of the railwagon have made contact with the ramp but the rear wheels are yet clear. Note that the journals of the flat car are locked inside.

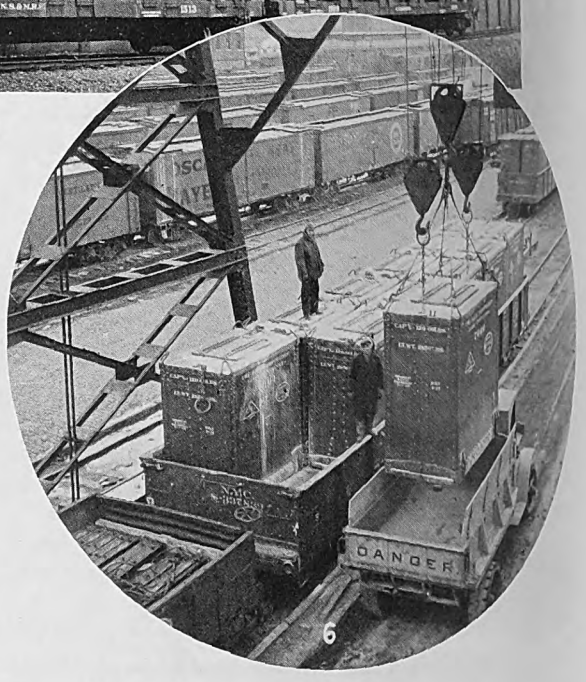
4. Six containers of the North Shore, actually highway semi-trailers, in position on flat cars.





5. Merchandise containers used by the New York Central Railroad for l.c.l. shipments.

6. Bulk containers of the New York Central are lifted by cranes and suspended over trucks for unloading.



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Attracting New

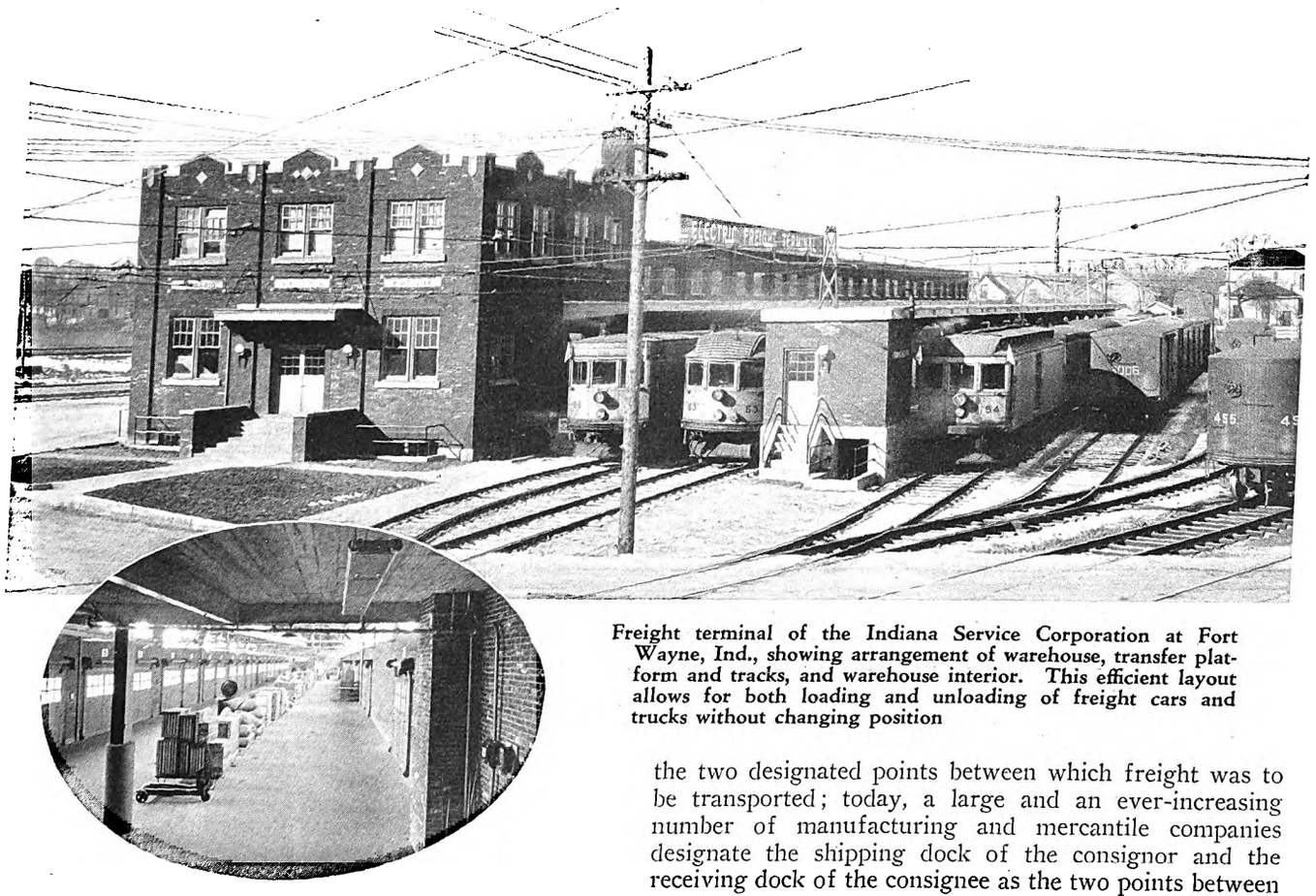
Freight Business

Fundamental Problem of Interurbans

By

DAVID R. THOMAS

President Electric Railways Freight Company
Cleveland, Ohio



Freight terminal of the Indiana Service Corporation at Fort Wayne, Ind., showing arrangement of warehouse, transfer platform and tracks, and warehouse interior. This efficient layout allows for both loading and unloading of freight cars and trucks without changing position

ATTRACTING a sufficient amount of new and profitable freight business to offset the gradual but constant decline in passenger revenue is the fundamental problem of the majority of interurban electric railways, not including those that may be classified as electrified steam roads. The fundamental problem of the freight business itself is that of profitably transporting merchandise between two designated points in such a manner as to render the service of the electric railways more attractive to the shipping public than that of any other transportation medium.

Twelve years ago the freight terminals of the railways were, except where side track facilities were provided, the two designated points between which freight was to be transported; today, a large and an ever-increasing number of manufacturing and mercantile companies designate the shipping dock of the consignor and the receiving dock of the consignee as the two points between which the transportation companies shall function in handling such freight as is included within the higher rate classification of freight tariffs. The dock-to-dock, door-to-door or pick-up and delivery service now demanded by the shipper and receiver of freight is the direct result of the extensive construction of hard surfaced roads and the development of the motor truck and its complement—the highway trailer.

When the interurban railways first entered the freight business the motor truck was scarcely thought of as a common carrier of freight. It was, therefore, possible to designate the electric railway freight terminals as the points at which freight would be received and delivered. The shipper and receiver of freight arranged and paid

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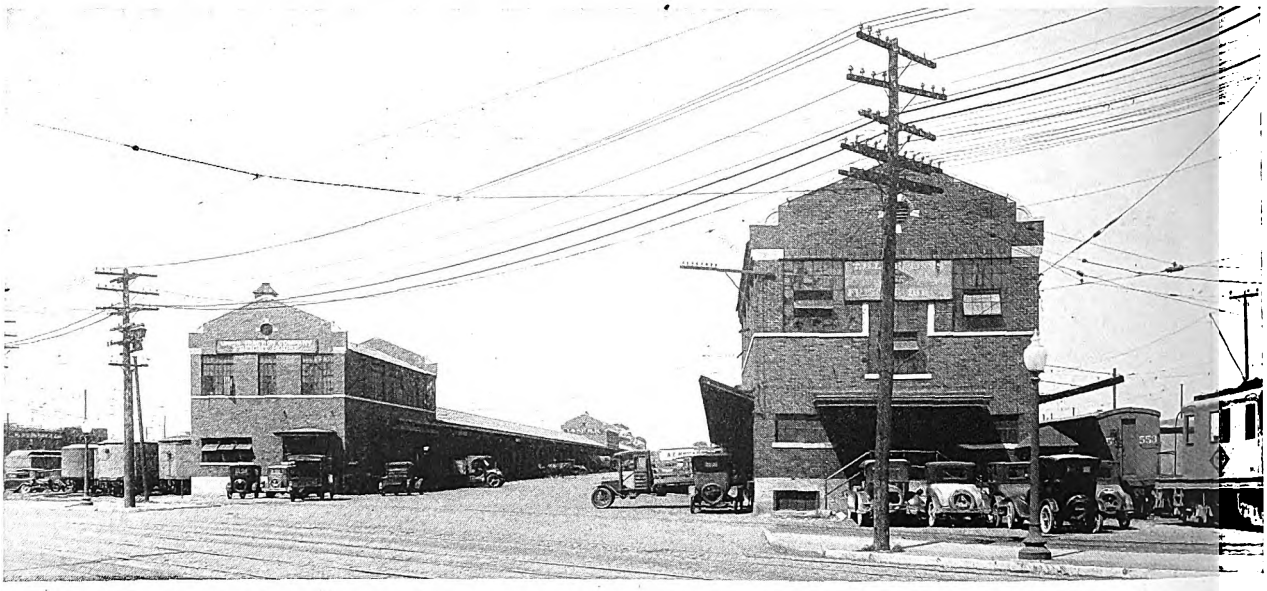
for cartage to and from the terminals, as a matter of course. Other conditions were also then favorable to the rapid development of a substantial freight business by the electric railways. For years prior to the time under discussion the steam roads had been financially unable to provide the freight equipment and facilities necessary to meet the normal increase in demand. The abnormal conditions existing during and immediately following the war made matters so much worse that the shipping public eagerly sought new carriers of freight.

It was then a comparatively simple matter to develop freight business. The only traffic and soliciting organization required was one capable of filing tariffs and of giving information relative to the service; accounting procedure was simple, the passenger business was then flourishing and the freight revenue was such a comparatively small part of the total that a detailed freight accounting system was unnecessary. The freight business, too, was largely local to the line originating it—



Freight terminals of the Union Traction Company of Indiana, the Terre Haute, Indianapolis & Eastern Traction Company and the Indianapolis & Southeastern Railroad at Indianapolis, all laid out for efficiency

there consequently was but little interline accounting and but little detail involved in adjusting claims. Capital expenditures for freight facilities were confined to modest warehouses, usually located upon leased grounds; rolling stock consisted of old interurban passenger cars rebuilt into freight motor cars. Later trail cars were purchased. Inasmuch as freight was usually transported late in the evening and early in the morning no additional trackage was required with the exception of terminal tracks and switches. Even with delays incident to inadequate warehouse organizations, insufficient equipment, and hit-and-miss freight schedules, the service of the electric railways was so much faster than that of steam roads that an ever-increasing amount of freight naturally gravitated to the interurban lines.

Today the problem confronting the electric railways materially differs from that of twelve years ago. The fundamentals of the problem have not changed, but the solution is more difficult. The speed with which freight moved via interurban lines between the door of the shipper and that of the consignee has been matched by that of the intercity trucks. Steam roads have improved their facilities and move freight more rapidly and efficiently. The "pick-up and delivery" system of motor freight companies and the "container" system of the steam roads are additional facilities made available to the shipping public at no increase in freight rates. Today, too, increased freight earnings are required by the electric railways to offset the decline in passenger earnings. Twelve years ago freight business was incidental to passenger business—today freight business is, in many instances, the more important of the two.

Many methods of increasing freight earnings are being discussed and considered by those directing the affairs of interurban lines. It undoubtedly would prove of interest were it possible to describe each method in detail. Space, however, does not permit of more than pointing out the salient features of each method suggested. This is done in the accompanying summary of suggestions and recommendations made from time to time by men interested in constructively developing the interurban electric railway freight business. Many of the methods briefly described are now being followed by some of the interurban companies, but not all of them are applicable to every company.

An analysis of this summary discloses the encouraging fact that many of the recommendations relative to methods of reducing operating expenses will automatically produce an increase in revenue. The recommendations that are attracting the immediate consideration of the managements of interurban lines are those pertaining to the things that electric lines will be required to do in order to meet the new requirements of the shipping public—requirements that are the result of the development of the motor truck as a carrier of freight.

Three Classes of Motor Freight Carriers

Motor freight organizations may be grouped into the three following classes:

1. Companies or individuals doing an intrastate business. These operators are required, in many states, first to obtain a certificate of public convenience and necessity; their schedules, tariffs, etc., are subject to supervision of the respective state utilities commissions.

2. Companies or individuals doing an interstate business. Interstate operators are not subject to the supervision of the Interstate Commerce Commission. Where state commissions have jurisdiction it is nominal only. In some states it is necessary to obtain a certificate of public convenience from the state commissions

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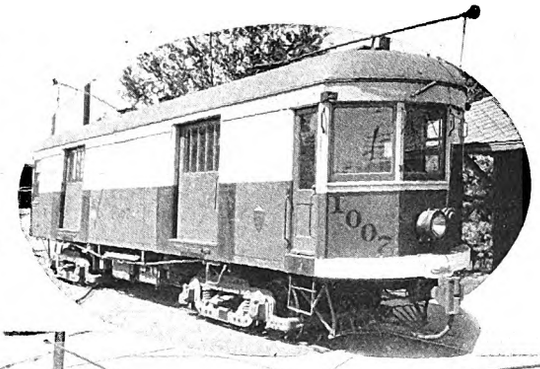
and to designate routes to be traveled over, equipment to be used, etc. However, it is not legally possible for the commissions to refuse to grant such certificate, although the truck companies are required to pay the equipment tax provided by the state laws and are governed by the rules regulating the use of the highway.

3. Companies or individuals engaged in "contract hauling." A "contract hauler" transports merchandise between the shipper and destination under a specific contract with the shipper or with the consignee. The state laws of a number of states provide for this type of operator by granting, on proper showing, an "irregular" certificate of public convenience and necessity. A "contract hauler" is not usually required to file a tariff, inasmuch as his rates are based upon contracts with the individual shipper.



Freight cars like these, with rounded ends and painted to resemble passenger cars, create a more favorable opinion when passing over city streets. In the oval, car of the Penn-Ohio System; below, Eastern Michigan Railways train

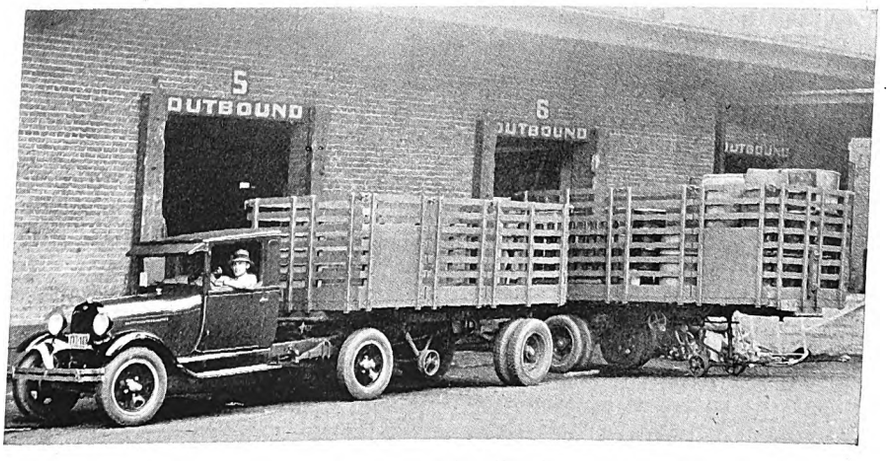
The motor freight companies transport merchandise from the door of the consignor to the door of the consignee at rates that do not exceed, and are often less than, rail rates—there is no additional charge for that portion of their service that corresponds to the city cartage company's function of hauling merchandise to and from the terminals. Where the individual shipments are sufficiently large it costs the motor freight companies no more to operate from door to door than it does from terminal to terminal.

Truck tariffs provide that a charge shall be added to the published freight rate to cover the cost of picking up and delivering shipments weighing less than a specified amount. This minimum weight varies from 1,000 to 2,000 lb., and the charge from 3 cents to 7 cents per 100 lb. Motor freight companies naturally desire to confine their operations to handling the tonnage of large shippers of high-class freight. The business of the smaller shippers is not solicited and therefore usually moves over the lines of the carrier.

Practically all companies operating under intrastate certificates also have "irregular" certificates. Many also are interstate operators. In view of the fact that rates applicable to "interstate" and "irregular" operations are not subject to the jurisdiction of any state commission or of the Interstate Commerce Commission, it will be appreciated that the freight rates of motor freight companies are susceptible of being "equal to almost any occasion" and limited only by the cost of handling the particular shipments involved. It is being discovered, however, that these costs are not as low as at first estimated, particularly where no "return load" is immediately available.

To afford facilities now made available to the shipping public by the motor freight operators it will be necessary for the electric railways to provide: (a) Pick-up and delivery service, (b) container service, (c) terminals open 24 hours each week day, and (d) increased soliciting efforts. Certain of the facilities named have been made available by one or more railways and a greater number of companies are experimenting with, or studying, methods of doing so.

As stated, the motor freight companies give door-to-door service at rail rates or less. Railway trap car tariffs provide that all switching charges are to be absorbed by the railways, provided the shipments conform to specified minimum weights. It is therefore apparent that, if the electric railways are to obtain any appreciable amount of new business by performing a pick-up and delivery service, the additional cost involved cannot be added to the present rail rate, but must be absorbed by the carrier.



Tractor with light semi-trailer for pick-up and delivery service

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Summary of Methods Recommended to Increase Freight Revenues and to Reduce Operating Expenses of Interurban Electric Railways

TO INCREASE REVENUES

1. Provide Pick-Up and Delivery Service—Absorb pick-up and delivery costs on shipments conforming to classifications and minimum weights provided in trap car tariffs; charge a reasonable rate for cartage of shipments weighing less than provided in trap car tariffs. In smaller communities furnish the agent with truck equipment and virtually put the freight terminal on wheels.

2. Render Container Service—Container service is attractive to shippers, as it eliminates the necessity of crating or wrapping merchandise for shipments, reduces loss and damage claims and eliminates rehandling merchandise at warehouse. It is possible to interchange containers between steam and electric roads. A rate covering movement of container direct from shipper to consignee will prove profitable and popular.

3. Own a Cartage Company—City cartage companies control routing of an appreciable amount of freight which can be diverted to electric railways; cartage companies are in themselves profitable.

4. Provide Express Service — Express service with city pick-up and delivery is an essential branch of electric railway merchandise service. C.O.D. feature is an important requirement of the shipping public.

5. Offer Station-to-Station Package Service—Have passenger agents or passenger conductors accept packages for delivery to passenger agents at destination stations.

6. Encourage Car Loading and Distributing Companies to Use Electric Railway Facilities—These companies collect freight and reconsign shipments to all points of the United States. This is a class of business that it is difficult for electric railways to reach. A car loading and forwarding company that operates exclusively on electric lines will add to the revenue of the latter.

7. Allow Joint Tariffs with Connecting Electric Lines—Practically all connecting interurban lines operate under joint tariffs.

8. Arrange Joint Tariffs with Steam Roads and Water Navigation Lines—The electric railways are natural feeders to steam roads and boat lines.

9. Improve Warehouse Facilities—Inadequate terminal facilities that cause delay to trucks of consignor or consignee in delivery or picking up shipments will drive business away; congested terminal conditions increase loss and damage claims and cause dissatisfaction with service. Insufficient warehouse and house track space delays loading and unloading of cars and slows up service.

10. Improve Handling of Shipments—Lost shipments and failure of "bills" to accompany shipments cause dissatisfaction with service. Greater care should be given to this feature of operation, particularly where more than one carrier is involved.

11. Increase Hours During Which Freight Will be Received—Motor freight companies receive or pick up and deliver freight 24 hours a day. The electric railways will increase revenues by giving similar service where required.

12. Establish Sub-Freight Stations—In larger cities additional revenue will be derived by establishing sub-freight stations in strategic locations, where these stations are not on the electric lines, and hauling the freight to the principal station in trucks and trailers.

13. Arrange Side Tracks in Manufacturing Plants—Many opportunities exist to arrange side-track facilities with industrial plants along interurban lines and also in cities, the latter in conjunction with city railways.

14. Utilize Available Sections of Interurban Lines for Handling Tonnage Requiring Steam Road Equipment and Arrange Switching Connections with Steam Lines—Steam road equipment cannot be moved over city streets, but many interurban lines have sections of road upon which such equipment can be handled with profit.

15. Operate Trains on Definite Schedules—Irregular arrival of trains at destination will result in loss of business. The reverse is true of trains regularly maintaining schedules. Fix schedules to conform with requirements of shippers.

16. Increase Schedule Speed of Trains—Early morning delivery at destination will get business that cannot be obtained if trains arive at noon.

17. Improve Track and Roadway, and Equipment — Eliminate curves, reduce grades, build cutoffs around cities, utilize facilities of belt lines to avoid city streets, increase power of motor cars and maintain high standard of rolling stock. Increased speed will increase revenue.

18. Operate Truck Line Feeders—The scope of the territory served may be profitably increased by joint tariffs with, or by operation of, feeder truck lines.

19. Establish Parallel Truck Lines—Freight requiring quick delivery is often tendered after regular trains have departed. Truck facilities that will permit handling such shipments will increase revenue and will make similar service of competing truck lines unnecessary to the shipper.

20. Increase and Improve Solicitation—The solicitors of the motor freight companies, the personal contacts of the "contract hauler," together with the personal contact of truck drivers with the routing clerks of each shipper, have greatly increased the demands of the soliciting department of the electric railways.

21. Insist on Courtesy to Customers—Courteous treatment of truck drivers delivering or calling for shipments at terminals will produce profitable results.

22. Pay Claims Promptly and Courteously—Freight service is in part measured by the promptness with which claims are paid.

23. Create Favorable Public Opinion (General)—Advertising, courtesy, consideration of pedestrians and automobile drivers by train crews, well-maintained equipment, well-painted equipment and reduced passenger fares all contribute to bettering public relations.

24. Create Favorable Public Opinion (City Operation)—It is essential that companies should eliminate as far as possible all causes for objection to use of streets: cars should be well-maintained and all danger of faulty equipment delaying traffic or causing accidents eliminated.

25. Consolidate Companies—Where two or more non-competing lines can be consolidated better service can be given to the shipping public and increased revenues will result. Increased purchasing power of larger companies also is a factor.

26. Combine Facilities—In the event the corporate entities of two or more non-competing lines cannot be combined, facilities may be beneficially combined such as terminals, solicitation organizations and freight motor equipment.

27. Consolidate Freight Departments—Where the corporate structure is such that the companies themselves cannot be combined beneficial results may be obtained, in part, by consolidation of the freight departments of connecting, but non-competitive, roads.

TO REDUCE OPERATING EXPENSES

1. Better the Freight Terminal Layouts—Freight terminals should be so designed that cars may be loaded and unloaded without shifting them from the inbound to the outbound station. Sufficient track, dock, warehouse and driveway space are essential to efficient operation. Provide transfer space or dock.

2. Add More Warehouse Floor Space and Use Labor-Saving Equipment—Floor space at a majority of interurban terminals is insufficient. Congestion results involving delays to cartage trucks, loss of time locating freight and rehandling. Lack of space also makes impossible the use of industrial tractors and other labor-saving equipment.

3. Provide Additional Track Room at Freight Terminals—At terminals in larger cities track room is insufficient for efficient loading of freight. Adequate track room enables spotting required number of cars and reduces cost of "flooring" and rehandling freight.

4. Have Sufficient Team Track Capacity—Sufficient team track capacity not only encourages carload business but also provides space for direct loading of large shipments, thus reducing handling costs.

5. Equip Terminals for Handling Heavy Shipments—Only a very few terminals are equipped with the necessary crane or hoist equipment to handle heavy shipments. The possible saving in labor costs is self-evident.

6. Use More Powerful Motor Cars—It is naturally true that it is cheaper to operate one train consisting of one motor car and five trailers than two trains each consisting of one motor car and two trailers.

7. Better the Maintenance of Equipment—A crippled car either means delayed arrival of freight at destination or transfer of freight to another car. Either is unprofitable.

8. Load Cars to Capacity—An unnecessary number of cars reduces the effective track capacity of terminals and increases transportation and switching costs.

9. Reduce Loss and Damage Claims—Loss and damage claims of interurban lines are in many cases excessive; the amount of claims can be substantially reduced.

10. Use Container Equipment—One of the two greatest items of expense is that of handling freight through the warehouse. Containers loaded at the shipper's warehouse and containing freight consigned to one city or to one consignee will reduce or eliminate handling costs, except that of transferring the container from the truck to the railway car or vice versa.

11. Have an Efficient Accounting Department—Information necessary to economical operation must be furnished by the accounting department. Freight accounting is very much in detail and an adequate personnel is necessary. Mechanical tabulating and office equipment is necessary to supply other departments with essential information efficiently.

12. Improve Track and Roadway—Cut-offs around cities and elimination of curves and grades will reduce operating costs.

13. Interchange Motor Cars—Interchanging motor cars with connecting electric lines will permit loading them with through freight and will eliminate necessity of operating them when only partially loaded.

14. Consolidate Companies—Where non-competitive interurban companies with connecting lines are combined reduction in overhead, solicitation, traffic and accounting expenses will follow.

15. Consolidate Freight Departments—Where the corporate structure of non-competitive interurban companies, with connecting lines, does not permit of consolidation, economies may be obtained by consolidating the freight departments of such roads.

16. Consolidate Facilities—In cities where two or more non-competitive companies maintain separate terminals and soliciting organizations economies may be obtained through joint solicitation and joint terminals.

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The cost of picking up and delivering merchandise does not necessarily represent an amount that will, in its entirety, be added to present freight operating expenses. There will be certain changes in methods and conditions that will tend to reduce expenses; the use of containers will reduce terminal labor costs and "loss and damage claims," and a larger volume of business will permit of heavier car loading with a consequent reduction in transportation expenses. The difference in rate between the comparatively low-class freight now carried and the higher class freight that pick-up and delivery service will recapture for the electric railways will, in some instances partially and in other instances entirely, absorb the entire additional cost of such service.

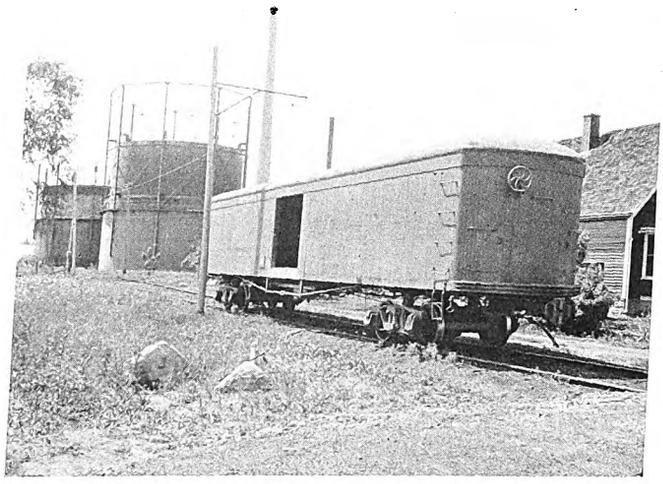
Inasmuch as the type of truck equipment now used in pick-up and delivery work is the same as that used by the city drayage companies, merchandise must be loaded or unloaded at the railway terminal. Were this rehandling cost eliminated a portion of the additional cost of pick-up and delivery service would be recovered by the railways. Interesting examples of efforts to solve this problem are the "container-trailer" system of the Chicago, North Shore & Milwaukee Railroad, the "container" equipment of the Eastern Michigan Railways and the Bonner Railwagon with which the Electric Railways Freight Company is experimenting at Cleveland. It will be noted by referring to accompanying illustrations that the containers of the Chicago, North Shore & Milwaukee Railroad and of the Electric Railways Freight Company are highway trailers, and when unloaded at a rail head can be drawn any distance required by trucks or truck-tractors now in commercial use. The container with which the Eastern Michigan Railways is experimenting is mounted on rollers and is readily transferable from the railway car to the platform of a motor truck or trailer and consequently is also adapted for highway use.

The Bonner Railwagon System, developed by Col. Joseph C. Bonner, contemplates the transfer of highway trailer containers from the highway to railway flat cars and vice versa, without the use of any special loading equipment other than that of a ramp 6 in. high placed on the outside of each rail. The railwagons are placed upon, or removed from, the ramps by any truck or tractor drawing them over the highway. Loading the railwagon upon the railway flat car is accomplished by running the railway car underneath, and between the wheels of the railwagons when the latter are in position on the ramp. When in proper relative positions the railwagons are locked in position on the railway car. As the latter moves forward on the rails the railwagons coincidently move forward on the ramp, and as the railwagons descend the inclines at the end of the ramp they gradually settle down and come to rest upon the platform of the railway flat car. In this position the railwagons are carried to destination. When unloading the railwagons from the car the reverse takes place.

No labor other than that of the train crew and truck driver is required for the loading or unloading of the containers. The ramp does not interfere with the use of the track for other purposes. Ramps are inexpensive and may be designed to hold any number of railwagons. The journals of the railway flat car are placed inside of the wheels instead of outside, and the space ordinarily taken up by outside journals is utilized for the wheels of the railwagons.

The use of containers will reduce operating expenses where shipments are made from one consignor to one consignee, or from one consignee to one terminal or vice versa, and also where one continuous movement, requiring transportation over both highway and rail, is involved. In addition to reducing operating expenses the use of containers will also increase revenue by supplying the demand of certain manufacturers for facilities that will permit them to ship their merchandise unwrapped or uncrated; this demand is not met now by any service of the electric railways which involves rehandling at terminals, but is filled by motor freight companies.

As yet there is no general agreement between the electric railways whereby each carrier participating in the transportation of any shipment bears a proportional share of the pick-up and delivery cost. Before the pick-up and delivery service can be made generally effective it will be necessary for the intermediate carriers and both terminal carriers of an interline shipment to share this additional cost; this will probably be worked out in the near future on the basis of allocating the pick-up and delivery cost of any shipment in the same proportion as interline freight revenue of that particular shipment is apportioned.



Industrial siding of the Toledo & Indiana Railroad at Bryan, Ohio. Sidings are necessary to secure the business of many large companies

Pick-Up and Delivery Tariffs

That the electric railways are preparing to adopt pick-up and delivery service is indicated by the fact that pick-up and delivery tariffs have been recently put into effect by a number of interurban companies. The established minimum weight of shipments that will be handled free of extra charge is usually the same as the minimum provided in trap car tariffs, which vary from 2,500 lb. for shipments carrying 2½ times first-class rate, or higher, to 10,000 lb. on shipments carrying the fourth, fifth or sixth class rates, or lower. These minimum weights cover quantities received from one consignor or to be delivered to one consignee. Some tariffs provide for absorbing a portion of the total drayage charges on straight shipments weighing less than the minimums stated above. These drayage absorptions vary from 5 cents per hundredweight on commodities carrying the third class or higher rate, to 2½ cents per hundredweight on commodities carrying the sixth class or lower rate.

An efficient modification of the pick-up and delivery tariff described is the container tariff of the Chicago, North Shore & Milwaukee Railroad which provides for handling freight of all kinds from one consignor to one consignee between Chicago and Milwaukee at the rate of

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20 cents per hundredweight on the basis of a minimum of 20,000 lb. per highway trailer unit. This 20-cent rate includes cartage in both Chicago and Milwaukee and rail transportation between these two points. A slightly higher, but similar, rate is available for 10,000-lb. shipments.

Arrangements for providing cartage service have not been standardized by the interurban lines. In some instances the railways pay the specified pick-up and delivery allowances to any cartage company or individual that will deliver to, or take away from, their terminals the minimum amounts specified in the tariffs. In other cases the railways specificially contract with one or more cartage companies to perform this service. In a few cases the railways themselves own and operate the cartage equipment. One interurban line is experimenting with the plan of doing a general cartage business in addition to merely handling the merchandise tendered for transportation over its lines, charging a slightly lower rate for merchandise going to or from its lines than is charged for merchandise going elsewhere.

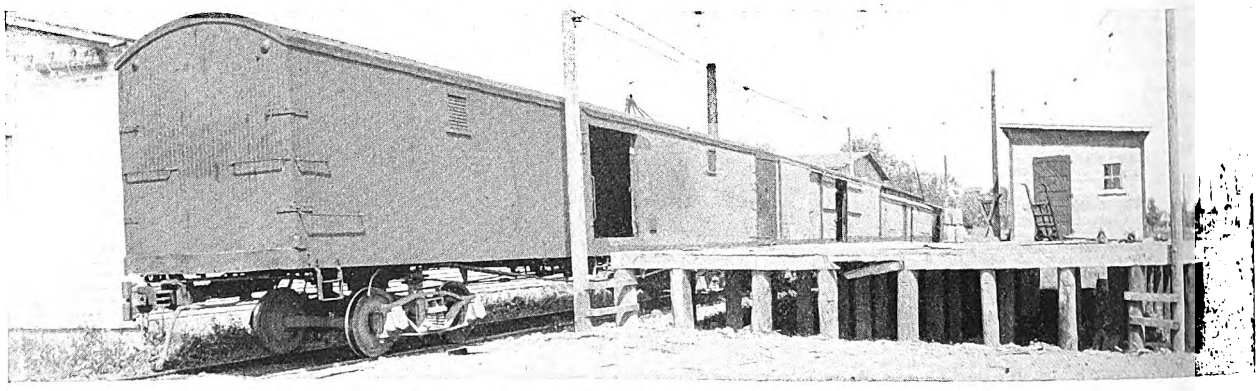
Another change in the old order of things brought about by the advent of motor freight companies is that affecting the hours during which freight terminals remain open to receive and deliver freight. Formerly freight terminals were closed at 4:30 or 5 o'clock in the afternoon but now, in order to meet the present requirements of the shipper, terminals remain open much later. This demand for a later closing hour on the part of the shipper is the result of manufacturers carrying lower inventories and of the desire of the shipper to put in transit everything manufactured during the day in order that such merchandise may be translated into "accounts receivable" and not carried as "material in the process of manufacture."

During and immediately after the World War it was the custom of industrial concerns to carry inventories sufficiently large to fill manufacturing requirements for a period of two or three weeks and sometimes longer. A glaring example of this new condition is that of two manufacturers located 300 miles apart; freight is tendered for transit by the consignor at 6 o'clock in the evening, and if not delivered to the consignee by 12 o'clock the following noon a department employing 300 men will be closed down for the balance of the day.

Accompanying the necessity of maintaining later terminal closing hours is that of operating trains more frequently, as it is manifestly impossible to hold at the receiving terminal until the following day the shipment tendered at 9 or 10 p.m. These shipments must go forward, and until received in quantities to be efficiently handled in railway cars should go forward by truck. This is an illustration of the value of interurban lines operating a truck route that parallels the rail line.

More Intensive Solicitation Needed

A further necessity created by the development of the motor truck is that of increasing the solicitation efforts. Every city of any importance is served by one or more motor freight companies of considerable size. There are also other companies controlled by individuals and operating one or more trucks; in addition thereto there are numerous "contract haulers." Each large motor freight company is represented by a soliciting organization; the solicitation work of the smaller companies is usually done by the owner and occasionally an assistant, and every "contract hauler" is a solicitor. Another feature in the situation is the fact that in the majority of the motor freight organizations a large percentage of truck drivers own the trucks and receive for their services from 65 to 70 per cent of the revenue derived from the tonnage carried by them. These truck drivers are, therefore, vitally interested in obtaining full loads for both their outbound and inbound trips, and naturally use every influence at their command with the shipping clerks of the consignor to obtain a maximum load on each trip. To meet this situation it is not only necessary for the railways to increase the personnel of their soliciting departments, but also to develop the initiative and promotional ingenuity of their solicitors and station agents and also to see that they have full knowledge of all details pertaining to the territory served by the company employing them.



Transfer platform for the interchange of freight between the electric railway and a feeder truck line

As between the motor truck and electric railway operations the economics of the situation favor the latter. It costs less per ton of available carrying capacity to construct a mile of track than it does to build a mile of paved highway. The unit transportation cost of the interurban lines is less than that of the truck. The unit cost, maintenance and depreciation of rail equipment is much less than that of truck equipment. The speed with which it is possible to transport freight, from door to door over the electric railway lines, is greater than that possible over the truck lines, and also than over the lines of other rail carriers. Consequently, in territories where the density of traffic is sufficient to justify interurban rail operations, and provided the companies will equip themselves to handle the business, there is every reason to believe that the development of the interurban railway freight business will prove profitable.

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More Financial Reports Summarized

REPORTS for several electric railway companies, principally in foreign countries, have become available for publication since the analysis which appeared in ELECTRIC RAILWAY JOURNAL for June. In general, these indicate continued stability in the industry.

Of particular interest is the report of the Paris system, which operates the tramways, rapid transit lines, buses and boats in the French capital. The operating deficit, it is explained, results from a retroactive wage agreement through which the increase in wages over a period of two years brings the total labor expense up to 70.54 per cent of the gross receipts.

The monthly reports which are available indicate that gross revenues are holding up well during the summer, and that the reduction in operating expenses which has been evident for some time is continuing. The Eastern Massachusetts Street Railway shows a large gain in revenue for July as compared with last year, while the expenses have been reduced sharply. As a result the gross corporate income increased $14,500 for the month.

Substantial gains in gross revenue also are shown on the United Railways & Electric Company of Baltimore, the Interborough Rapid Transit Company, and the New York, Westchester & Boston Railway.

Table I—Monthly Reports of Electric Railway Companies

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Honolulu Rapid Transit Co., Honolulu, Hawaii					
July, 1929	88,204	48,497	7,932	32,859	19,636
July, 1928	92,022	52,268	13,151	27,509	20,065
7 mo. end. July, 1929	615,811	351,800	66,260	205,436	112,874
7 mo. end. July, 1928	625,716	368,090	81,709	183,175	129,613
United Railways & Electric Co., Baltimore, Md.					
July, 1929	1,328,176	902,717	125,859	313,530	35,763
July, 1928	1,287,229	859,053	124,087	315,891	34,506
7 mo. end. July, 1929	9,718,530	6,669,204	944,998	2,207,420	231,450
7 mo. end. July, 1928	9,511,297	6,433,927	913,214	2,249,232	264,181
Boston Elevated Railway, Boston, Mass.					
3 mo. end. June, 1929	8,549,863	5,804,333	.....	2,344,012	257,192
3 mo. end. June, 1928	8,716,346	6,008,183	.....	2,338,826	316,978
6 mo. end. June, 1929	17,557,690	12,021,888	.....	4,715,381	523,611
6 mo. end. June, 1928	18,077,173	12,448,747	.....	4,792,271	743,815
Eastern Massachusetts Street Railway, Boston, Mass.					
July, 1929	868,923	467,879	29,281	207,566	44,884
July, 1928	720,971	518,647	28,156	193,099	55,624
7 mo. end. July, 1929	5,124,412	3,168,119	228,862	1,856,294	582,573
7 mo. end. July, 1928	5,355,100	3,423,585	206,380	1,855,894	598,271
Brooklyn & Queens Transit Corporation, New York, N. Y.[e]					
July, 1929	2,042,814	1,609,538	116,849	337,188	212,936
July, 1928[e]	2,066,545	1,709,787	103,631	272,568	143,524
12 mo. end. June, 1929	24,142,065	19,851,747	1,266,049	3,296,087	1,760,799
12 mo. end. June, 1928[e]	24,398,931	19,970,703	1,328,911	3,377,142	1,803,396
Interborough Rapid Transit Company, New York, N. Y.					
July, 1929	5,466,406	3,775,811	202,000	1,488,000	*300,377*[f]
July, 1928	5,093,243	3,351,402	197,196	1,432,000	*257,782*[f]
New York, Westchester & Boston Ry., New York, N. Y.					
July, 1929	238,506	131,563	24,016	83,675	*144,838*
July, 1928	219,100	141,346	20,804	57,724	*152,585*
7 mo. end. July, 1929	1,451,618	888,503	153,681	414,522	*1,086,311*
7 mo. end. July, 1928	1,357,041	895,197	135,706	334,708	*1,066,535*
Third Avenue Railway, New York, N. Y.					
July, 1929	1,297,310	1,101,403	90,853	224,625	*32,476*
July, 1928	1,305,678	999,499	94,573	228,367	*16,275*
New York State Railways, Rochester, N. Y.					
3 mo. end. June, 1929	2,265,029	1,652,046	.....	467,102	94,405
3 mo. end. June, 1928	2,402,929	1,752,605	.....	520,325	146,629
Community Traction Co., Toledo, Ohio					
July, 1929	299,785	227,478	.....	.....	*13,534*
July, 1928	300,157	202,877	.....	.....	.....
Youngstown Municipal Railway, Youngstown, Ohio					
July, 1929	172,301	.....	.....	.....	20,101
July, 1928	.....	.....	.....	.....	.....
Philadelphia & Western Ry., Norristown, Pa.					
July, 1929	63,210	38,139	.....	25,071[d]	9,906
July, 1928	67,034	40,791	.....	26,243[d]	11,708

a Includes taxes. *b* Net operating revenue. *c* Surplus (deficit) after dividend *d* Before taxes. *e* Figures for 1928 are combined for properties included in the new system. *f* After Manhattan Railway dividend rental.

Table II—Condensed Financial Reports of Electric Railway Properties, 1928-1929

	Boston Elevated Ry. Boston, Mass.		Brooklyn City R.R. New York, N. Y.		Ontario Hydro-electric Essex District		Société des Transports, Paris, France		Mexico Tramways Mexico City, Mex.[c]	
	1929[b]	1928[b]	1929[b]	1928[b]	1928[j]	1927[j]	1928	1927	1928	1927
Railway operating revenue	34,223,172	34,909,542	11,405,799	11,612,491	1,158,710	1,069,631	661,574,950	622,966,808	5,842,437	5,505,432
Railway operating expenses	24,473,329	25,083,391	9,225,037	9,321,427	884,333	840,257	664,136,029[a]	624,411,616[a]	5,376,939[a]	5,062,602[a]
Net revenue, railway oper.	9,749,843	9,826,151	2,180,762	2,291,064	274,377	229,374	.....	.....	.....	.....
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	1,695,086	1,793,128	607,591	661,376	.....	.....	.....	.....	.....	.....
Operating income	8,054,757	8,033,023	1,573,171	1,629,688	.....	.....	*2,561,078*	*1,444,807*	465,498	442,829
Non-operating income	89,633	100,390	106,961	73,643	.....	.....	.....	.....	1,605,902	.....
Gross income	8,144,390	8,133,413	1,680,132	1,703,331	.....	.....	.....	.....	2,071,400	.....
Deductions from gross income	8,324,544[d]	8,050,601[d]	487,862	514,370	260,272[a]	249,544[a]	96,560,683	96,155,728	1,075,955	.....
Net income	*180,153*	82,812	1,192,269	1,188,960	14,095	*19,980*	*99,121,762*	*97,600,535*	995,445	.....
Operating ratio, per cent	71.5	74.7	80.9	80.3	76.3	78.6	.....	.....	.....	.....

	Liverpool Corp. Tramways, Liverpool, England	Edinburgh Transit Dept. Edinburgh, Scotland			Glasgow Corporation Tramways, Glasgow, Scotland					
					Tramways		Buses		Subway	
	1929[e]	1929[f]	1929[g]	1928[g]	1929[h]	1928[h]	1929[h]	1928[h]	1929[h]	1928[h]
Railway operating revenue	£1,567,180	£715,014	£161,940	£149,585	£2,284,890	£2,385,928	£185,329	£45,304	£96,757	£100,061
Railway operating expenses	1,213,310	508,698	157,231	142,217	1,525,102	1,498,993	130,445	35,826	83,336	88,801
Net revenue, railway oper.	353,870	206,316	4,709	7,367	759,788	886,935	5 ,884	9,478	13,421	11,260
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	78,021	16,525	.....	.....	158,896	161,062	1,077	516	9,817	9,722
Operating income	275,848	189,791	4,709	7,367	600,882	725,873	53,807	8,962	3,604	1,537
Non-operating income	.....	9,531	177	125	103,035	85,875	.....	.....	2,319	2,178
Gross income	275,848	199,322	4,886	7,492	703,918	811,749	53,807	8,962	5,923	3,715
Deductions from gross income	196,410	198,183	8,913	2,915	789,140	764,803	40,651	9,958	25,314	24,706
Net income	79,438	1,139	*4,026*	4,576	*85,221*	46,945	13,156	*996*	*19,390*	*20,990*
Operating ratio, per cent	77.4	71.1	90.9	95.0	66.7	62.8	70.4	79.0	86.1	88.6

a Includes taxes. *b* Year ended June 30. *c* Figures converted to American currency at 50 cents per peso. *d* Includes dividends and rentals on leased roads. *e* Year ended March 31. *f* Year ended May 15, electric cars. *g* Year ended May 15, buses. *h* Year ended May 31. *j* Year ended Oct. 31.

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NEWS *of the Industry*

$1,500,000 Car Order in Brooklyn

Surface Lines Award Contracts to Osgood Bradley and Brill for 100 Vehicles

THE Brooklyn & Queens Transit Corporation has placed orders with the Osgood Bradley Car Company, Worcester, Mass., and the J. G. Brill Company, Philadelphia, Pa., for the construction of 100 single-end trolley cars, delivery of which is to be completed in about six months. The cars will cost approximately $15,000 each, completely equipped.

The new cars are to be front entrance, center exit cars, and equipped with prepayment fare turnstiles adapted for use on individual cars. With such turnstiles they will be especially adapted for one-man operation.

Each will have seats for 54 passengers. Eighty of the cars will be equipped with leather covered, spring cushion seats, the supports and backs of which will be made of aluminum. Thirty-two of the seats will be arranged in pairs—ten pairs on one side of the car and six pairs on the other—and the remaining 22 seats are to be single seats running lengthwise along the sides and around the rear end. This arrangement of the seats is designed to provide a maximum of aisle space. The remaining twenty cars are to be equipped with wooden seats, the two types of seat—leather covered and wooden—being used for comparative purposes to determine which type is more practicable.

Rapid Acceleration Provided

Each car will have four 35-hp. motors, and the control equipment is to be of the automatic acceleration type similar to that now used on subway cars. This feature will enable the cars to keep abreast of, if not outdistance, automobile traffic using the same streets as the surface cars, since it will be possible to pick up speed rapidly and automatically.

The specifications require that the control equipment must provide acceleration at the rate of 3 m.p.h.p.s. and retardation or braking at the rate of 2½ m.p.h.p.s. The control equipment is to be provided by the Westinghouse Electric & Manufacturing Company.

At the center exit, two doors will fold inward, controlled by treadle plates in the floor and on the steps just inside the exit doors. The door control and airbrake equipment will be so interlocked that the doors cannot be opened unless the brakes are applied and the car is stationary.

The new cars are to be 45½ ft. long overall and 8 ft. 7 in. wide. Their height from rail to roof will be 10 ft. 2¾ in. and the distance from floor to headlining 7¾ ft. The estimated weight per car without passengers is 37,000 lb., this relatively low weight being obtained by the use of aluminum for interior panels and headlining, with the car body itself constructed of steel.

The roof of the car is to be of the arch type with twelve ventilators in each car. Porcelain hand-rails suspended from the ceilings at a height of 6 ft. from the floor take the place of handstraps. The floors are to be of the same composition as the floors of subway cars, a half-inch layer of this composition being laid over half-inch thick steel sheets.

No Figures Yet Under St. Louis Plan

Complete statistics showing the effect of the new fare schedule at St. Louis, Mo., on street car travel are not yet available. During the first two weeks of operation of the St. Louis Public Service Company's experimental fare of twelve rides for 90 cents and extra rides at 5 cents each in any one week and a cash fare of 10 cents for adults compared with the old 8-cent fare for adults, traffic by the People's Motorbus Company, which charges a straight 10-cent fare for adults and children occupying seats, has decreased during the rush hours when the twelve-ride tickets are generally used, but has picked up at periods when casual riders are abroad. This gain in business, however, is moderate.

St. Louis Public Service has established seven downtown stations for redemption of unused portions of twelve-ride tickets. Four department stores and three banks are redeeming the tickets. In addition authorized agents at the main offices of the company and all carhouses also redeem the unused parts of the tickets. If nine or more rides are used no refund is made.

Men Reject Tentative Strike Settlement

Hope for Adjustment at New Orleans Not Entirely Lost—President Mahon Sorely Disappointed at Outcome

CONDUCTORS and motormen of the New Orleans Public Service, Inc., New Orleans, La., by a vote of 1,009 to 87 on the night of Sept. 11, rejected the tentative agreement looking toward a settlement of the strike which had been drafted by William Green, president of the American Federation of Labor, and A. B. Paterson, vice-president of the New Orleans Public Service, at a conference in New York. The agreement also was approved by W. D. Mahon, president of the Amalgamated Association of Street and Electric Railway Employees.

At Indianapolis, Mr. Green said that the rejection of agreement was due to a "misunderstanding," and from Seattle came word that Mr. Mahon, in that city at the convention of the Amalgamated Association, regarded the negative vote of the car men as a "serious mistake" and that he would seek to have the vote reconsidered.

Local union officials at New Orleans asserted that neither Mr. Green nor Mr. Mahon had the true facts of the situation, which was aggravated by the refusal of Public Service officials to reassure the union that the strikers would be taken back to work. The clause in the agreement, the union officials said, did not bind the company to re-employ the men, and they had reason to believe that about 400 of the former employees never would be reinstated, under the terms.

In a telegram sent to Mr. Mahon in response to a telegraphic query, A. B. Paterson of the New Orleans Public Service, Inc., said:

"Subject to prompt acceptance of the agreement by your association, a large number of men can be returned to work immediately. The others as fast as conditions will permit."

At Seattle Mr. Mahon is reported to have said that he was disposed to order the New Orleans Association to accept the compromise strike settlement agreement offered by the American Federation of Labor, provided the agreement still holds good, but would take no action until Mr. Green gives him a definite reply as to whether the compromise agreement had been withdrawn. Mr. Mahon said he believed the action of the New Orleans strikers in refusing the settlement had been unwise.

The tentative agreement to settle the strike was brought about by the efforts of Father John O'Grady, of the Catholic University of America, Washington, D. C. In New Orleans during the early stages of the strike Father O'Grady had an opportunity to confer with Acting Mayor Walmsley and members of the Commission Council and Father Wynhoven, head of Catholic Charities in New Orleans.

When Father O'Grady returned to Washington, he sought out William Green, president of the American Federation of Labor, on his own initiative, and finally secured from Mr. Green an agreement to meet A. B. Paterson, vice-president of Public Service, if a conference could be arranged.

In the meantime Father O'Grady obtained Mr. Paterson's acceptance to meet Mr. Green in New York. In this way the conference was arranged. In addition to Mr. Paterson and Mr. Green, those who took part in the conference included Henry C. Abel, representing the Electric Bond & Share Company; Rudolf S. Hecht, chairman, board of directors, Public Service; W. D. Mahon, president of the Amalgamated Association; Edwin Peyroux, president of Local 194, and Edward Rightor, attorney for that union.

The agreement to settle the difficulties was signed by Mr. Paterson and Mr. Green. Mr. Mahon approved it also.

Two features of the agreement are those which give Public Service the benefit of the open shop plan and the provision for an impartial tribunal upon which both

(*Continued on page 944*)

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New Jersey Agreement Renewed

The wage dispute between Public Service Co-ordinated Transport, Newark, N. J., and its employees was settled on Sept. 6 by the signing of a new contract for three years, starting Oct. 1. The new contract is a renewal of the present one, with a few minor changes. Union men had asked wage increases of approximately 25 per cent and the company had countered with a suggestion that wages be reduced. The company offered to arbitrate the dispute, but the men voted in favor of a renewal of the present contract rather than resort to arbitration.

Golf at the A.E.R.A. Convention

As chairman of the golf committee in connection with the convention at Atlantic City, Harold B. Gardner has arranged with the Country Club of Atlantic City, Northfield, N. J., to hold the golf tournament there on Sunday, Sept. 29.

The matter of prizes has also been arranged. The first 18 holes are to count toward winning prizes in four events, namely:

Class "A"—Handicap scratch to 14 inclusive.

Class "B"—Handicap 15 to 24 inclusive.

Class "C"—Handicap 25 to 35 inclusive.

Kickers—Numbers to be chosen between 75 and 85.

The tournament will be on the basis of medal play. All members of the A.E.R.A. should advise Mr. Gardner, Westinghouse Air Brake Company, 150 Broadway, New York, of their intention to play, giving their regular club handicap and name of club. If there is no handicap, the applicant should state his three best scores when filing his application. In case of a tie the lowest handicap will win. No player is eligible to more than one prize.

Theatrical District in New York Asks Modification of Traffic Ban

The Broadway Association in New York has announced that it was preparing to ask Police Commissioner Whalen to meet Dr. John A. Harriss, president of the association and a traffic expert, to discuss possible changes in future procedure in the regulation of traffic in the theatrical section of the city that would benefit the district. The problems that face theater owners, restaurateurs and shopkeepers in the zone where parking is prohibited during certain evening hours were described by Dr. Harriss, who said the Broadway Association "believes that a better solution of the entire traffic problem can be found, and it hopes and believes the commissioner will see it that way." It will be recalled that Commissioner Whalen modified the original rules in the interest of owners of businesses conducted in the district.

Another Grade Protection Conference in Ohio

Definite steps have been taken by the Ohio Public Utilities Commission to insure the installation of flasher signal lights or other protective devices at more than 600 unprotected railroad crossings in Ohio. Copies of an order, issued by the commission, have been sent to representatives of each interurban and steam railroad affected. The representatives of the roads are to meet again with the commission on Sept. 17 to discuss the matter. The commission favors the automatic flasher light system, but the entire subject will be gone over thoroughly with each railroad.

$300,000,000 Chicago Expenditure Forecast

"Deadlock Committee" Gets Tentative Financial Program Proposal Under Pending Co-ordination Scheme

IN THE long-awaited financial plan for the proposed Chicago consolidated system which was submitted on Sept. 5 to the "deadlock committee," Chicago transportation companies forecasted the expenditure of $300,000,000 in the extension and improvement of that city's transit lines. Of this sum, $200,000,000 would be spent by the surface and elevated lines for extensions and improvements during the next ten years, and the city would be expected to spend $100,000,000 in the construction of subways during the next three years. The plan provides that there shall be no change in the present fare of 7 cents for the surface cars and 10 cents for the elevated, but calls for a 3-cent charge for transfers from surface to elevated lines.

Public hearings are to be held soon by the City Council's committee.

According to the plan, the new corporation would start with a capital value of $262,137,980, divided thus:

Rapid Transit lines	$97,558,695
North and West Side surface lines	94,898,302
South Side surface lines	69,680,983

Of the sum which the companies would devote to improvements, it is estimated that about $67,000,000 would go to extensions and betterments of the surface lines, and the remainder for the improvement and extension of the elevated system. The companies contend that it will be necessary to crowd fifteen to twenty years of delayed construction and extensions into the next ten years, in addition to the normal number of extensions and betterments required to meet the current needs of a community of 4,000,000 or 5,000,000 people.

The capital of the elevated and surface lines is at present represented by 28 different security issues. The two-fold financial plan devised by the companies suggests that these securities be refunded or exchanged for not more than five or six kinds of securities. To finance the $200,000,000 of new money it is proposed that the company issue first and refunding mortgage bonds, the initial issue to bear interest at 5½ to 6 per cent. It could also issue other securities as might be advantageous at different times.

In a table attached to the report the companies estimated the city's compensation at 3 per cent of the gross earnings. No definite rate of return for the companies is given in the report, but in their tabulations the companies estimate that the revenues would give a return of from 6.52 per cent in the first year to 5.94 per cent in the last of the ten-year period.

The group working for more than three months on subway plans has been delayed by disagreements between engineers for the surface and the elevated companies as to what type of subway is needed. The deliberations of the committee have been secret, but it is understood that one of their proposed plans called for the expenditure of $217,000,000 for the underground tubes, more than double the sum estimated in the companies' plan submitted to the "deadlock committee."

Railway Service Withdrawn in Enid

The French Bus Lines and a number of jitneys are attempting to meet the transportation problem created in Enid, Okla., by the sudden suspension of street car service. The city cancelled the franchise of the Enid City Railway and ordered cars stopped following a controversy with the company over maintenance of the properties and paving between the tracks. The city immediately issued a permit for one year to the French Bus Lines to operate buses in Enid. The buses have started operation with a 5-cent fare. The French Bus Lines at first were able to secure only two buses to use on the city streets, but two more have been ordered. In order to meet the emergency created by a circus crowd in town on Sept. 4, a number of jitneys were authorized to operate. Local newspapers have carried interviews with many citizens which show that sentiment is divided as to whether this city can meet its transportation needs without street cars. Three former mayors of the city are quoted in the Enid *Morning News* as opposing the change.

Final Briefs in Louisville Case

The case carried to the federal court some weeks ago in which the Louisville Railway, Louisville, Ky., is seeking to enjoin the city from interfering with it in collection of a 10-cent fare with a special ticket rate, intended to produce an 8 per cent return on the investment, argued before Judge Dawson some weeks ago, has progressed by the filing of briefs by the Louisville Railway and the city. The city now contends that the company for years paid dividends under a 5-cent fare, but did not set aside funds adequate to care for depreciation. The question now raised is whether or not refusal of an increase to more than 7 cents in fare is confiscation of property, as asserted by the company. It is a matter of speculation just how soon Federal Judge Charles I. Dawson will render his decision.

Working Control at St. Louis With Holding Company

More than 38 per cent of the voting stock of the St. Louis Public Service Company, which operates the co-ordinated railway and bus system in St. Louis, has passed to the City Utilities Company, a Delaware holding corporation, in turn controlled by the Newman interests and the North American Company.

In June the Public Service Commission, over the protest of minority stockholders of the railway and officers of the city, authorized the City Utilities to acquire more than 10 per cent of the stock. An appeal by the city to the Circuit Court of Cole County is now pending.

The North American Company formerly owned all of the common stock of the United Railways, which was succeeded after foreclosure and sale by the St. Louis Public Service Company.

City Utilities was formed by J. K. Newman at the time he reorganized the railways in St. Louis and Kansas City. Its authorized capitalization is 50,000 shares of $100 par value preferred and 300,000 shares of no par value common stock. The company is understood to be the holder of a substantial amount of stock of the Kansas City Public Service Company.

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Hearing on Indiana Sale Set for Oct. 29

Final hearing on the temporary injunction restraining the bondholders' committees of the Union Traction Company of Indiana from selling bonds held under deposit agreement to the Midland Utilities Investment Company, Chicago, was postponed from Sept. 7 to Oct. 29. The injunction suits were filed by Gavin L. Payne and S. E. Test, Indianapolis, acting for minority bondholders. They say negotiations for the sale of the bonds to the Midland Company were in violation of the deposit agreement, which, it is contended, provided that the bonds were to be used to protect the interests of bondholders during receivership and reorganization but were not to be sold. The Midland Company has offered 20 cents on the dollar for the bonds.

Flat Rate Cab Company Goes Broke

The Ring Cab, Inc., operating in Worcester, Mass., has liabilities of $16,308 and assets $8,605, according to its bankruptcy schedule filed in the federal court at Boston. The corporation has secured claims of $7,000, the only secured creditor being the Devonshire Financial Service Company, Worcester, whose claim is secured by a lease on automobiles. The corporation has unsecured claims of $9,308. Assets consist mainly of vehicles valued at $6,000. Debts due on open accounts amount to $1,755, which the corporation says is "due from drivers." The Ring Company was the original 35-cent flat rate taxi to enter the field in Worcester. This it did on Oct. 1, 1928. At that time there were 224 taxicabs and 423 licensed drivers in the city. Last March there were 335 cabs and 1,146 drivers. Since then conditions among the taxi operators have become chaotic, best instanced by the Ring bankruptcy.

Fare Hearing in Portland, Ore., on Nov. 12

Discovery that under the law a 10-cent fare could automatically become a fact in Portland, Ore., if the Portland Electric Power Company cared to put it into effect, unless the state took some action before Nov. 24, led the Public Service Commission on Sept. 7 to set a hearing on the request of the company, for Nov. 12.

While Franklin T. Griffith, president of the company, declared he had no intention of attempting to raise the fare without a full hearing before the commission, it was found that the company would have the right to do so unless the state denied the request within six months after the application was filed.

To determine the attitude of the city on the fare case, Mayor Baker called a special meeting of the City Council on Sept. 9.

Mr. Griffith announced that he would not put the 10-cent fare into effect until after 30 days' notice following the expiration of the six-month period.

Fare Experiment in Boston

The Boston Elevated Railway, Boston, Mass., will experiment with a new method of collecting local fares on street cars operating from Sullivan Square to Scollay Square via Main and Bunker Hill Streets, Charlestown. Single metal tokens will be sold for 7 cents; four tokens for 25 cents. The intent of the single token is to enable persons who do not want to buy four local rides but wish only a single ride to do so for 7 cents instead of 10 cents on these lines.

Persons wishing to buy four local rides may do so at the regular rate of 6¼ cents, but instead of paper tickets tokens will be used on these lines. Tokens presented for local fare will be acceptable on other lines of the system. No transfers will be issued on the token fare.

Cars running on these two lines have been equipped with a new type fare box which will take only the metal tokens and dimes, and will show a separate registration of the two coins.

$95,500,000 Chicago "L" Value

The properties of the Chicago Rapid Transit Company, which operates the elevated lines in that city, have been valued at $95,500,000 by an especially appointed committee composed of Col. A. A. Sprague, Joshua d'Esposito, consulting engineer, and George Woodruff, vice-chairman of the National Bank of the Republic. Their report was delivered on Sept. 7 to Alderman McDonough, chairman of the Council local transportation committee.

The committee recommended that the sum be considered both as the price at which the company should merge with the other lines and as the basis of rate making. Although this figure submitted by the committee is approximately $2,000,000 lower than the valuation given in the financial plan submitted by all of the local transportation companies, it appears probable that it will be accepted.

In evaluating the properties, the committee began with the appraisal set by the Illinois Public Utilities Commission in 1918. From this valuation, which was $86,250,000, the committee deducted $1,000,000 as an allowance for working capital. It then added $8,300,000 for additions and betterments made since 1919. This was $986,073 lower than the costs as shown on the companies' books. For real estate owned by the company and unused at present for railway purposes, the committee allows $2,300,000, bringing the valuation to a total of $95,500,000.

New Cars in Prospect for Columbus

The Columbus Railway, Power & Light Company, Columbus, Ohio, may purchase faster and lighter cars as a step toward relieving congestion in that city. To this end officials of the company will study the exhibits at Atlantic City, and it is believed that at least one experimental car will be delivered for use in Columbus shortly after the close of the convention.

In daily peak loads the company operates 239 cars. Nearly all of them traverse High Street or cross it in the congested area. The company favors rerouting some of the lines, but each proposal has met with opposition from car riders and downtown business men. So far the only lines which have been taken off High Street in recent years are the West Broad Street and the Cemeteries lines.

Railway officials also favor the prohibiting of parking in High Street in the downtown area. To the end that conditions may be improved the company has volunteered to co-operate with the police, the Columbus Auto Club, the Columbus *Citizen* and any other group or organization that is working to eliminate traffic accidents and to relieve traffic congestion. The skip-stop system was recently put into effect as one step in this direction. A study of traffic conditions is being made by engineers to determine further possible plans.

Men Reject Settlement

(*Continued from page 942*)

workers and company are to be represented. The full text of the tentative agreement, condensed only to avoid repetition of proper names, follows:

"It is agreed that the strike of the employees of the Public Service will be terminated upon the acceptance of the following stipulations:

"That all persons in the employ of the company when the strike occurred on July 2 shall return to work in the order of their seniority; all to be re-employed as rapidly as conditions will permit, and no other employees to be hired until after all old employees have been given full opportunity to return to work.

"It is agreed that the details of an agreement between the management and Local 194 shall be negotiated at the earliest date which may be mutually convenient, the agreement which has been in effect for the past nine years to be the basis upon which this contract shall be negotiated.

"It is understood that the president of the Amalgamated Association and the president of the American Federation of Labor shall participate in the negotiations of this agreement, and that said new agreement shall be built upon the basis of co-operation, mutual good will and common understanding.

"It is agreed further that the new terms to be negotiated shall create an impartial tribunal upon which the workers and the company shall be represented. This tribunal shall endeavor to develop and foster a co-operative relationship between employees and employer to secure the maximum of efficiency on the part of the management and employees in the operation of the railway.

"The duties and functions of this tribunal shall be agreed upon and defined by those who participate in the conference when the new agreement is finally negotiated.

"All persons who are eligible to membership may exercise the right to join Local 194, and no man who may become a member of the local union shall be discriminated against because of his membership in the said union, or for any part he may take in the legitimate administration of the affairs of the local union.

"It is further understood that the agreement which shall finally be reached shall be between New Orleans Public Service, Inc., and Local 194.

"It is understood that any employee, if he elects, may plead his own case and present his own grievances, but in the event that he desires representatives or committees to represent him, said representatives or committees must be the duly and properly appointed or elected committees by authority of Local 194. No others will be recognized."

Following the announcement of these terms, members of the city government, civic leaders and industrial executives expressed their pleasure at the tentative settlement, but officers of the local union declined to comment in any way except by public notice that the strike was not officially over.

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Maryland Men at Ocean City

Discussion at association meeting centers around the improvement of equipment and its maintenance

DISCUSSION of means for improving transportation equipment and its maintenance featured the meeting of the Transportation Section of the Maryland Utilities Association on Aug. 30 at Ocean City, Md.

Progress in transportation vehicles was outlined by Adrian Hughes, Jr., superintendent of bus transportation, United Railways & Electric Company, Baltimore. It is not a question of the car against the bus, but of providing transportation to give the service demanded by the public. Improvements have been made in both classes of equipment. Mr. Hughes feels that maximum speeds of equipment have been featured on account of the advertising campaigns in the sale of automobiles. The real criterion, however, is the time that it takes to get the vehicle over the route. Here success demands high acceleration and braking rates, combined with moderate free running speeds. As buses are being built larger and larger, he feels that sight must not be lost of the economic necessity of continuing with one-man operation. Greater comfort is needed, he thinks, both for the passenger and for the operator. Proper destination signs both inside and outside the vehicle are important in making it easy for the passenger to use the service. According to Mr. Hughes a change in the appearance of the street car would make that vehicle appear as though it is going somewhere. He believes an agreement could be made so that the production of street cars could be on a quantity basis, and thinks that it should be possible to standardize on a single-truck car, a double-truck car, and possibly an articulated car for rush hour or heavy service.

Maintenance of street cars was discussed by W. H. McCarty, president of the Electric Railway Equipment Men's Association of the Middle Atlantic States, while bus maintenance was discussed by R. D. Voshell, of the Washington Railway & Electric Company. Both speakers stressed the point that maintenance should be preventive. In connection with bus maintenance it was held that lubrication is one of the most important elements. It was also proposed that safety tests, such as tests of brakes, should be made a matter of record. It would then be possible to prove conclusively whether or not the vehicle was in proper condition as regards safety if an accident should occur.

F. J. Moore, bus manager and superintendent of bus maintenance, Blue Ridge Transportation Company, outlined some of the problems of long distance bus transportation. He believes that the private automobile is the most serious competitor to the electric railway or the bus. To meet this competition he has made a party rate of one and one-tenth times the one-way fare for five or more persons. The fares on the Blue Ridge lines were fixed at about 4 cents a mile originally. Interstate competition ensued, the rates on the competitors being about 2½ cents a mile. Accordingly, his company figured out a new basis of charges on a sliding scale, so that the longer the ride, the cheaper the rate.

The morning meeting was presided over by J. H. Stephens, superintendent of railways, Washington Railway & Electric Company. The members engaged in various sports in the afternoon.

In the evening there was a banquet by the association in honor of Light's Golden Jubilee. Talking movies were shown, featuring Thomas A. Edison, who told some of the incidents in connection with the develoment of the incandescent lamp.

Boise Valley Operation Approved

The Boise & Western Railroad has been authorized to operate in Ada County, Idaho, from Boise to Star, 16 miles, and from Boise to Onweiler Junction, 9 miles. These lines form segments of the loop operated in the Boise River valley for more than twenty years by the Boise Valley Traction Company and its predecessors. Operation of the loop line was suspended in May, 1928. The Boise & Western was incorporated in July, 1929, and has acquired the segments of the old line which it proposes to operate. The Interstate Commerce Commission holds that the experiment properly may be permitted if a conservative financing plan is adopted.

Washington Fare Case Closed

The hearings on the petition of the Capitol Traction Company, Washington, D. C., for an increase in fare came to an end on Sept. 11 and the case was postponed to Oct. 7 by the Public Utilities Commission. At this time the question of savings to the companies, possible through joint use of tracks and other facilities, will be discussed. All parties were given until Sept. 30 to file briefs on that portion of the case affecting the rate of fare to be charged, and until Oct. 15 for the filing of briefs in reply. No oral arguments will be heard on the case.

Late News Briefs

New York, N. Y.—Michel Kirtland, receiver of the Eighth & Ninth Avenue Railway, started suit in the Supreme Court on Sept. 10 for a review of the refusal of the Transit Commission to grant his company the right to charge a 7-cent fare. Justice Crain has directed the Transit Commission to file all proceedings relating to the fare application in court within twenty days. The review of the commission's decision is asked on the ground that the company is deprived of its property without due process of law, and that the rejection of its evidence as to its loss at a 5-cent rate was unlawful.

Atlanta, Ga. — The Georgia Power Company has asked the United States Supreme Court to review its controversy with the city of Decatur, Ga., arising out of the city's petition, granted by a lower court, that the company be perpetually compelled to operate its North Decatur Street car line at a 5-cent fare. Under the franchise granted in 1903 the company agreed "to never charge more than 5 cents for one fare." The company agrees that this provision fixed the rate of fare while the line was operating, but contends that "such provisions did not undertake to compel perpetual and never-ending operation."

Staten Island, N. Y.—On Sept. 3 a fire attributed to a short circuit destroyed the platforms of the Tottenville station of the Staten Island Rapid Transit Railroad and burned six coaches on a nearby siding.

Boston, Mass.—In July, the first month of the trustees' fiscal year, the cost of service on the Boston Elevated Railway exceeded its revenue by $285,903 compared with excess cost of service in July last year of $331,329.

Cleveland, Ohio—The Cleveland & Southwestern Railway may discontinue its branch line from Seville to Wooster, since the village of Creston ordered the removal of the tracks within its limits when city and railway officials failed to get together on a renewal of the franchise.

Atlanta, Ga.—The City Council has adopted a resolution in which it requests the Georgia Power Company to reduce school children's fares on buses from 10 cents to 5 cents, the same school rate now applying on street cars, and to issue transfers from buses to street cars and vice versa. The buses are run by the Atlanta Coach Company, a subsidiary of the Georgia Power Company.

Youngstown, Ohio—The Youngstown & Southern Railway is working on a program to extend its line from Columbiana to Signal. Recently the Village Council of Columbiana granted the company a new franchise within its corporate limits and the new road has been surveyed from Columbiana to Signal. Completion of the line to Signal will also give the Rogers district in Middletown township service to Columbiana and into Youngstown.

Baltimore, Md.—The Washington, Baltimore & Annapolis Electric Railroad is adding the new steel trailers, ordered a few months ago, to its North Shore branch, operating between Baltimore and Annapolis.

Chicago, Ill.—A drive for still greater courtesy among the trainmen has been launched by C. H. Evenson, superintendent of transportation of the Chicago Surface Lines. In a recent statement to the trainmen Mr. Evenson said: "The trainman is the salesman of the only commodity the railway has for sale—service. If he is disagreeable in his contacts with passengers he is a failure as a salesman."

Richmond, Va.—An amendment to the bus ordinance authorizing the Virginia Electric & Power Company to substitute bus service on Hermitage Road, and Laburnum and Chamberlayne Avenues in place of the present railway service, will come before the Aldermen at their September meeting. The paper has passed Council.

New York, N. Y.—An order directing Police Commissioner Whalen to show cause why he should not grant the application of the White Horse Taxi Service for a permit to operate taxicabs in the city was issued on Sept. 9 by Justice Valente, of the Supreme Court. In a recent similar action, Commissioner Whalen refused to grant the permit on the grounds that he was attempting to lessen traffic congestion and that he would have to be entirely satisfied with the financial responsibility of a concern before he would issue a license.

Cleveland, Ohio—The Statler Hotel has been selected as the place for the next meeting of the Central Electric Railway Association, to be held on Jan. 23 and 24, 1930.

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Providence, R. I.—Two years ago the United Electric Railways scrapped approximately 300 obsolete cars of various types and this year it is scrapping another 160 cars which, because of type, age and condition, are no longer serviceable. The list this year includes 113 closed passenger, 16 open passenger, 16 express and 15 miscellaneous service cars. The average age of these cars is about 26 years. The car bodies are burned after all serviceable material has first been salvaged.

El Paso, Tex.—A brief now in process of preparation is to be presented to the committee of judges setting forth the safety record of the El Paso Electric Company for 1928 in competition for the Anthony N. Brady Silver Memorial Medal to be awarded under the joint auspices of the American Museum of Safety and the American Electric Railway Association. The El Paso Electric Company won this medal for 1926, and again in 1927 received a certificate of award and honorable mention in this contest. Its accident record for 1928 is even better than that established during 1927, which in turn was an improvement over the record for the year before.

Birmingham, Ala.—The next meeting of the Electric Railway Association of Equipment Men, Southern Properties, will be held here on Jan. 27, 28 and 29.

Staten Island, N. Y.—The strike of the drivers of the Tompkins Bus Corporation, which began on Sept. 6, ended at 9 o'clock on Sept. 12 in a victory for the company. J. P. Ryan, president of the Central Trade and Labor Council of the American Federation of Labor, said: "After careful consideration of the labor situation in Staten Island, I feel that the men were ill-advised in calling a strike at this time and instructed Thomas J. Lyons, president of Local 807 of the Teamsters' Union, to call it off." Throughout the strike full schedules of the company's eleven lines were operated without interruption, the island's 35,000 commuters by bus being carried to and from their destinations each day without accident or delay. M. T. Gordon, Jr., acting president of the company, reiterated his intention not to take back the 22 men whose discharge precipitated the walkout, adding: "The Tompkins Bus Corporation will, in the future as in the past, employ any and all men measuring up to its standards."

St. Louis, Mo.—R. J. Kelker, Jr., consulting engineer of the St. Louis Transportation Survey Commission, says that the city should consider the advisability of a rapid single deck bus service which would make stops only at points like Union, Kingshighway and Grand Boulevard, in coming down town.

Shreveport, La.—It is expected that the presentation of testimony will soon be completed in the case in which E. Wayles Browne is acting as special master for the court in its consideration of the plea of the Shreveport Railways for the right to run one-man cars. The company is seeking to show that the system is not making a fair return on its investment and that unless economies such as one-man cars are put into effect, it will mean confiscation of property. Depositions were taken recently in New York among men in the industry qualified to testify for the company as experts on the results attained in other cities with the one-man car.

Boston, Mass.—The Eastern Massachusetts Street Railway has declared a dividend of 37½ cents a share on the common stock, payable Oct. 15 to stock of record Oct. 1. A like declaration was made three months ago. On April 1 an initial dividend of 37½ cents a share was paid on the stock. The usual quarterly dividend of $1.25 a share on the adjustment stock was also declared, payable Oct. 1 to stock of record Sept. 16.

Boston, Mass.—The legislative committee of the Boston Central Labor Union, appointed several months ago to investigate the Boston Elevated Railway situation with regard to ownership and management, has reopened the entire question of public ownership or continuance of public control.

Portland, Ore.—Beginning Sept. 13, every one of the 3,150 employees of the Portland Electric Power Company will launch a "safety drive" which will involve not only street car and bus operation but every activity in the organization. During July street cars and buses of the company ran an average of 49,135 miles for each reported accident.

New York, N. Y.—At the meeting of the International Congress on Accounting held on Sept. 10, L. R. Nash, of Stone & Webster, criticized accounting system prescribed for public utilities that fall under the control of the Interstate Commerce Commission. He said that the interstate system is objected to on the ground that its cost is burdensome, and that it permits inaccuracies because it is based on an assumption as to useful life which the outstanding executive and technical talent in the industry believes to be untenable.

Duluth, Minn.—Directors of the Duluth Superior Traction have taken no action on either common or preferred dividends for quarter ended Sept. 30, due at this time.

Boston, Mass.—The Atlantic Avenue route of the Boston Elevated Railway probably will be utilized in an interstation mail transfer plan expected to speed up delivery of letter mail deposited locally and intended for local distribution. The system has merely been discussed tentatively.

Minneapolis, Minn.—Mayor Kunze has requested the Minneapolis Street Railway to grant school children a 5-cent fare. He sent the communication to the City Council, and it will be referred to the street railway committee. T. Julian McGill, vice-president of the railway, said he understood the 5-cent rate was in effect in Duluth as an experiment on the assumption that it would increase the Duluth company's operating receipts.

Richmond, Va.—The Virginia Electric & Power Company announces a new car-to-bus transfer system as the result of the mis-use of the transfer under the universal transfer plan. Under the new plan, passengers desiring a car-to-bus transfer will request a "bus transfer" instead of a "transfer" as under the old plan. Special bus transfers have been prepared and will be different in design from the old universal transfer, thus avoiding the use of the bus transfer by persons riding at reduced rates, many of whom have obtained a bus-car ride for almost half the regular rate. The old 7-cent car fare, 8-cent bus fare and 1-cent for car-to-bus with transfer will obtain as usual.

Chicago, Ill.—A new edition of "Seeing Greater Chicago" is just off the press and ready for distribution. It contains the routing of all street cars of the Chicago Surface Lines and a brief description of points of interest with directions for reaching them. The guide will be distributed through agencies handling street car tokens and at information desks in railroad stations, hotels and elsewhere.

Alliance, Ohio—Approximately $25,000 is being spent by the Stark Electric Railroad to rebuild half a mile of track on Liberty Avenue. Early this year, the company replaced its 65-lb. rails with 100-lb. rail on this street. When the city, a short time later, made plans to re-pave the street, the Stark Electric awarded the contract for half of the street excavation. By the time the city contractor was ready to begin work, the Stark Electric had most of its portion of the street project completed. With half the street excavated, the tracks were thrown onto a temporary roadbed without interruption of service.

South Bend, Ind.—The hearing on the petition of the Chicago, South Shore & South Bend Railway to remove tracks from Chicago Avenue in East Chicago, Ind., was on Aug. 29 continued until early October by the Public Service Commission. The railway wishes to build a new right-of-way along the Calumet River in East Chicago.

Havana, Cuba—Plans are under way to establish a transportation commission to organize rail, motor and street car transportation and the fixing of routes to avoid ruinous competition. All fares will be changed, taking into consideration the interests of the public.

Detroit, Mich.—Notice that interurban passenger service on the Detroit, Jackson & Chicago Railway between Jackson and Detroit would be discontinued has been issued by J. F. Collins, receiver for the road, under the authority of a court order signed by Federal Judge Charles S. Simons. The dismantling of the Detroit-Jackson line ends passenger service that has existed for 30 years between the two cities. Passenger service on the Michigan Electric Railway from Jackson has been suspended for several months.

Greensboro, N. C.—The City Council has received a petition signed by residents and property owners of North Elm Street asking that the present trolley cars of the North Carolina Public Service Company now running over that street be supplanted by buses.

Montreal, Que.—City engineers have been instructed to proceed immediately with such additional city work as may be necessary and the Montreal Tramways Company was requested to begin laying rail for the extension to the summit of Mount Royal. The line will join Mount Royal Avenue with Shakespeare Road, thus opening transportation between the north and east ends with the west end by a direct route to the rear of Mount Royal, affording great relief to lines between mountain and river which now have to carry practically all crosstown traffic.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

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New Ideas

and New Tools to Execute Them

READINESS to accept new ideas—a spirit indispensable to progress—was evident in greater degree than ever before at the 48th annual convention of the American Electric Railway Association just closed. New ideas in car and bus design; new ideas in track and overhead line construction; new ideas in operating methods which a few years ago would have been looked upon as being extremely radical, are today receiving unquestioned acceptance.

The industry now passed beyond the old controversy of cars *or* buses. The sentiment of the present is for both cars *and* buses. On the one hand it has been learned that the bus is an indispensable asset in rounding out our transportation systems. On the other hand, the conviction is firmer than ever that the electric railway is and must remain the backbone of at least the larger transportation systems.

WITH the argument about the place of the car and the place of the bus practically settled, the field is clear for action. Cars that will win against the automobile are the most pressing need. Public favor cannot be won by an academic discussion of car design, nor can it be won by a single specimen vehicle displayed as an exhibit. It must be won by service. A broad gage program is required to convince the public that the development of electric rail transportation is keeping pace with the times. The public demands comfort and speed. New rolling stock developments of the past several years have emphasized passenger comfort. This year comfort has by no means been neglected —but special emphasis has been given to speed. Notable improvements have been made in car design. More rapid acceleration and braking were features of the equipment exhibited this year.

Radical innovations have been made in many of the individual items of equipment and apparatus. The electric railway industry has learned from the automotive industry the lesson of re-design. No longer are the railways content with trifling modifications. The demand is for entirely new designs to replace those no longer suitable to our needs.

AS THE chief stumbling block in the way of the much needed improvement in rolling stock stands the high price of new cars. Inherently there is no reason why a street car should cost more than a bus. On the contrary, it should cost less. Just so long as street cars are built to measure, however, they will remain more expensive than a ready-made article. Some degree of standardization is needed—not a single type, which must necessarily be unsuitable for many conditions, but rather enough standard types to meet all ordinary conditions. Details of design are comparatively unimportant, but the industry has reached a point where wide-spread acceptance of certain fundamental principles and definite action to put them into effect are required. The time has come to act, rather than merely to talk. The final word has not yet been said on the subject of vehicle design. But the final word will never be said. It is a military maxim that in a crisis it is better to do any intelligent thing rather than to strive hesitatingly after the ideal.

Already many improved designs are available. The willingness shown at the convention to accept new ideas is most encouraging. It remains now to translate these new ideas into action—to test their value in actual service. In no other way can the industry verify the soundness of its thinking and regain the experience necessary for future progress.

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A Strong Pull

NO MATTER how many conventions are held where the executives of the industry tell each other what their needs are, it avails little. When they tell outsiders of the needs of the industry, that is a step in advance. But when leading men come to the association and tell its members that they understand and appreciate the problem, that is real progress.

Summing up the sessions of the American Association, it becomes evident that the problems of the industry are becoming more widely understood. Speakers of national reputation demonstrated at this year's convention an intimate knowledge of the industry's affairs that a few years ago would have been almost impossible. Such men as Secretary Lamont, Colonel Barber and Mr. Stevens presented searching analyses of several phases of the transportation business that show thorough investigation and deep thought.

As for the course of events within the industry itself the program that has been advanced for improvement—better vehicles, better handling of traffic, better operation and financing—must be pushed forward. While it is indeed gratifying to transportation executives to feel that the constructive work that has been carried on by the American Electric Railway Association during the past several years has been so fruitful, when men of note outside of the business show such recognition of the vital importance of public transportation evidence is given of real progress in its relations with the outside world. But we must not rest on our oars. We must pull unremittingly against the current of unthinking opinion. Every stroke makes the battle easier. And with the showing that was made at Atlantic City the industry can feel that it is definitely moving in the right direction.

From the Scrap Heap to the Front Rank

FOR its remarkable achievement in moving, within the short period of four years, from the scrap heap to the front rank among electric railways of America, the Chicago, South Shore & South Bend Railroad was awarded the Charles A. Coffin prize for 1929. Despite the competition of several steam railroads and the private automobile, this company increased its operating revenue 34 per cent over the preceding year and 257 per cent over its 1924 figure. The number of revenue passengers was increased 8½ per cent last year and 24 per cent during the four-year period. Freight business has been increased enormously despite the competition of motor trucks on the many well-paved highways traversing the South Shore territory. Equipment has been improved and schedules speeded up. Effective work has been done in accident prevention. To accomplish these many improvments an investment of $13,000,000 was required. That this expenditure was amply justified, is shown by the substantial profits which have replaced the former heavy losses. The record of the South Shore Line is another bright page in the history of electric railways which have been rehabilitated and made prosperous by the adoption of courageous and far-sighted policies.

Notable though the achievements of the South Shore Line have been, the contest was remarkably close. All of the briefs submitted by the seven contestants this year were excellent and several were outstanding in many respects. It has been the experience of the committee of judges that the presentations have been of higher quality each year, and have shown an increasing record of accomplishment. The reports this year were even more impressive than those of previous years. The average increase in operating revenue reported was slightly more than 9 per cent. This was accomplished partly by economies in operation and maintenance and partly by higher rates of fare. It is particularly noteworthy, however, that the group of contestants this year showed an average increase in passenger traffic of 4 per cent over 1927 and 7 per cent over 1924. Details of the achievements of the various properties are given in an article appearing elsewhere in this issue. No evidence more impressive than this could be found to show the progress which is being made by the local transportation industry.

Fundamental Transportation Problems Studied

VITAL to the welfare of the industry are the five subjects, all broad in scope, investigated during the year by the committees of the Transportation and Traffic Association. They were studied in great detail, with the result that extremely informative reports were presented.

One endeavor was to develop means of using the existing street facilities more effectively. The movement of the vehicle committee considered four distinct questions, the control of parking, traffic regulation, stop location and equipment design. President W. H. Boyce emphasized the importance of this investigation when he said:

"One of the greatest problems of thickly populated communities today is that of traffic movement, and so difficult has this problem become that managements of transportation companies realize that their ability to attract revenue is dependent on their success in moving their vehicles with regularity and adequate speed."

Two outstanding contributions also were made by the committee on the equipment. One of these was the development of a practical method of determining a few sizes and types of uniform vehicles which will permit their manufacture on a production basis. The second was the outlining of a method of accounting or cost keeping to provide needed data regarding results of operation of individual lines and to furnish a guide for efficient transportation management. Recognition also was apparent that more attention must be given to the actual needs and desires of the traveling public and a more definite knowledge secured of the real attitude of passengers toward the service. To that end the committee on the passenger outlined in detail the methods of making market analyses—definite investigations into the views of the riding public. The fundamental problem of the industry today is to obtain more car riders. They can be secured chiefly through the contact of the employees with the customer. In giving the human force that same serious consideration which has long been expended upon the mechanical side of our industry, the employee committee has made a great forward step.

The small city committee succeeded in collecting much valuable information during the year. This is a big subject. No systems are more harassed than properties operating in such communities. It was quite proper that this subject was referred back for additional study. It is not one that is easily exhausted. The continuance of the study of the small city problem should be productive of other helpful ideas to supplement those already advanced.

In getting down to the fundamentals of the industry and reaching out for the answer to the many problems

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with which it is confronted the T. & T. Association is more than doing its part. Commendable spirit and effort were shown in these deliberations. The work done presages a continuation of the vigilance so necessary to keep the industry headed in the right direction.

Making the Platform Man a Partner

WHILE comparatively few men from the ranks were able to attend the recent convention at Atlantic City it is a matter of satisfaction that their status in the industry was the subject of much consideration and interest. In papers and discussions the importance to the industry of developing a strong and intelligent personnel was a prominent theme. The claim agent insists that the best hope for decreasing accidents lies in impressing the platform man with the importance of safe practices. The power engineer is well aware that the possibility of effecting a saving in energy consumption rests with the motorman. The master mechanic will admit that his maintenance costs depend to a large degree upon the skill with which the equipment is handled while on the road, while the new-business department realizes that the best way to retain the present traffic and build up receipts is through the organization of an intelligent sales force from among the men on the cars. More and more, the idea is gaining ground that great possibilities lie in the development of a superior operating personnel.

Perhaps the platform man himself may not gain much immediate benefit from this active interest in his intellectual welfare. But in the long run he is bound to benefit. After all, it is his company and his job. To the extent that his company's operations are improved, his chances for material reward increase. If his company prospers, corresponding prosperity cannot long be withheld from him. Thus it is in his own interest that he is urged to start the program at a point where it is the consensus of opinion that it must start, in the development of a finer spirit and a more intelligent co-ordination of effort among the men in the ranks.

Arrangement of Programs Presents a Problem

MANY changes have occurred in the form of programs for the several associations since the last convention held in Atlantic City in 1925. A glance at the program in that year shows that the major portion of the time was taken up with presentation of committee reports and discussion based on them. Only a few addresses were made, either before the American Association or any of the affiliated associations. This year the committee reports of the American Association were not presented on the floor of the convention. The only reference made to them was in the address of President Barnes, who in a few words summed up the committee work of the year. No opportunity was afforded for discussion, either of committee reports or the addresses.

On the other hand, the affiliated associations devoted a large part of their time to committee reports. In the Engineering Association eight sessions were taken up almost exclusively by them. Unfortunately, no one person could attend all these sessions, four being held on each of two days. Presumably the members attended those sessions with which they had the most concern, and other matters of secondary importance had to be left out of their consideration. Specialization in this association's proceedings has indeed been carried a long way.

The real work of the American Association was carried out at the series of nineteen luncheon conferences. In this again there was a large element of specialization, since five luncheons were held at the same time. The topics were well chosen, and at most of them the discussion was excellent. As at any meeting of the sort, the value depended to a considerable extent on the ability of the chairman to draw out those men who were able to make real contributions. In general this was done, and those who attended the luncheons left with the feeling that they had been well worth while.

As to the value of general sessions consisting exclusively of set speeches, with no opportunity for discussion, there may be some difference of opinion. It is a subject that itself merits discussion. Three sessions of this sort take a great deal of the delegates' time, and when they are followed by luncheons lasting well into the afternoon, there is little opportunity remaining for other activities. Before the next convention serious consideration should be given to these features of the program.

Depreciation Accounting Demands Attention

REALIZATION of the seriousness of the present depreciation accounting situation is increasing slowly. For many months the members of the American Association sub-committee on depreciation have been engaged in an intensive study of this subject. Briefly stated, the situation is this—the Interstate Commerce Commission has promulgated a plan of depreciation accounting for the steam railroads the effect of which is to fix definitely the amounts which the carriers must set aside for depreciation each year and to specify in considerable detail how these charges shall be made. Moreover the plan contemplates the transfer of a large amount of what has heretofore been regarded as maintenance expense into the depreciation account. Under the new system such property as ties, rails, paving, etc., which in the past has been renewed mainly through maintenance would be replaced through charges to depreciation. In other words, maintenance expense would be substantially reduced and in its place would appear a much larger depreciation allowance. It is clear that this large reduction in the maintenance account might seriously interfere with the ability of an operating company to adjust its expenses to meet changes in revenue. Heretofore it has been customary to curtail maintenance programs in lean years and expand them when conditions improved. Under the plan proposed by the I.C.C. such adjustments would be impossible.

Although the proposal applies only to steam railroads at this time the plan contemplates the ultimate inclusion of such electric railways as are under I.C.C. jurisdiction. Even this would not be so bad were it not that many of the state regulatory bodies are bound to follow the lead of the I.C.C. in this matter. The proposal is therefore of immediate concern to every electric railway. Strenuous efforts are needed to arouse the industry to a realization of the situation. A paper on this subject presented by Dr. Thomas Conway, Jr., before the Accountants' Association at Atlantic City is abstracted elsewhere in this issue. The interest aroused by his able presentation is an encouraging sign that railway men are awakening to the vital importance of the depreciation situation.

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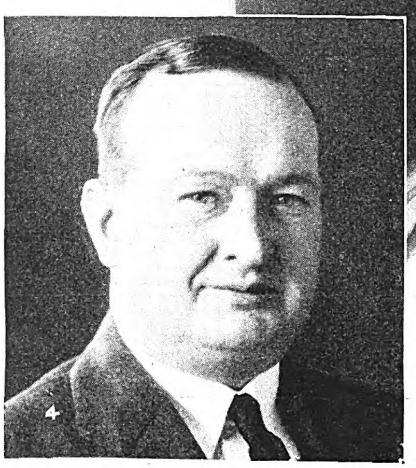
Newly-Elected Presidents

of the

American and Affiliated Associations



1. **PAUL SHOUP,** newly-elected president of the American Association, is president of the Southern Pacific Railroad. He is a former chief officer of the Pacific Electric Railway and other electric subsidiaries of the Southern Pacific, and as such has been for many years in direct contact with problems in this industry, since the lines that go to make up the Southern Pacific embrace city, suburban and interurban railroading as well as electric operation over main line divisions. Mr. Shoup is a native Californian. He stands not only as one of the outstanding business executives of the territory west of the Rockies, but of the entire nation as well.

2. **W. W. WYSOR,** new president of the Engineering Association, is a graduate engineer. He has been in his present post, chief engineer of the United Railways & Electric Company, Baltimore, since 1917, having previously served that company as assistant chief engineer, after wide experience on city, suburban and interurban properties. His connection with the system in Baltimore dates from February, 1916, when he was appointed assistant chief engineer.

3. **SAMUEL RIDDLE,** elected president of the Transportation and Traffic Association, is vice-president of the Louisville Railway, Louisville, Ky. He has served as an officer of the Connecticut Railway & Lighting Company, the Rhode Island Company, the Chicago, South Shore & South Bend Railroad and the Philadelphia Rapid Transit Company. He was formerly superintendent of transportation at Louisville. He has long been active in sectional association affairs in the Central West.

4. **WILLIAM E. FOLEY,** the new president of the Claims Association, since 1924 has been general claim agent of the Third Avenue Railway System, New York. In July, 1907, he began work with the Metropolitan Street Railway and was assigned to the Third Avenue division. He was advanced from clerk in the accounting department to payroll clerk, and in 1912 was assigned to the claim department, being transferred to the trial department in 1914. He was made chief examiner in 1917 and claim agent in 1924. Mr. Foley is a native of New York who completed his schooling at night after he had entered business. He is only 39 years old.

E. H. REED, who heads the Accountants' Association, is an accounting officer of high standing and long experience, one of the group of men who assisted in rehabilitating the Brooklyn City Railroad after the lease was abrogated under which that system was long operated by the Brooklyn Rapid Transit.

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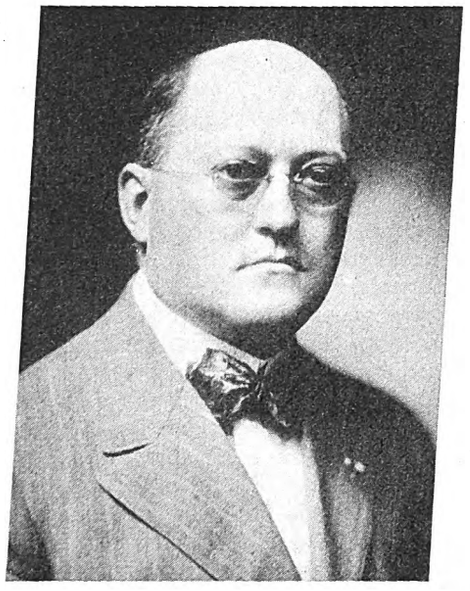
We Are Forever at a Turning Point

By James P. Barnes
President American Electric Railway Association
President Louisville Railway

In his presidential address before the American Association, Mr. Barnes calls attention to the ever-changing needs of the public for transportation and to the new methods we must develop continually to supply them

NO LESS than eleven times in the last twenty years has this association met in Atlantic City. Our sense of homecoming is natural and it is intensified by enlarged facilities which this city, in a sense our home-town, places for the first time at our disposal. The courage and vision of Atlantic City in embarking on the vast enterprise represented in its new auditorium exemplify the qualities which have kept our industry progressing during the years of its greatest trials.

The program of this 48th annual convention is stripped of all extraneous material. The exhibit committee has admirably acquitted itself under the extraordinary difficulties of staging an exhibit so large and comprehensive that every foot of available space in the auditorium is filled.



J. P. Barnes

Our committee organization is our working machine and is drawn from the best of our personnel. To it and to the headquarters staff we are indebted for sincere effort and positive accomplishment. I cannot better review this year's work of the association than by a brief synopsis of a few high points of committee activities.

The committee on street traffic economics endeavors, first, to formulate the fundamental principles of automatic signal control of traffic and of parking control. Secondly, it presents a concrete suggestion for minimizing interference and delay at street intersections. Thirdly, it urges application of the uniform vehicle code and model city ordinance developed by the Hoover Conference on Street and Highway Safety for the practical betterment of an extremely important phase of community activity.

The committee on publicity has functioned with a smoothness and efficiency which have come to be traditional. Our association has stood for honest and open dealing in all publicity matters. There is as great need for clean publicity as there ever was. Association headquarters stands ready to assist member companies with advertising copy, with posters and with motion pictures.

The committee on taxation deals with a topic which, like the poor, is always with us. Each year the electric railways of the country collect and pay to various branches of government some $62,000,000. The committee's figures show that, when indirect taxes and special imposts are included, nearly 10 per cent of the rider's fare is a tax for the privilege of using this essential mode of common transport. Several of the states have recognized the injustice of indirect taxes and special imposts, particularly the outworn requirement of paving maintenance, and have relieved companies in their jurisdictions from this presently unjustifiable burden. Is it too much to hope that governments may some day exercise practical compassion toward that unorganized host of citizens, the car riders, of whose burdensome special tax we are the reluctant collectors?

The committee on depreciation has devoted its attention to the newly promulgated depreciation rules of the Interstate Commerce Commission for steam railroads. Practically all companies would be affected if the terms were in substance adopted, as I.C.C. accounting rules usually have been, by the commissions of the various states. It is, therefore, of the highest importance that executives and accountants of all properties uphold the committee's hands with analyses and comments that may be useful in pesuading the adoption of thoroughly sound principles in this vital matter.

The committee on industrial relations has done much in formulating principles and in pointing out proper policies in matters of wages, working conditions, continued employment and individual and group relations with employees. The American Federation of Labor recently declared its intention to investigate the labor policies of the street railway industry. This industry has no secret policy. We adhere to the principle of fair dealing. The committee on insurance, with co-operation

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of stock fire insurance companies, has this year succeeded in bringing about a revision of our rating schedules based on analyses of the industry's fire loss record. Our industry has done well during the past five years in prevention of fires through better construction, improved protection, modernized equipment and methods, and the committee has been equally effective in vitalizing these things into constructive results.

The committees of affiliated associations serve not only to advance the professional work of their associations but afford excellent opportunities for personal discussion of professional problems. Members are amply justified in expending time and energy in committee work of the American or affiliated associations. Our printed proceedings embody a living record of the growth and progress of our industry. Carefully considered rules and standards which are continually undergoing modernization spell not the stagnation but the progress of those who use them.

All of the association's activities are summarized and co-ordinated in the deliberations of the Advisory Council which is now completing its fifth year. It is not my purpose to anticipate its report but rather to comment upon the inspiration and cohesion which the existence and functioning of the Advisory Council and its managing director have brought into the industry. The quiet influence of Lucius S. Storrs has permeated the industry as we have followed without stumbling the clear light of his leadership. No appraisal of our present situation can fail to note the upthrust of the last five years, due so largely to the working-out of Past-President Shannahan's constructive vision. We are fortunate that Mr. Shannahan has consented to assume the chairmanship of the Advisory Council after B. C. Cobb had so generously borne the burden of its first four years.

Something like consternation followed the resignation of the managing director whom we had learned to trust and follow. The wisdom of Mr. Shannahan and his associates in filling that vacancy will be abundantly demonstrated. They have selected a man of education and energy who can think, write and speak. The industry will cordially accept as its prophet Charles Gordon.

In pursuance of a program initiated at the beginning of the year committees on research, public transportation, co-ordination and fare structure were appointed.

The research committee has made a survey and has received pertinent suggestions as to research which might be undertaken under the auspices of the association. Without research, which includes interpretative findings, we are a ship without a compass. We must not drift.

The committee on public transportation co-ordination has entered upon a program based upon the conception that we must render a whole and not a partial transportation service. We cannot scoff at buses; we must not sneer at taxicabs; we may not ignore the other quasi-public forms of transportation service. We are squarely challenged to adapt our means and our methods to the most useful general scheme of public transportation and we must meet the challenge.

The committee on fare structure undertakes the further exploration of an equally important field. Other public utilities have discovered and applied means for adjusting charges to the different services in fair proportion to their usefulness. It is our business to know our market; to appraise its fluctuations and vagaries. We must produce what people will buy; we cannot compel them to buy what we produce. In the truest sense, scientific fare structure is sensible merchandising.

In the near future the mind of the industry must turn more generally than in the past to rapid transit problems and in more than the largest cities only. Geographical extension has been accompanied by such increased speed of communication that the modern community has been in effect greatly compressed. Many cities which cannot presently bear the expense of subway or elevated construction can and will develop arterial highways with few, if any, grade crossings, upon which vehicles may operate at high speed. Since these transportation arteries will be paid for by the public, they should provide for operation of public as well as private vehicles. We must therefore do our share of the thinking and planning that will bring about their development.

In every direction our thought is going deeper and straighter on these and similar questions. This is as it should be. It is our task today to provide the bones of transportation facilities and clothe them with the flesh of service. We are private agencies acting in the interest of the fare payer and committed to the proposition that he, our customer, shall get value received.

For years past your presiding officers, one after another, have stated that the industry was at a turning point in its history. It is a peculiarity of our business that we are forever at a turning point. We must continue turning to face always in the direction of progress. Our communities are changing in shape, in size and in habits. To continue to serve their needs we must continually turn to new developments and methods and this continual turning must be accomplished without vertigo. We must reach deep below the surface and grasp the fundamentals in order that our development may be actual and not a mere change of raiment. The past year has been unusual in devotion to this ideal. We have entered upon a sincere search for the elements which will support our future growth. We cannot rear a structure without a solid foundation nor can we fit our business into the life of the communities we serve unless we base it on fundamentals. The industry must snap out of its complacency, think straight and act boldly.

"Value Received" for Riders

ELECTRIC railways must do their share of the thinking and planning that will bring about the development of rapid transit facilities, grade crossings, arterial highways, and subway and elevated construction. In every direction our thought is going deeper and straighter on these and similar questions. This is as it should be. It is our task today to provide transportation. We are private agencies acting in the interest of the fare payer, and committed to the proposition that he shall get value received.

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American Association Gets Down to Fundamentals

Excellent papers covered the general problem of transit, the regulation of traffic, and progress of the industry. New officers were elected and installed

PRESIDENT JAMES P. BARNES formally opened the 48th annual convention of the American Electric Railway Association on Monday, Sept. 30. He introduced Hon. Anthony M. Ruffu, Jr., Mayor of Atlantic City, who welcomed the association back to Atlantic City for the first time in three years. He called particular attention to the new setting given by the erection of the magnificent convention hall, which has given the world a new idea in the provision of accommodations for such gatherings as this one.

In his annual address, President Barnes laid particular stress on the work done by the committees of the association in solving the many vexing problems of the industry. Not only the American Association committees, but those of the affiliated bodies, have been of the greatest assistance in determining the proper procedure on many matters.

Lucius S. Storrs, until Sept. 1 managing director of the association, spoke feelingly of his connection with it during the past four years. One of his greatest sources of satisfaction has been in the many friendships he has made while with the association. He expressed the wish that his successor will have the same co-operation and the same devotion from his associates.

In lieu of the usual report by the managing director, Charles Gordon said that he has been in office such a short time that it would not be possible to prepare an annual report. Accordingly, he presented an address giving his own views on the problems confronting the industry and the association at the present time, and indicating some of the means that can be used to further the interests of the local transportation industry. Mr. Gordon also expressed his appreciation to those who have assisted him in conducting the affairs of the association since he has taken office, in particular Mr. Storrs.

W. H. Sawyer, chairman of the committee on revision of the constitution and by-laws, made a brief report. The proposed revisions, which deal principally with the method of nomination and election of officers and the apportionment of dues, were adopted.

Two formal addresses were presented. The first, "At the Public's Service," was by W. L. Willkie, general counsel of the Northern Ohio Power & Light Company. He pointed out what the business of furnishing service to the public involves.

W. E. Wood, chairman of the board Virginia Electric & Power Company, spoke on the subject, "Men and Machinery." He stressed particularly the necessity for dealing with the human element if a property is to be a success. While machinery is absolutely necessary to the conduct of the business, he said, it is of no value without the full co-operation and assistance of the men who run it. Abstracts of the two addresses will be found elsewhere in this issue.

At Tuesday's session the report of the committee on nominations was received. W. H. Sawyer, in making his report, explained that it had been necessary to revise the published list of nominations on account of the withdrawal of several of the candidates. He presented a new ticket, which was unanimously elected.

Three addresses occupied the remainder of the session. The first, by Elmer Stevens, chairman of the transportation section Chicago Association of Commerce, dealt with means of increasing street capacity. Traffic congestion is a necessary evil if a city is to transact a large volume of business, he said. A city that does not have a traffic problem is either doing little or is suffering from dry rot. The problem to a great extent is whether we need more, bigger and better streets or more, bigger and better use of the streets. He cited the experience in Chicago to indicate that the capacity of existing streets can be increased materially and the speed of vehicles increased at the same time.

Mr. Stevens pointed out a number of things that have helped to improve the situation materially in Chicago. The restriction of parking, while it was not popular at first with the merchants, has been accepted as a logical development, which has benefited the Loop district and has not harmed the merchants. Outside districts are now demanding similar treatment, which goes to show the soundness of the plan. Night use of all facilities, he said, will greatly increase the street capacity at little cost. Staggered hours of business is another means that will assist in making it easier to handle the passenger business in Chicago. Besides, staggered hours aid the worker and the merchant by giving people the opportunity to purchase goods outside of working time.

Price alone, concluded Mr. Stevens, will sell very little. He gave several illustrations of articles which have been able to win on a quality basis. Even the mail order houses and the 5 and 10 cent stores do not make their appeal on price alone. The same principle should hold in the transportation business.

Col. A. B. Barber, manager Transportation and Communication Department, Chamber of Commerce of the United States, gave his views on current traffic problems, with a summary of the observations gleaned from a trip to Europe last summer. Even with the immense number of automobiles in this country as compared with European countries, he found that the fatalities are proportionately much less here than in European cities. He called attention to the benefits that have accrued from

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Henry W. Blake

IT IS with deep regret that the executive committee learned of the death of Henry W. Blake. There can be no mistake about the service that Mr. Blake rendered to this industry over a period of more than 35 years. He was the scholarly editor who directed the recording of events in this industry over the period that saw the decline of the horse car, the supersession of the cable and the coming of electricity for use on city, suburban and interurban service and for main line electrification work. And he recorded the progress of the art adequately in all its manifestations. He was not only a classical scholar but he was an engineer with an uncanny sense of what was essential in technical description. That by his writing he contributed greatly to the spread of the use of electricity for propulsion is well established. Moreover, he aided not only in the spread of technical information but also of the economics of the business, particularly accounting, playing an important part in the development of the standard classification of accounts. Modesty was the manner of the man. He was not much heard from vocally and it was only through the medium of his published writing that he faithfully served the industry. It was a source of satisfaction to him that he was attached to the staff of such an outstanding publication as the ELECTRIC RAILWAY JOURNAL, and the pages of the JOURNAL for years reflected not only in their general contents, but particularly in their editorials, the well-poised judgment of the technician tempered with the moderation of touch of the scholar and the gentleman. We join with his many friends and admirers in expressing our grief at his untimely end and in offering sympathy to his family and his business associates.

the laws for licensing drivers that have been adopted in a large number of states. While less than 5 per cent of the accidents in some states can be laid directly to mechanical defects of automobiles, there may be many more in which such defects are a contributing cause. No matter how many private vehicles there may be, Colonel Barber is of the opinion that adequate mass transportation must be provided. The volume of travel in the modern city is so great that it precludes the use of individual vehicles.

"We may not all be good organizers, but we all can be co-operators," said E. F. Wickwire in one of his characteristic addresses. Mr. Wickwire said that he had desired to sit in the audience and listen, but that he had been prevailed upon to tell his views. He chose as his topic "A Restful Ride for Ragged Nerves," and with the aid of witty examples carried the message of the necessity for co-operation of all persons involved in the supply of transportation to the American public.

At the opening of the Thursday session, the cup awarded in the *Electric Traction* speed contest was presented to the Chicago, South Shore & South Bend Railroad by Vice-President G. A. Richardson. The cup was received by Charles H. Jones, general manager of the railway, who made a few brief remarks on the progress that his company has made.

Upon presentation of the report of the committee on resolutions by Mr. Richardson, resolutions were passed covering those who have assisted in making the convention a success. Resolutions also were adopted on the deaths of B. A. Hegeman, Jr., Henry W. Blake, T. E. Mitten and Walter White, which have occurred during the year. The one on Mr. Blake appears opposite.

Three addresses of vital interest were given during the session. The first one was by Myles B. Lambert, on "Better Cars and Buses." In the second address, Dr. Thomas Conway, Jr., discussed the "Outlook for Interurbans."

The closing address on "Benefits of Unified Transportation Systems," was by Thomas N. McCarter. Before beginning his address Mr. McCarter stated that he recently had made addresses in the same room before the American Gas Association and the National Electric Light Association. In both instances the hall was filled. At the sessions of the American Electric Railway Association, on the contrary, there was a noticeably smaller number of persons in the number of persons in the audience. He raised the question as to whether the men making up the industry really were doing all they could to get the benefit of conventions such as this one.

In his address Mr. McCarter traced the development of the Public Service Co-ordinated Transport system from its inception during the 25 years of its existence, and the arrangements by which it has become possible to furnish street railway, bus, taxicab and rapid transit service. The co-ordination of all facilities he held to be essential to the proper development of the community and its continued existence.

Abstracts of the addresses will be found elsewhere.

Following the addresses, the new officers were installed. Paul Shoup, the new president, spoke briefly on the plans of the association for the coming year.

Following is the list of officers and members of the American Association elected Oct. 1:

President, Paul Shoup, president Southern Pacific Railway, San Francisco, Cal.

First vice-president, J. H. Hanna, president Capital Traction Company, Washington, D. C.

Second vice-president, G. A. Richardson, vice-president Chicago Surface Lines, Chicago, Ill.

Third vice-president, J. H. Alexander, president Cleveland Railway, Cleveland, Ohio.

Fourth vice-president, W. A. Draper, president Cincinnati Street Railway, Cincinnati, Ohio.

Members of executive committee:

Operating Companies, three year term:

Frank R. Phillips, vice-president Philadelphia Company, Pittsburgh, Pa.

Edward Dana, general manager Boston Elevated Railway, Boston, Mass.

To fill unexpired term, two years:

F. W. Doolittle, vice-president North American Company, New York, N. Y.

To fill unexpired term, one year:

W. E. Wood, chairman of the board Virginia Electric & Power Company, Richmond, Va.

Thomas Conway, Jr., president Cincinnati, Hamilton & Dayton Railway, Philadelphia, Pa.

Manufacturer Companies, three-year term:

C. E. Morgan, president Cincinnati Car Corporation, Cincinnati, Ohio.

C. C. Castle, vice-president A.C.F. Motors Company, New York, N. Y.

Safford K. Colby, manager sales promotion and development, Aluminum Company of America, Pittsburgh, Pa.

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Co-operative Planning and Action Are Needed

By Charles Gordon
Managing Director
American Electric Railway Association

Charles Gordon

FOR a number of years I have been very much interested in the analysis of the electric railway situation in this country. I have become convinced that the industry plays a vital part in the life of the nation and that it holds large opportunities for development and expansion. Obviously, however, this must be predicated upon its ability to achieve a sound financial basis so that it may compete successfully with other industries for capital. From the investor's point of view there is $6,000,000,000 at stake. But from the broader point of view of the public interest the stake is even greater and more important. It involves hundreds of millions of dollars in property values; it affects the basic trend of modern business, and it is interwoven with our whole civic and social structure.

Certainly, then, we have a great responsibility, and any suggestion of failure in our efforts to go forward is simply unthinkable. To be sure, our path is beset with many difficulties and perplexities. As in industry we have come through a combination of economic and political strangulation that makes us marvel at our own survival. As individuals we faced discouragement that only strong men could withstand. Is it all worth while? I believe that it is. I believe that the very difficulties and complexities of our business put a premium on the qualities of courage, vision and foresight. I believe that this in turn gives those who are devoting their money, their energy and their lives to this business even greater opportunity for earning that satisfaction which is the reward of constructive human enterprise than exists in other industries where the road may seem easier.

The business is characterized by high capital investment in proportion to the earnings. Furthermore, most of this capital is put into fixed structures and equipment. Depreciation becomes a very important and bothersome question. The necessity for long-term financing magnifies the importance of fiscal policy in the success or failure of the enterprise.

The operations of a transportation company are carried on in the public streets. They affect property values and business. They have a direct influence upon the very development of the community itself and in turn the tracks and service are affected when many public improvements, including street improvements, are undertaken. The ability to win public confidence and to enlist public co-operation is, therefore, a major phase of management.

Even the former advantage of monopoly is today largely eliminated by the rapid development and widespread use of the automobile. As a consequence we have found it necessary to undertake the study of questions of merchandising, advertising and the fixing of competitive prices.

It seems quite evident from all of this that the business in which we are engaged is a highly complicated, technical and difficult one. Nevertheless, the man on the street senses little of this. I feel, however, that if the general public really understood the complexity of this business there would indeed be scant attention given to the suggestion that we would be any nearer a solution of the community transportation problem through the substitution of public—which means political—management for that of private enterprise.

How, then, may local transit facilities keep pace with growing community requirements both with respect to quality and quantity? It is obvious that relatively little progress can be made until these companies are put upon a sound financial basis and there is assurance that present and future investors who put money into them will be permitted to earn, and will be able to earn, a reasonable return consistent with that in other forms of enterprise.

As a matter of fact we face here a question not only of being permitted to earn a fair return on an investment but of ability to earn under present competition. Unless management is permitted sufficient freedom of action to work out measures necessary to cope with this competition it is seriously handicapped in its efforts. That is the situation faced by many properties which were saddled with obsolete rigid franchises that specifically fixed the rate of fare. Relatively few public officials have had the political courage to face the facts presented by changed conditions.

It is hard for the public to understand that the attempt to collect under these franchises "its pound of flesh" from those whom it had formerly considered as "traction barons," drained the lifeblood from many a transportation company and struck at the public interest itself through crippling this essential community service. In

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many instances the intervention of the courts came only in the nick of time—but not until the properties had been drained into a condition from which they have survived only with the greatest effort.

Perhaps the best plan of providing necessary flexibility in the regulation of local transportation rates under the conditions of competition to which they are subjected, is that of fixing only the maximum fare, granting the right to charge any fare up to that maximum. If the maximum is made high enough it permits the development of a rate structure using the maximum as a base, and designed to improve the load factor on the property so that it may be made of greatest public usefulness. We have recognized the need for flexibility in regulation of new transportation services like buses. In fact, this factor has been so strongly in the minds of those interested in promotion of the use of buses, that it has held up the adoption of legislation needed to curtail destructive competition and to protect the public interest. If flexibility in regulation is important for buses which require relatively low fixed investment, then certainly it is even more important for rail service with much higher investments and subject to changing conditions.

From whatever angle we approach our problem, therefore, it is all-important that we enlist greater public interest and public understanding of the local transportation situation. In pursuance of this objective, I believe that we are totally ineffective when we ask the public for help merely on the plea that our investments were made in good faith. The answer is likely to be that it is our hard luck that we did not foresee changing conditions. The great strength of our case is that measures for the improvement of local transportation are fundamentally in the public interest. We do not ask relief from unfair burdens and restrictive franchises in the interests of our investors alone, but so that we may proceed with rehabilitation and service improvements.

In dealing with broad questions of community planning it is important that we point out the distinction between measures which are in the interests of the public as a whole and those which are primarily for the benefit of certain articulate and powerful minority groups. When a general traffic and transportation plan is formulated by disinterested agencies it must withstand the attacks of many groups clamoring for the expenditure of general public funds for measures that will benefit their special interests.

There is great need for disinterested co-operation among leading groups in modern communities to the end that special interests will be made secondary to the general welfare. Our industry stands for the principle that "the greatest good for the greatest number" should guide public action with respect to the approach to the modern community traffic and transportation problem. Certainly that principle is founded upon the bedrock of our democratic institutions, and we have every right and reason to fight militantly and aggressively to support it.

I believe that we are entirely sound in basing our claim for public consideration on the fact that we render a vital and necessary public service. It is becoming clearer each day that the only permanent solution of street congestion is the improvement of public transportation to a point that will permit necessary regulation of the use of the individual car in congested sections of crowded cities. We must make street improvements needed to expedite the movement of automobiles. People demand better facilities and attractiveness in the cars which they purchase. No longer are they content with mere convenience. But no construction program within the bounds of reason would permit everyone to ride in automobiles for all transportation needs. The sooner we realize that, the more intelligently will we be able to apply our community resources toward the relief of congestion.

We all have much to learn regarding the fundamentals of local transportation. We know, for example, that efficient transportation service creates property values. We know that buiness grows along these transit arteries and that it concentrates at the focal points of transit traffic. But under our present system directly benefited property contributes relatively nothing toward the cost of the facilities which create huge values. The car rider pays the entire bill. Nevertheless, business men and property owners do not consider it presumptuous to dictate the location of lines, with little regard for the riders' convenience. As a matter of fact, in many cities there is a fallacious impression that the paving obligation of the street railway companies is a contribution by the stockholders to the general public. It is not that at all. It is a contribution by the car rider to the property abutting on the streets over which he rides.

In this discussion of some of our fundamental problems I have been voicing merely my personal views. Obviously, the policies upon which our industry as a whole may unite must be carefully determined after the most thorough study by the best minds we can muster. As I have already indicated, the development of local transportation is so interwoven with that of the community itself that many of our problems are likewise public problems. If we are to unite upon the advocacy of measures based upon the application of certain general principles, these principles must be sound from the standpoint of the public interest, not in one community alone but in cities of various sizes and varying characteristics throughout the nation. We know that the actions of one community frequently affect many others. We have had ample evidence of this in matters of franchises, fares and taxation. We also know that each operating property is dependent for its development on the state of the technical art in the industry as a whole. This is illustrated by our present efforts to develop more satisfactory types of car and bus equipment. With all this in mind, therefore, the importance of co-operative planning and co-operative action cannot be over-emphasized.

OUR industry stands for the principle that "the greatest good for the greatest number" should guide public action with respect to the . . . . transportation and traffic problem. Certainly that principle is founded upon the bedrock of our democratic institutions and we have every right and reason to fight militantly and aggressively to support it.—CHARLES GORDON.

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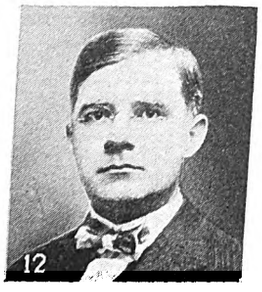
Vice-Presidents and General Officers of the A.E.R.A. for 1929-1930

1. J. H. Hanna, *First Vice-President*
2. G. A. Richardson, *Second Vice-President*
3. J. H. Alexander, *Third Vice-President*
4. W. A. Draper, *Fourth Vice-President*
5. G. C. Hecker, *General Secretary*
6. Barron Collier, *Treasurer*

Newly-Elected Members of the Executive Committee

7. William E. Wood
8. C. E. Morgan
9. Edward Dana
10. C. C. Castle
11. S. K. Colby
12. F. R. Phillips
13. Thomas Conway, Jr.
14. F. W. Doolittle



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Good Service
Is Produced by Men and Machinery

By W. E. Wood
President Virginia Electric & Power Company
Richmond, Va.

The author, speaking before the American Association, points out that while both men and machinery are important, if the men understand their jobs and are in sympathy with the ideals of the company good machinery will follow as a matter of course.

GOOD service for our industry is manufactured out of a combination of men and machinery. A greater interest in the utilization of man power might seem to minimize the importance of the proper kind of machinery, so I want to say that good service is impossible without good machinery, which, of course, includes equipment and plant.

W. E. Wood

Service is manufactured with men and machinery. Good machinery, plant and equipment are as necessary as men in the making of attractive service. We shall deal mostly with men because if an organization is of the right sort it follows as night follows day that it will never rest contented until it obtains proper machinery by which to manufacture satisfactory service.

When we speak of men we must mean the entire personnel of the organization from president to day laborer. Unfortunately, an organization is like a chain. It is only as strong as its weakest link. Our personnel must be perfected.

There are certain important factors essential to a successful transportation service that we should like to emphasize. In the first place, it is inconceivable that a transportation system can be successful unless it is generally deemed a good citizen of the community it serves. This in turn means that its policies as a corporation should be the same as the policies of any important good citizen. The company as such should contribute towards constructive civic work in the same proportion that any other good citizen of its size could reasonably be expected to contribute. Besides, it should train all its personnel individually to be good citizens. If we have developed our company and the individual men who compose it into aggressive, broadminded, good citizens, we have laid a fine basis for a successful transportation system.

Next, we must find ways and means whereby we can teach to every employee two things. First, a comprehensive understanding of the aims, methods and policies of the company. To do this we must be able to convince him wholeheartedly that these policies are proper and constructive. Next, we must find ways and means of teaching him how best to perform his individual work within the company. The man in the office does not have to understand the methods of the mechanic in the shop, nor does the mechanic have to understand the technique of the car operator, but each should be brought as near as possible to perfection in his education. The method varies but some effective method must be found.

There is one more thing that has to be accomplished. The entire personnel should be brought sincerely to respect the organization and to develop a spirit of cooperation for the purpose of rendering the best service at the lowest cost and carrying out the policies of the company. If these conditions can be obtained, it will be surprising what a good character of service will be furnished and how understanding the public will seem to be. If a company would accomplish these things, the surest way is to deal with both the public and the employee with perfect frankness. One of the things that has most impressed itself upon my mind through my experience has been that in good public utility operations there are practically no secrets of any sort that cannot be told to both the employees and to the public. Many officials would be surprised to find how often a discussion of their perplexing problems with the members further down in their organization would bring out sidelights and ideas that would prove most helpful in successfully solving these problems.

The officials of a company spend a great deal of time in producing a proper public understanding. If the entire personnel of the company understands the company's point of view on difficult questions, is in sympathy with it and believes it to be justifiable and logical, it is surprising the amount of work it will do among the public unwittingly in bringing about a better understanding. It is very difficult for a public to suspect the motives of a company if in its contact with the company it finds that its employees are well trained, loyal and understanding. This very attitude on the part of the employees will disarm the doubting citizen.

The transportation business today is a difficult one but for that reason it is also an interesting one and if we will all set about to cultivate, instruct and win over our personnel, we will find our problems infinitely easier to solve.

As civilization progresses, styles change. Our basic principles remain unchanged but fortunately methods have to keep pace with the changing styles. The handling of our employees, of course, must be kept sufficiently up to date to retain their interest. With an up-to-date organization possessing the characteristics we have tried to describe above, the best service will be worked out and this of course will include the modernizing and perfecting of our machinery, plant and equipment.

As we said in the beginning, we have discussed more particularly the morale and education of the personnel but before closing we want to emphasize again that we can never lose sight of the fact that even the finest organization cannot give good service without the proper tools with which to work.

Do not make the mistake of ever letting the impression get out that our business is not an interesting one. It has a useful future and if we will but look at it from the right point of view, we can develop a happy and interested personnel that will render efficient public service at the most reasonable cost.

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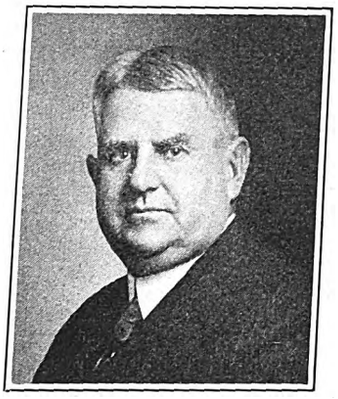
Unified Transportation
Is Necessary

By THOMAS N. MCCARTER
President Public Service Co-ordinated Transport, Newark, N. J.

The author made a strong plea for a transportation system including all forms demanded by the public. This abstract of his address before the American Association gives his views after a quarter-century of experience in the business



Thomas N. McCarter

REALIZING that the task was not easy, that there were stupendous obstacles to overcome and that we faced a popular prejudice and lack of understanding which would make our labors of long duration, with my associates I undertook to improve a chaotic condition that existed prior to 1903 in the affairs of the electric railway companies serving New Jersey. Nevertheless, with the courage and the vigor and the hope of youth we undertook it and today after 26 years we are still at it with our goal, enveloped in the mist of uncertainty, still ahead of us.

Part of our objective has, indeed, been attained. It is not too much to claim that the growth and progress which those sections of New Jersey served have experienced and the prosperity with which they are blessed, are in measure due to the system that has provided for them comprehensive and dependable urban, suburban and interurban transportation. But the return to those whose money and whose initiative made that enterprise possible has been meager and entirely incommensurate with the risk involved, the energy expended and the investment made.

I believe that the situation existing in New Jersey is repeated generally throughout the country and that in practically every community where local transportation systems function an enormous benefit has been conferred upon the public, for which inadequate return has been, and is being, made to those responsible therefor. That situation has existed as long as I have been connected with the industry and this association and it still exists. It is wrong economically, it is wrong practically, and until it is corrected the local transportation systems of this country will never operate to their full public usefulness.

Before the Great War our troubles were in the main concerned with matters of law and regulation—of restriction of return, character of franchises, public requirements as to service and rates—problems of extreme importance and difficulty, yet matters which were capable of solution through the action of state and municipal legislatures. There has since been added a new set of difficulties based on economic changes that have, among other things, more than doubled our wage scales and that are infinitely harder of settlement and it is these that are constituting the major obstacles in the path of our progress to better conditions.

The development of automotive transport has entirely changed the face of local transportation conditions. Whatever natural elements of monopoly the industry once enjoyed have disappeared. No matter what temporary artificial restrictions may be imposed by regulatory bodies, so long as a comparatively few thousand dollars will put a bus line on the street alongside of a railway system in which, perhaps, millions have been invested, the threat, if not the actuality, of competition affects your operation. So long as the passenger motor car is available at decreasing cost and with increasing comfort you can count on passengers only by offering them something that approaches its service in convenience. With the constantly growing congestion on streets and highways we face higher costs and increased physical difficulty of operation.

Yet local transportation is today as vital to the welfare of communities as it has ever been. There has been a change in the character of the service which people want but there has been no abatement in the total demand. A count of street car passengers no longer provides a correct index of riding habit. To the total of persons using the street railway must be added the number using other and newer forms of transportation if a figure that will reflect public requirements is desired. And a combined total of this kind indicates clearly that the business is there for transportation companies to get if they will take the right methods to get it.

Increase in the population of our larger cities has created demand for rapid transit; the spreading areas of so-called metropolitan districts have added to demand for intercommunication; the trend toward suburban living has increased demand for suburban line extension; the decreasing working hours and increased leisure of our working people have brought about a demand for pleasure riding; while the very street congestion of which we

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complain is reaching further to increase the use of public carriers.

Under these circumstances, it is evident that in spite of the widely prevalent and growing use of the automobile the American public continues to be dependent on the essential service which public carriers provide. That being true, such communities have an interest in the conservation and promotion of their transportation systems which is only in degree less than that of their owners and at the same time this industry has a reason for optimism and a sound basis upon which to undertake the task of fitting itself to new conditions. For if its service be essential and the continuing demand for that service be assured, then a way will be found to put it upon a solid financial foundation.

We have the right and the duty to seek from government and the people assistance in the task of placing the industry upon a sound economic basis. Neither on behalf of the properties with which I am connected nor of the industry do I ask that local transportation shall be subsidized by government or that government shall loan to the companies providing transportation either its funds or its credit, unless it be for the construction of subways or other expensive structures. But I do ask that the public and public authorities shall in their dealings with us be governed by the consideration that we are engaged in performing a public service productive of prosperity for communities, increased value for property owners, better labor markets for manufacturers, more trade for merchants, better living conditions, added comfort and greater convenience for every citizen.

I do ask that our operations be regulated by the states and the municipalities in the light of, and with knowledge of, the fundamental economic facts controlling them. I submit that our use of public streets and highways, long considered as an excuse for the imposition of taxes and other burdens, is a use first of all for the benefit and in the interest of the public; that upon us devolves the duty and obligation of performing for the public essential services and that unreasonable imposts increase cost to the user, while burdensome regulation reacts to prevent good service. I submit that if we are properly to perform our functions we should be assured a return that will maintain our credit and so safeguard our ability to improve and extend service and that if we are to be regulated as a monopoly, taxed as a monopoly and generally treated as a monopoly, we should not be subjected to competition, difficult to meet when our hands are tied by legislative and regulatory restrictions.

I do ask, specifically and concretely, that those transportation companies which have borne the burden of providing service during that long period in which, while benefits continued to accrue to public and riders, owners went without return or bore continuing losses, shall within reasonable limits be protected in the right to provide the extended and diversified service that local transportation now properly includes.

I am not the less insistent because it may be that the granting of this protection will lead to the cry of monopoly. Monopoly, regulated and controlled in the public interest, is in my opinion necessary to provide public requirements for local transportation service. If the history of transportation in this country proves anything at all, it proves that indiscriminate competition among common carriers inevitably leads in the end to poor service and high rates. Today when there are more available transportation agencies than ever before this conclusion applies with increased force.

Subways, elevated structures, street cars and motor buses in city, suburban, interurban and special service, and taxicabs, have all become necessary rapid transit facilities. If they are pitted against each other in competitive warfare, the result is waste that destroys the ability of each of them to perform its full possibility of service, and increased costs of operation that must in the end be borne by the user of the service. If they are co-ordinated under a single management, each can be used to its full advantage, providing a service that meets public requirements, and each can be operated economically and efficiently so that all together can give such comprehensive service as is called for by community requirements rather than by the profit making exigencies of a host of individual owners.

In co-ordination—in the grouping under one responsible management of the various agencies of local transportation—lies, in my opinion, not only the future of this industry but the hope of our communities to secure adequate service.

In New Jersey we are working to that end. Public Service Co-ordinated Transport is, as its name implies, an organization employing several transportation facilities. Operation of street cars and ferries was begun in 1903; of motor buses on an extended scale in 1923; of taxicabs in 1927; and within a comparatively short time the operation of cars in an open cut subway will be undertaken. The company owns 2,390 street cars for operation over 524 miles of route, which includes 872 miles of track; 2,406 motor buses over 2,570 miles of route; nine ferry boats at two separate crossings and 67 taxicabs. This year it will carry 670,000,000 passengers, of whom 350,000,000 will be transported in buses.

Many kinds of transportation service are rendered: mass transportation both by cars and buses; feeder service by buses for cars and other buses; interurban and suburban service by cars and buses; interstate service by buses; super-service by buses providing superior accommodations at a higher fare; charter bus service, both local and long distance, and excursion bus service to various points of interest and on special occasions.

We may, I think, properly claim to be merchants of transportation because we are attempting to find out what the public wants and are doing our best to give it to them.

It is the development of the motor bus that has given us this opportunity. I recognize, as every transportation man must, that transportation on rails will indefinitely continue to be essential to mass transportation and I recognize its importance in the scheme of good service, yet I am forced to the belief that, in the expansion and diversification of that service, it is the bus that will play the most important part.

In 1910 before the advent of the motor bus we were operating some 450 miles of route, as distinct from miles of track; in 1923 when we began the operation of motor buses we were operating 534 miles, a gain of 84 miles in thirteen years. Since 1923 we have added some 2,700 miles of route, all in miles of bus route with the exception of a minor extension of track, for which we have, of course, incurred no expense for either track construction or right of way. Necessary investment in track and equipment would, even under the most prosperous conditions, have made any such extensive expansion of street railway facilities impossible, yet the rapid decline in riding habit on practically all street railways during the period indicates that if additional passengers are to be obtained it is essential that the companies extend their facilities in order to get them.

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In 1910 we carried on our cars 341,398,688 passengers. The figures for 1923 are not available for comparison by reason of a suspension of service caused by a strike but in 1922 we carried 410,212,814, a gain of some 68,000,000 in the twelve years. Then in 1923 we began to operate buses and in 1928 we carried on cars and buses 643,134,181, a gain of some 230,000,000 passengers in five years as the result of our taking over other agencies and extending our service. These figures of increase are somewhat affected by changes in the method of counting passengers but the legitimate increase is very substantial.

This is an age in which people demand speed in everything that affects their living habits, convenience and comfort. In my opinion the motor bus affords an opportunity to transportation companies to create and at the same time meet new demands in the transportation field. The bus is the best answer to the urge for the private motor car. In speed it nearly approaches it; in comfort the better type of bus equals it; in convenience, when the difficulties in finding parking space are considered, it excels it; while it is far and away the more economical. The bus permits, also, a near approach to that "house to destination" service to which the use of the private automobile has accustomed Americans.

In New Jersey we have found it the best way to meet public demand for additional transportation facilities. The financing of track extensions sufficient to provide any appreciable part of the service that we now give would have been impossible, as I have said, yet if we had not undertaken to meet this demand we would have been confronted by irresponsible competition that would eventually have ruined such railway properties as we did operate.

We cannot as yet boast of satisfactory financial returns as the result of our efforts at co-ordinating service but we can say that our situation is today immeasurably more favorable and secure than it would have been had we attempted to meet the new conditions by any other method than through such co-ordination.

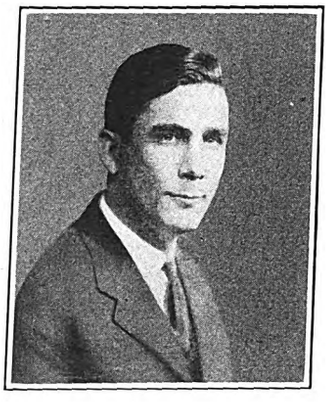
We are not yet out of the woods; our problems are not as yet all solved; we have not yet attained a state of self-sufficiency, and we are still in need of that public co-operation and assistance of which I have spoken. Neither this system nor any other system can function effectively if it is compelled to bear the burden of unjust taxation; nor can it do so unless it receives protection from irresponsible competition and co-operation from the public authorities in the very essential business of maintaining schedules in the face of growing street and highway congestion; while it is a *sine qua non* that it must be permitted to earn for itself a return which will justify its efforts and the investments made in it. If what we have learned in the process of creating probably the largest co-ordinated system of transportation in the country can be of assistance to other units of the industry, our experience is at your command.

The future of the industry represented here today rests upon its ability to adapt itself to the new conditions which confront it. It continues to have a great public service to perform. Its functions have been broadened as new agencies for their performance have come into being and with this widening of opportunity has come increased essentiality and a closer relationship to public weal. Upon these developments is based my firm belief that the industry will emerge from the cloud of troubles that now surrounds it and take its deserved place among the nation's prosperous utilities.

The Public Is Fair if Properly Informed

By W. L. WILLKIE
General Counsel
Northern Ohio Power & Light Company, Akron, Ohio

Legislative action must coincide with public opinion if the result is to be favorable to the utility. This point was made clear in a paper included in the American Association program.



W. L. Willkie

IN THEORY, councilmanic and legislative acts follow public opinion. The loss or gain of our business comes when the two do not coincide in time and place. Every lawyer knows that the course of court decisions follows public opinion. The recognized political thought of today is the court interpretation of tomorrow. As a matter of fact all of our law in this country is based upon the English common law. Consequently it seems to me that in the management of the railway property dependent for its existence upon the course of legislative action, court decision and public reaction, two things must be done: (1) A constant effort must be made to keep a direct relationship as to time between public opinion and governmental action. (2) Public opinion must be educated to correct beliefs as to street railway problems.

Whether we like it or not the life of our business is as intimately and directly dependent on these two factors as is the political life of him who occupies public office. Any variance as to time between public opinion and legislative action usually leads to unhappy results. The obtaining of a franchise grant eminently fair and favorable to the public which is contrary to the then prevailing public opinion is in most instances useless. Nothing is so destructive of the future public relationship as a franchise thus obtained.

The public, rightly or wrongly, has a conviction that public utilities sometimes take advantage of public officials, and when the concessions obtained are not in accord with the public opinion of the community involved, many citizens conclude that the public utility has obtained an unfair advantage. This becomes a settled conviction with them and has an exclusive control over their future attitude toward utility problems. But the great mass of American citizens is both conservative and fair and surprisingly intelligent in the grasping of such public utility problems if the facts are presented to them.

It is not sufficient to convince the representatives of government of the merit of your cause, and it is not sufficient to convince the public. The all important thing is to convince both as nearly simultaneously as possible. The rule of eternal vigilance is the only one by which such a result can be accomplished.

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"A Restful Ride for Ragged Nerves"

By E. F. WICKWIRE
Vice-President Ohio Brass Company, Mansfield, Ohio

In one of his characteristic addresses before the American Association, Mr. Wickwire mixed philosophy with homely example that appealed to all.

E. F. Wickwire

IT MIGHT not be a bad idea for each and every one of us connected with the industry to ask ourselves if we are doing as good a job as we know how to do. Because if we're not, as individuals, doing the best job we know how to do to help advance our industry, it follows that the industry as a whole is not going to make the progress that it should. Particularly is this true at the present time, when we are confronted with problems the solution of which demands the best individual and co-operative effort on the part of everybody connected with the industry.

Perhaps one of the worst phases of our situation today is the fact that so many people look upon a trolley car as being neither a necessity nor a luxury. In fact, some of them seem to feel that if the trolleys were only removed from the streets it would relieve traffic congestion. We might suggest to these people that a simpler and surer way to solve the traffic problem would be not to permit anybody to drive an automobile until it was paid for. I'll grant you that it takes a lot of backbone to put forth one's best effort when confronted with a situation like this, but cheer yourself with the thought that things are never so bad but what they might be worse.

There is no denying the fact that in recent years our industry has made marked improvements in our car designs. But that's just the trouble. Some of the leaders of our industry have the feeling that we have stuck too long and too closely to our old, established precedents in this matter of car design. A number of them hold the idea that we might go on forever making improvements in our old designs and not strike the public's fancy. In other words, it doesn't seem sufficient to keep on improving the old design—we must design the new.

Recently I talked with an operating executive whose company placed a number of cars of the so-called modern type in operation some time ago. "Yes," he said, "we placed in service some cars of the most modern type obtainable, but we felt at the time that these cars only represented a small step in the right direction. We tried to embody all the best ideas that we had and could obtain in designing these cars, but we felt that far greater changes and improvements in car design would rapidly follow. In other words," he said "you might say that we followed somewhat the same method that they seem to use in Washington in designing a new tariff. They get all the facts they can, get the best expert opinions they can and then guess as close as they can."

We all know that the average man likes to brag about his home town and its industries, and we want him to include his electric railway system when he starts to brag. But can we hope to get him enthused about his street cars if they look to him in style and general appearance just about the same today as they did ten years ago, whereas everything that he owns, from his alarm clock to his automobile, shows signs of radical changes and improvement over that period?

We're all agreed that the biggest single factor with which we have to contend is the privately owned automobile. It's the thing that has confronted us with the problem of selling transportation to people who, in most cases, now have their own means of transportation. Fortunately for us, it hasn't shortened the distance between parking places.

We can't help wondering how the automotive industry induces the public to pay "so cheerfully" for the millions of automobiles that are produced, whereas this same public, generally speaking, seems to begrudge our industry a few cents increase in carfare.

It does seem strange that many public officials find it so easy to convince the public that a 3-cent increase in carfare is "highway robbery," but that a 3-cent gas tax is simply a "highway necessity."

This is especially significant in the face of the fact that we see many indications that nowadays people don't really want cheap "cotton-stocking" transportation. They seem to want better transportation and, apparently, do not object to paying a fair price for it, when the kind of transportation offered appeals to their "spending instinct." And that seems to strike the keynote of our problem. How can we make a stronger appeal to the public's spending instinct; in other words, get a fair share of their patronage and a fair rate of fare?

It doesn't seem possible to accomplish the desired results with old style equipment. We can't induce the public to give us better rates of fares so long as a good percentage of the people persist in looking upon our industry as the "town drudge" and feel rather "sheepish" about being seen riding in some of our cars. And can we hope to overcome this feeling unless we present our product to the public in an entirely new "dress" and appeal to their "spending instinct" by still further improvements in our merchandising methods?

It is a well-recognized fact nowadays that advertising is a very important factor in the success of every business, and this is especially true in dealing with the public at large. It has been demonstrated many times that where sales have been built up by good advertising, they soon drop off if the advertising effort is reduced. Many properties in our industry have a strong feeling that our business is no exception to this rule and they are doing some excellent work along this line. But it seems as though we ought to be able to improve our opportunities in this direction, not only individually but collectively. It strikes me that if our industry should adopt a yearly "Get-together and pull-together" program it might well include some advertising ideas which could be featured to advantage.

As Old Bill Wise says:

"When traffic drags and twists and bumps,
Don't drive to work with nervous jumps;
You'll find the trolley always serves
A restful ride for ragged nerves."

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Courage, Faith and Vision Will Advance Interurbans

By Dr. Thomas Conway, Jr.
President Cincinnati, Hamilton & Dayton Railway

This straightforward talk before the American Association points out that the greatest chance of development is in the freight business

Dr. Thomas Conway, Jr.

BEFORE endeavoring to read the future, let us pause to analyze the present position of the interurban industry and the tendencies in the recent past. The name "interurban" is a general term, loosely applied to a considerable group of properties whose physical and economic characteristics are widely dissimilar, varying from the roadside trolley, built in pre-automobile days as a connecting link between city lines in neighboring urban communities, to what the census bureau some years ago termed the "fast, long interurban" constructed on private right-of-way, usually in accordance with the physical standards of the steam railroads. A large proportion of these properties have always handled considerable freight, and their freight business in most cases has substantially increased in recent years. Such properties are the real interurbans.

According to its published statistics, the number of electric railways reporting to the Interstate Commerce Commission (made up almost entirely of interurban companies) decreased from 312 in 1921 to 235 in 1927. The railway operating revenues of the reporting companies were $235,656,072 in 1921 and $180,886,164 in 1927, a decrease of 23 per cent. Railway operating expenses in this period declined from $189,450,749 in 1921 to $151,847,259 in 1927, a decrease of almost 20 per cent. Passenger revenues were $193,166,389 in 1921 and $126,342,522 in 1927, the decline being 34 per cent. Revenue passengers carried in this period decreased from 2,099,721,398 to 1,180,867,000 or 43 per cent. The only bright spot in the picture is the growth in the freight revenues of these properties which were $28,585,712 in 1921 and $40,410,824 in 1927, an increase of 41 per cent. The reported investment in road and equipment declined from $1,529,065,210 in 1921 to $1,272,943,916 in 1927, or approximately 16 per cent. The total miles of road operated were 14,438 in 1921 and 12,277 in 1927, a decrease of 15 per cent.

These are the high spots in the dismal picture. With the exception of the gratifying increase in freight traffic and revenues, the tendencies of the last decade have been uniformly unfavorable.

We all know the reasons for these disastrous conditions. To some extent they are due to the operation of competitive bus routes under separate ownership, but the real explanation is to be found in the revolutionary changes in public habits and methods of travel which have followed the general introduction and use of the private automobile. In 1921 the total registration of private automobiles in the United states was 9,346,195 as compared with 21,379,125 in 1928, an increase of 129 per cent. The total hard road mileage in the United States was 521,915 in 1925 and 625,000 in 1928, a growth of almost 20 per cent in three years. The total registration of motor trucks in the United States was 1,118,520 in 1921 as compared with 3,113,999 in 1928, an increase of 178 per cent. And the end is not yet.

No one knows to what extent the further expansion of the automobile business in this country will go. Personally I do not believe that we have, by any means, reached the point of saturation as regards the ownership and use of the private automobile. I base this belief upon the following considerations, among others:

(a) On the whole, manufacturers are turning out better cars each year and selling them at lower prices. I believe that the cars which will be offered for sale five years hence will be greatly superior to the models of today.

(b) I look for substantial further improvement in automobile acceleration and braking, safe speeds, roadability, comfort and cost of operation.

(c) I believe that a large part of the future expansion in the ownership and use of the private automobile will come about as a result of the ownership by an ever-increasing proportion of our population of more than one car per family. This tendency is most pronounced.

(d) We are, apparently, on the verge of an era of much cheaper automobiles than any heretofore sold.

(e) I look for a further large expansion in the hard road mileage in the United States.

(f) The parking problem is becoming increasingly serious, but I look for a large increase in the construction of transient garages and outdoor parking facilities.

If my diagnosis of the future tendencies in the evolu-

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tion and use of the automobile is substantially correct, it seems clear that if we are to induce those owning automobiles—which includes practically the entire population—to use our service, we must transport them more quickly and comfortably than they can travel in their motor cars. If the automobile of the future will be capable of comfortable and safe operation at higher speeds than the car of today and if super-highways will be built, then it seems obvious that the interurban must greatly quicken its operating speeds. Many interurban companies are radically reducing the number of country stops in order to shorten the running time between terminal cities. I believe that the tendency of the future will be toward equipment capable of much higher speeds than heretofore generally attained.

It may interest you to know that my company recently has placed orders for twenty new de luxe interurban cars which will weigh approximately 46,500 pounds and will be capable of free running speeds, where track conditions make such speeds practicable, in excess of 75 m.p.h. We are working on the theory that what the American public desires is speed with comfort and safety. If we are to induce the driver of the private automobile to travel with us, we must get him to his destination more quickly than he feels he can safely make the journey by automobile. I do not believe that an interurban line can survive if automobiles on abutting hard-surfaced roads constantly pass its cars.

We have made very careful observation of long distance bus traffic by interviewing passengers to ascertain why they patronize these buses. The answer, with few exceptions, was that while the service was uncomfortable and the fatigue almost unbearable, the much cheaper fare on the bus not only attracted business which would otherwise use the steam trains, but begot a large amount of traffic which otherwise would not move. We believe that the greater part of this business can be won over to our de luxe high speed interurban service.

While it is too early as yet to reach a definite conclusion, our experiments seem to indicate that in many instances a larger net revenue will result from lower rates of fare. I believe that the electric railways of the country, and especially the interurban properties, can well afford to experiment with special tickets and different rates to determine the combinations which will produce the maximum return. It by no means follows that the highest rate of fare will always produce the largest revenue.

In a large proportion of cases there are few new sources of passenger business. If the passenger business declines it seems obvious that decreased earnings per car-mile must be offset by corresponding greatly decreased costs per car-mile. In my opinion, the desired end must be achieved by a vast improvement in the interurban passenger car which will lower its cost, permitting us to write it off in say ten years, and which will greatly reduce its car-mile cost of operation. The car body itself represents a relatively small proporton of the total weight, and further large reductions in weight and cost must come about through improvements in the design and fabrication of motors, trucks and miscellaneous equipment. The weight of the modern city type motor is approximately 15.9 lb. per hp. As compared therewith, the weight of the power plant of the average automobile is about 8 lb. per hp., and of the modern aeroplane 1.75 lb. per hp. A study of these figures, to my mind, indicates clearly a tremendous margin for improvement. I believe there is room for considerable improvement in car trucks both as regards weight and noise. The weight, original cost, cost of maintenance of air brake and electrical control apparatus must all be greatly reduced. These are but illustrations of the things which must be done if this entire industry is to survive.

What I have just said with respect to the necessity for far-reaching technical improvements in cars applies with equal force both to urban and interurban properties. This industry must do what the automobile industry and in fact every other successful industry have done. We must think less of increasing our fares and more of reducing our operating costs, and the latter can be achieved only by the application of the same methods which have enabled the automobile manufacturer to sell us a car made up of some 4,000 parts for approximately $600. The greatest handicap of our industry is the arrested development of its technique which is at least fifteen years behind the times and which prevents us from balancing our operating budgets.

Freight Business Offers a Hope of Salvation

It seems very clear that the further development of the freight business is the main hope of salvation for a substantial part of the interurban industry. On my own property freight revenues have been increased 91 per cent in the last three years. One of the distinguishing characteristics of recent years has been the development of hand-to-mouth buying, making possible a marked reduction in merchandise stocks of both wholesalers and retailers. Hand-to-mouth buying is dependent upon the rapid and reliable shipment of merchandise between the manufacturer, wholesaler and retailer.

The lion's share of the freight traffic of the interurban lines consists of less-than-carload business. The motor truck has been a very serious competitor of the average interurban railroad because the distances over which it transports freight are within the effective range of the truck. Some two years ago a survey showed that 84½ per cent of the freight tonnage moving less than 20 miles was shipped by motor truck; 54.7 per cent of that between 20 and 39 miles; 32 per cent of that between 40 and 59 miles; 24.2 per cent between 60 and 99 miles, while only 2.3 per cent of the total tonnage moving a distance of 100 miles or over was shipped by truck.

The handling of less-than-carload freight requiries a high order of managerial skill if it is to be done profitably. The steam carriers have never been able to make any money out of the l.c.l. freight business; most of them are handling it at a loss. Unfortunately the interurban railroads have copied in most respects the equipment, practices and operating methods of the steam carriers. There is no doubt in my mind that there is a most fruitful field for improvements in the technique of the interurban carriers in successfully and profitably handling less-than-carload freight. Very few electric railway carriers have experimented with mechanical devices, such as conveyor belts, etc., to reduce labor costs at terminal stations. I believe there is a wide field of usefulness for the so-called container car in the interurban railway freight service.

Improvements in Technique Will Increase Profits

As we improve our technique we shall increase our profits from the freight business. It is now possible to make money out of freight. Our operating ratio in the freight business is reasonably comparable with

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the operating ratios now prevailing on the steam railroads and we are handling the freight business at a profit. As we improve the technique of handling less-carload freight we obviously increase the profits derived therefrom, extend the field which can be profitably exploited and increase the attractiveness of the service to our shippers.

Another fruitful field of opportunity for the interurbans is the development of an express business or the handling of packages from station to station. Other things which the interurbans must do are to improve warehouse facilities; to establish modern and efficient warehouses on their lines; to establish off-rail freight stations, absorbing the cartage charges therefrom to rail head stations; to install side tracks into manufacturing and wholesale establishments, thus putting the interurban on an equal footing with the steam carriers; to provide adequate team track capacity at all points; to install cranes and other mechanical devices necessary to handle heavy shipments; to achieve the economies which can be effected through the use of tabulating devices and other mechanical equipment in freight accounting; to improve and extend the work of freight solicitation and to support it by effective publicity designed always to keep before shippers the advantages and possibilities of interurban railroad freight service; to build up average car loadings; to operate trains on fixed fast schedules, and in many other ways to improve efficiencies, to achieve economies and to increase the attractiveness of the service to shippers.

The new interurban cars purchased during the last twelve years represent only 18 per cent of the passenger cars owned by the interurbans at the end of 1928. At the rate at which new cars were purchased during these years, it would require over 55 years to replace all the interurban equipment now owned. According to the data compiled by ELECTRIC RAILWAY JOURNAL, during the ten years from 1919 to 1928, both inclusive, the annual rate of reconstruction of interurban trackage was 0.904 per cent per annum. At this rate it will require over 110 years to reconstruct all the interurban mileage reported in the last federal census. It is obvious the industry as a whole is not even keeping up with normal physical replacements, much less with the progress of the art.

Since the freight business is indispensable to the economic existence of most properties in Indiana and Ohio and constitutes the main reliance for the future, the assurance of such freight traffic is a matter of the greatest importance. In most cases the further development of the freight traffic is dependent upon the continued co-operation of connecting interurban carriers. Many of these interurban lines are unable to finance the purchase of new freight equipment, to purchase additional motive power for the movement of freight trains or to construct sidings, freight stations or other property additions necessary. Of course, consolidations, without strong economic justification therefor, will not help the industry, but the consolidation of such lines under a conservative and sound financial plan will greatly stimulate and strengthen the credit of such properties and their ability to provide first class service to the public, and will make possible very substantial operating economies. The larger consolidated property can bring to its problems men of wider experience and greater technical ability than the average small property can afford.

As I have heretofore said, we must have the will to win if we are to succeed; not hurrah-boy speeches and enthusiasm without a solid foundation, but courage, faith and clear-sighted vision of what is required and the inflexible determination to succeed by hard, intelligent work and a vast and continuing dissatisfaction with half-way measures, inadequate facilities and obsolete equipment. In no other way can the future of this industry be assured.

Motor Vehicle Regulation Demands Attention

BY ALVIN B. BARBER

Manager, Transportation and Communication Department, Chamber of Commerce of the United States

Public transportation men have a vital interest in laws governing motor vehicles and in regulation of the use of streets, the speaker told the American Association.

Col. A. B. Barber

BASIC principles of motor vehicle regulation can conveniently be discussed under four headings: (1) Licensing of vehicles and operators, (2) vehicle equipment and maintenance, (3) rules of the road and (4) utilization of street space.

These subjects have been canvassed by various committees of the National Conference on Street and Highway Safety. Today the uniform state and municipal codes, which were completed in 1926 and 1927, have already been adopted in a good number of states and cities, and substantial progress has also been made with other parts of the conference program.

As compared with our ratio of less than one traffic death for every 1,000 motor vehicles in this country the rate per motor vehicle abroad is three to five times as great as our own. Their rates exceed what ours were at the time when we had corresponding density of motor vehicle ownership. We have every reason to be convinced of the soundness of the measures which have brought down the ratios of accidents to automobile registration here.

The licensing of the vehicle is well established in every state, but registration and anti-theft measures should be on a more uniform basis throughout the country. Perhaps the most important single measure of motor vehicle legislation calling for attention in many states today is the drivers' license law. Such laws have been in effect for a number of years in the North Atlantic states and in California. Their effectiveness in promoting better and safer driving seems to be incontestably established.

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It is an accepted principle of regulation that every vehicle should conform to certain standards as to size, weight and equipment—brakes, lights, horns, etc.—to assure that it may be operated without imperiling other users of the highway and without undue injury to the highway itself. In the uniform act regulating the operation of vehicles on highways care was taken to lay down in the law only those requirements which need to be fixed by legislation and which will remain reasonably constant over a period of years. The act leaves to be prescribed by the administrative authorities of the several states a great amount of detail covering such matters as headlight specifications, braking requirements, etc.

In regard to vehicle maintenance there has been less progress than in safety of design and construction. While most analyses of accident reports attribute less than 5 per cent of fatalities as primarily due to mechanical defects, studies show that the percentage of accidents in which defective maintenance of brakes, steering gear, horns, lights, etc., is an important contributing factor reaching much higher figures. An extensive study of 45 fatal accidents in Massachusetts indicated bad brakes as the principal or contributing cause in 24.5 per cent of the cases. Other estimates are even higher.

From the point of view of public safety uniform rules of the road have an importance hardly less than that of the drivers' license. Of all the conference proposals those which have made greatest legislative progress are the rules of the road. A total of 21 states have adopted this act and have already thus demonstrated their genuine interest in uniform rules of the road.

Considerable progress has also been made in adoption of the model municipal traffic ordinance. It is only in the last few years that pedestrian crosswalks at intersections have been recognized. The status of street car loading zones and the rights of persons passing between them and the sidewalks are still not standardized. There is also still a diversity of opinion in some quarters as to whether an unoccupied safety zone may be driven through or not, although the uniform vehicle code and the model municipal traffic ordinance definitely prescribe that it may not. Another development of recent years has been in the more formal recognition of the superior rights of traffic on main highways and the establishment of through traffic arteries.

There has of late been relatively less progress in taking care of the problem of grade crossings of steam and electric interurban railways. This whole subject is now under study by a committee of the National Conference on Street and Highway Safety.

In any consideration of the right-of-way rule at intersections it is important that the special conditions relating to street cars should be taken into account. The uniform act proposed by the national conference lays upon motor traffic the responsibility of yielding the right-of-way to street cars at intersections. A difficult question is that of giving proper priority to the movement of street cars at intersections controlled by automatic signals while avoiding abuse of that priority. Some mechanical device for this purpose should have careful attention.

As to speed limits, there is still a great diversity of opinion. The national conference went on record in favor of prima facie speed limits, that is limits beyond which the burden of responsibility is placed upon the motorist to show that he was driving safely.

In the European cities parking is much more effectively limited and controlled than in most of our cities. The unloading of merchandise in congested streets is closely regulated. Where buildings are under construction materials are required to be placed on the private property with only the minimum necessary time allowed vehicles to stand in front of the property to permit unloading, which is sometimes permitted only at night or at specified hours during the day. Street obstructions and the tearing up of pavements are similarly controlled.

The National Conference on Street and Highway Safety has from the beginning given attention to the problem of congestion. Recently it has been felt that there has been sufficient experience as to the most promising measures for the relief of traffic congestion to warrant a study and report on the subject and Secretary Lamont has just appointed a new national conference committee for the purpose, under the chairmanship of E. J. Mehren.

It seems fundamental that those who are engaged in the industry of urban transportation must be vitally concerned in every move designed to free our streets of congestion, whether by widenings, creation of new streets, removal of obstructions to traffic flow or otherwise. If streets are congested electric cars and buses will be unable to supply speedy and attractive service. Congested traffic slows up mass transportation even more than it affects individual transportation.

There are certain basic principles governing the utilization of street space on which agreement is general, but as to other principles and as to many details there is far from agreement. For example, it is quite generally agreed that existing street space should as far as necessary be available for the use of moving traffic. In practice, this principle is constantly violated by more extensive curb parking than conditions justify. Compromise on this issue seems almost inevitable, for as long as there is available curb space which can be used for parking without interfering with moving traffic it is too much to expect the motoring public complacently to renounce its use.

Again it is accepted that, along with the abolition or severe restriction of curb parking, there must come development of off street parking facilities. In general, parking facilities provided by public authority are in parks or other vacant property, while those established by private enterprise are of two kinds, in garages and in the open air, usually in vacant lots. The latter type can hardly be more than a temporary or partial means of meeting the need, while the well organized parking garage seems to have a definite field of usefulness.

I am entirely sympathetic with the zoning movement in general, and particularly with the set back requirements that are designed to insure light and air to the lower stories of tall structures. I do believe, however, that a concentrated business district consisting of skyscrapers with large employment of vertical transportation by elevators offers great advantage for doing business. Of course, if the advantages of sky scrapers are to be preserved, there must be sufficient street width for pedestrian and local traffic and adequate transportation must be provided, either on the surface or underground.

I have endeavored to indicate the inter-relationship of the different phases and to point out the interest of street transportation executives in traffic problems. I believe that the future welfare of the mass transportation industry depends on the solution of these problems.

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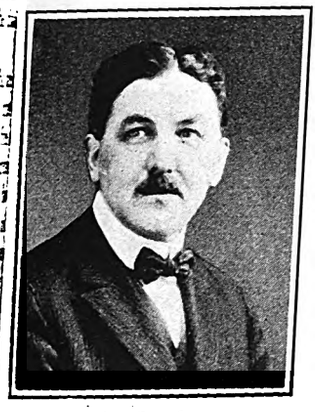
Better Cars and Buses Needed

By Myles B. Lambert

Transportation Sales Manager
Westinghouse Electric & Manufacturing Company

The necessity of developing without delay vehicles better suited to meet present-day competition was pointed out in this address before the American Association.



Myles Lambert

BEYOND doubt the car and the bus are the basic instruments of transportation. While the track, the power supply, public relations and all other things are necessary adjuncts, the car and the bus ride is the service you have to sell the public. That there exists a real need for better cars and buses is perhaps the reason why all the state and regional associations throughout the country, as well as Europe, have had this same or similar subjects on their program this year.

What do we really mean by better cars and buses? We already enjoy every known advance in the art, better body design, better seats, better ventilation, better looking cars, better motors and control, than we ever had in our history, but the cry is still for better cars and buses. Not because this is a normal attitude of a progressive industry, but because modern traffic and other economic conditions have imposed such abnormal requirements that operating engineers realize that they must not only have all these advances, but must have them with much higher schedule speeds, with greater comfort and greater economy in operation. Cars are needed that will get away and move faster than other traffic, attract patronage, and yet be sufficiently economical to operate at a profit.

What Kind of Vehicles Are Needed?

The problem before us may again be stated simply as one of evolving cars and buses that will lead traffic movement safely, reduce traffic congestion, attract patronage, and operate at a profit. What kind of cars or buses are these ideal vehicles? There's the principal nub of our problem. I submit that few, if any, of us know. We do know that on many properties where modernized cars have been placed in service, they are reported to show a satisfactory return on the investment. But the industry in general has not accepted these modern cars as adequately solving the general problem. The best evidence of this is the relatively few that have been purchased.

This question is not brought up in jest, but in all seriousness. First, because there is a wide difference of opinion about it, and second, because I believe it is the crux of our problem. A large number seem to feel that the carbuilders and manufacturers have lacked the necessary enterprise and visualization to produce the kind of car the industry sorely needs, and that if they had, large numbers of cars would be bought.

About a year ago it was stated at the master mechanics' convention that they would not measure up to their degree of "masters" of mechanics unless they addressed their talents to this very problem and visualized for the industry the kind of car modern conditions required; that they were obviously in a better position to do this than any other group in our industry; that they had for decades largely determined by their specifications the kind of cars their companies bought.

The street car of today is an "assembled car" and the joint product of many manufacturers, the purchaser largely determining the character of the assembly. The equipment manufacturer may visualize this or that advance in his art, only to find difficulties. As a rule it results in a compromise to adapt it to other existing or advanced design in trucks, car weights, axle arrangement, etc., and similarly in more or less degree are the truck builders or car builders confronted with similar problems. This being a condition rather emphasizes the need, of some better set-up in the industry to co-ordinate better, with facts about the needs, so that all manufacturers might have before them a common objective in car design to attain.

Interurban Cars Also a Problem

The interurbans have a similar problem as regards cars. Here also much has been done in modernization, lighter weights and higher speeds, but again there is a lack of definite conclusions on what kind of cars are really needed to restore the interurbans to their once general satisfactory operations. We have a number of examples of successful rehabilitation of high speed heavy service interurban lines; still others that have been re-equipped with very light weight cars, and steps have been taken recently to provide a modernized service on a network of consolidated lines in the Middle West with moderately light weight cars and especially high speed service, so that the coming year will without a doubt bring to the surface many fundamentals about interurban service that have been lying more or less dormant for several years.

The only purpose of rails is to provide a way to run on at higher speeds with greater safety than any other way. If buses weighing 20,000 lb. can run with safety and comfort on smooth pavement at 35 to 50 m.p.h. then a properly designed interurban car should run with equal safety and comfort on good track at very much higher speeds.

With the availability of modern street car equipment which makes it possible to accelerate a light weight car as fast or perhaps faster than most other passenger vehicles on the street,—the street car of tomorrow should be a big factor in speeding up traffic. Whether or not the bus will keep in step is a question. Mr. Green, vice-president of the General Motors Truck Company, delivered a very instructive paper last year on the bus in general. The bus manufacturers have rendered a real service to our industry. Of course, their market or customers are not all nailed down on railroad ties. They have a much wider market to thrive on, and the electric railway industry has profited by that wider market. New styles, new models and numerous advances in the art, as a general rule, come about largely by improving the product each year, nourished by the sales of the previous year.

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Timely Topics Discussed at Luncheon Conferences

LUNCHEON meetings are growing in popularity. This was evident from the attendance and interest taken in those held during this year's convention. With the subjects carefully selected and skillful sponsors chosen to guide the discussion, those who attended and participated came away feeling well repaid for the time spent.

Spirited discussion on the proper fare structure took place at a luncheon on that subject. W. H. Sawyer replaced G. H. Clifford as sponsor, as the latter was unable to be present. John A. Beeler pointed that while the per capita earnings in the larger cities are higher today than they were ten years ago, they are less in the smaller cities. The problem, he held, is to arrive at a fare that will bring the maximum return for the service rendered, rather than to obtain the maximum possible rate of fare. A number of combined ticket, token, permit and pass systems were described. W. W. Holden explained the plan used in San Antonio. There was considerable difference of opinion as to whether a 10-cent base rate is suitable. D. L. Fennell and Henry C. Page held that this rate is suited to their conditions. M. R. Boylan held that a 10-cent flat fare drives business away when there is competition. Most of the speakers held the same view. Several speakers emphasized the point that it is desirable to render the greatest possible service to the community. J. L. Alexander believes that we should get the lowest rate from the patron who rides the most; Walter Jackson stressed the need for getting off-peak riding; R. N. Graham told of the good results in this direction obtained through the use of the weekly pass, while C. W. Chase held that if the companies do not get riding in proportion to the growth in population the railway is not doing its duty. J. P. Barnes said that if it is possible to get a certain return from a small number of patrons on a high fare or double the number on a low fare, it manifestly is desirable to do the latter. He also stressed the need of giving real service as it is not possible to divorce fares and service.

Interurbans Should Seek Greater Speed

That speed is the principal requirement of the interurbans, and that in addition it is necessary to provide adequate terminal facilities, modern cars, accurate schedules and courteous trainmen to build up riding, was the opinion expressed by those who attended the interurbans luncheon. Instilling in the employees the desire to sell the service, and using buses in connection with the rail lines were topics which also were discussed.

That the relation of the employee to the customer is the paramount issue in connection with securing new business is the view taken by O. C. Gettinger. "We must instill in the employees individual responsibility for selling the service and building up traffic," he said, "if we are to be successful in any merchandising campaign." Mr. Gettinger cited a number of instances where employees on his system had established closer contacts with prospective customers and had secured them as permanent patrons.

F. W. Coen and Truman Curtis, both representing railways in the Ohio territory, told of the experience of their properties with competing bus lines. It was Mr. Curtis' experience that with sufficient speed and modern equipment the interurbans could more than hold their own in competition with buses.

Charles H. Jones, sponser of the luncheon, in closing the meeting expressed the opinion that lack of terminal facilities in the large cities was one of the reasons for the falling off in interurban traffic in the face of competition from privately owned autos. He also stressed the need of selling the service through the contacts of employees and by judicious advertising.

Employee training is the foundation upon which every intelligent industrial relations program rests, according to Edward Dana, sponsor of the industrial relations luncheon. This sentiment was echoed and emphasized by other executives who followed him.

It was the consensus of opinion that employee education, in spite of its importance in the scheme of things, was in its infancy in so far as general recognition was concerned, and that the subject was one which should be given the earnest attention of every executive. The opinion was expressed that at least one member of the association staff should give his entire attention to the matter of industrial relations and to the assembling of material which could be incorporated into a handbook upon the subject.

General agreement was evident at the luncheon meeting held on public relations, with L. S. Storrs as sponsor, that service is the foundation of public relations. This point was specially stressed by G. B. Anderson. The public is fair minded, according to J. N. Shannahan, and any transportation company can count upon being successful if it is able to make the public understand its problems. Dr. Thomas Conway pointed out that the customer is the one who must decide what constitutes satisfactory service. A satisfactory franchise is not a panacea for all the ills of a street railway, according to C. S. MacCalla. E. D. Kilburn pointed out that the manufacturers can help by institutional advertising. Every one, in the opinion of R. S. Tompkins, must work on public relations and not leave the job entirely to the company's public relations man.

The general trend of the discussions held during the luncheon conference on new cars, of which Thomas Fitzgerald was the sponsor, indicated that the present-day automobile strongly impresses its mark on modern street car design. W. T. Rossell said that heretofore the mechanical department influenced too much the decision of the management of the railway when new equipment should be acquired. Frank R. Fageol felt that the demand for street cars would be increasing for the first five to ten years, but held the opinion that after 25 years the demand for buses would greatly surpass the demand

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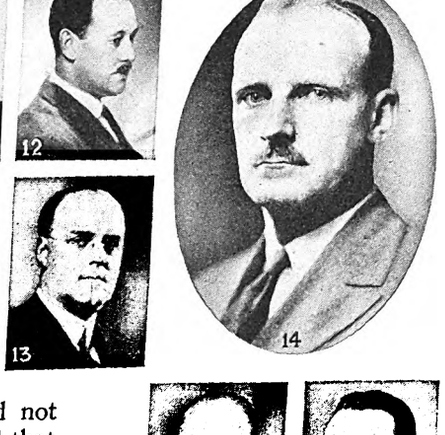

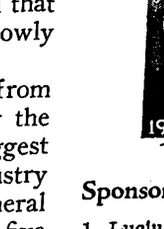

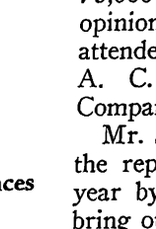

Sponsors of Luncheon Conferences

1. Luclus S. Storrs.
2. T. Fitzgerald.
3. Jesse S. Hyatt.
4. G. H. Clifford.
5. Harold L. Geisse.
6. A. C. Spurr.
7. B. W. Arnold.
8. C. H. Jones.
9. R. P. Stevens.
10. Edward Dana.
11. D. L. Fennell.
12. D. E. Blair.
13. G. A. Richardson.
14. Leslie Vickers, in Charge.
15. Adrian Hughes, Jr.
16. E. B. Atchley.
17. Samuel Kahn.
18. Carl W. Stocks.
19. Julian M. Bamberger.
20. R. N. Graham.

for street cars. Looking at this problem from the point of a manufacturer, Myles B. Lambert of the Westinghouse Electric & Manufacturing Company admitted that the development and modernization of street railway equipment did not go as fast as it should, but stated that improvements are incorporated slowly but surely.

Methods of securing relief from excessive tax burdens, especially the paving tax, is one of the biggest problems confronting the industry today, according to the general opinion of more than twenty-five executives who attended the luncheon on taxation. William A. Jackson presided in the absence of Harold L. Geisse, the original sponsor.

H. B. Weatherwax, vice-president of the United Traction Company, Albany, N. Y., stated that the electric railways of his state were paying about 70 per cent of their net income for taxes, and that all efforts made in recent years to bring about a reduction of taxes had been unsuccessful.

"Take the merchants and the public into your confidence and get them to help solve your excess tax problems," advised John L. Swope, vice-president of the United Railways & Electric Company, Baltimore.

Acknowledgment of the fact that traffic regulation must be based on the greatest good for all classes of users of the street was the dominant note at the traffic luncheon, with D. L. Fennell as sponsor. J. H. Hanna said that railway men must begin with a process of self-education in this matter.

Progress made in the solution of the traffic problem in Baltimore was outlined by Dean Locke. According to J. Rowland Bibbins, it is desirable that traffic should be controlled by a master signal system covering a large area rather than by a series of independent systems.

J. B. Stewart, Jr., expressed the opinion that it is difficult to secure effective action through citizens' traffic committees. Whatever the value of such committees may be, the fact must be recognized, according to J. A. Miller, Jr., that these committees exist, and it is of great importance that the members be fully informed on the subject of public transportation needs. Col. A. B. Barber spoke of the traffic problem being of outstanding importance and praised the active part taken by the electric railways in working for its solution.

Analysis not only of every small city property but also of all phases of operation on every line is necessary to get at the root of the serious problem facing the systems in cities of 75,000 population and less. This opinion was advanced by those who attended the small city luncheon. A. C. Spurr, Wheeling Traction Company, was sponsor.

Mr. Spurr presented extracts from the report prepared during the past year by the small city committee to bring out certain phases of the problem and to note progress made in analyzing small properties.

Many valuable ideas on merchandising the electric railway business were advanced at the "Merchandising" luncheon, held under the sponsorship of G. A. Richardson, vice-president and general manager Chicago Surface Lines. It was the general opinion of those who attended that a salable product in the form of real transportation service must first be obtained and that this must then be sold intensively by every possible means. Among the merchandising methods discussed were a self-analysis of the company's activities, providing the trainmen with neat uniforms, holding frequent meetings to discuss service, giving away weekly passes to persons whose names were advertised in department store newspaper advertisements and canvassing from house to house.

Hudson Biery of Cincinnati told of the efforts of his company in public relations work in "being a good citizen." He stated that his company had for a long period advertised everything but the service, and that at present the test for any advertising is that the end sought must be for the benefit of the city as well as the company. "Start from the top and go down," was his advice for developing a sound public relations policy.

S. B. Way gave the same counsel. "Imbue the public with the thought that the management wishes to maintain good will and you will have taken the greatest step in merchandising," he said. R. S. Tompkins also contributed some valuable thoughts on merchandising in relating the intensive selling of a new de luxe bus service into an exclusive territory in Baltimore, in distributing time-tables and in assisting in the promotion of the city's 200th anniversary celebration.

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Much animated discussion marked this round-table luncheon on the motor bus for city operation, which was led by D. E. Blair, general superintendent, Montreal Tramways. The opinions generally fell into two camps, one led by A. R. Williams, of the United Electric Railways, Providence, and the other by R. N. Graham, Pennsylvania-Ohio Public Service Corporation, Youngstown, Ohio.

Mr. Williams favored a greater use of the bus, stating that in Providence they had found it popular and profitable to carry people from the distant residential districts to the dense areas. Mr. Graham, supported by several others, held that there is no inherent advantage in the motor vehicle that the electric car does not possess, and that equal comfort may be secured on well-designed street cars.

At the luncheon conference on motor bus maintenance methods, Adrian Hughes, Jr., pointed out the necessity for the bus operator knowing the problems encountered by the other men, thus aiding him in improving his own methods. Various speakers discussed the maintenance methods used on their own properties.

Renewed Confidence in the Industry Needed

Dr. Thomas Conway, Jr., sponsor of the financing luncheon, summed up the various opinions of those present when he said:

"The trouble with our industry is that for years we have been selling the public the idea that we are destitute, always on the verge of bankruptcy. No wonder the public's confidence is shaken in us. We have no one to blame but ourselves. Now we have to unsell this idea, and the sooner we do it the better. Why, even most of us are afraid to invest our own money in the industry. Then how can we expect to attract outside capital? What we need to do is follow the example of the steam roads who had troubles like our own after the World War. They didn't preach hard times. They advertised their prosperity. They sold the public on the idea that they were a prosperous industry. We must do the same thing."

Opinion generally favored offering frequent and high-class service on long-distance bus lines as the most effective means of securing the volume of patronage necessary for profitable operation of interurban buses, in the luncheon conference on "Motor Bus, Interurban and Long Distance Operation." C. S. MacCalla, presided over the meeting.

On the question of how far an interurban railway should extend its bus operations, M. R. Boylan said that question could only be answered by knowing local conditions. R. N. Graham thought that electric railways have been over-conservative in the operation of buses, with an unprofitable result.

"We must discover what the people want, and then provide the service," Adrian Hughes said. "They will be willing to pay for it."

"The most important element in the utility business today is what the public thinks of you, and the best way to obtain a favorable public attitude is through the platform men," according to one of the speakers at the luncheon devoted to education and training. The meeting was presided over by J. S. Hyatt. H. H. Norris reviewed briefly the history of the association's educational activities and told of some of the more recent phases of the work in Boston. "No educational program can be a complete success without the intelligent and whole-hearted support of the management," he said, a sentiment which was echoed by all present.

R. C. Forman explained his experience in public speaking instruction, and introduced W. E. Adams, a trainman from the Beaumont, Tex., property and one of his protégés, who had been sent by his company to the convention in recognition of his services in the interest of better personal relations.

That humorous appeal in public utility advertising is a desirable appeal was the theme of John Marsh at the advertising and publicity luncheon. Humorous appeal, however, is the most difficult to write, and should be used sparingly. The speaker outlined the program of advertising which his property had conducted during the past year, using humorous appeal copy, and told of the widespread attention which it had attracted in the community. Robert Dougan of the Capital Traction Company, Washington, D. C., told of the advertising used by his company in developing de luxe bus service, but expressed the belief that if the service is made sufficiently attractive it will advertise iteslf. The success of the Chicago Surface Lines in bringing about parking relief was described by J. B. O'Connell, who stated that his property had found that the best approach to the problem was through showing the merchants that their interests would be best served by the proposals which the street car company was advancing. The company must show that it has no selfish motove, but is working for the general good. A well-organized speakers' bureau had been very effective in winning public good will.

House-to-House Canvass Promotes Good Will

C. B. Short, manager Roanoke Railway & Electric Company, Roanoke, Va., told of the success attending his company's house-to-house canvass in the promotion of traffic. A six weeks' campaign was carried out early in the year and is to be repeated this fall. While it was difficult to measure the actual increase in business resulting from the canvass, the company is satifised that public relations were distinctly improved as the result of the house-to-house calls.

"See that the newspapers get the news," said Hudson Biery, Cincinnati Street Railway Company; "they are just as anxious to get real news as we are to get passengers. Editors, too, are always glad to get editorial material." Other speakers included Raymond S. Tompkins, United Railways of Baltimore; David Evans, North Shore Line, and Labert St. Clair, director of advertising for the A.E.R.A. The meeting was presided over by E. B. Atchley, Northern Ohio Power & Light Company.

Two subjects, both very live ones for those interesetd in the promotion of safety, were discussed at the safety luncheon on Thursday, the classification of accidents as chargeable or non-chargeable and the bonus method of reducing accidents. The luncheon was sponsored by R. N. Graham. C. H. Evenson contributed some valuable thoughts on the first subject in outlining in some detail the method of charging accidents in Chicago.

Types of buses most desirable for city service, suburban service and intercity service on trips under 100 miles were discussed by A. T. Warner at the luncheon on motor bus design, with C. W. Stocks as sponsor. In his opinion the treadle door is not suitable for use where the zone fare system is in effect. Buses used in city service should have ample headroom for the comfort of standees, because during rush hours they constitute a large part of the number of passengers carried. A shorter headway with smaller buses is to be preferred to longer headway with larger buses, because frequency of service resembles more the transportation service obtained with

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he private automobile. Convenient placing of the fare egisters for observation by the operator as well as by he passenger was stressed by Alexander Shapiro.

Trends in design of auxiliary elements for better lriver efficiency and increased schedule speeds were dis- ussed by W. H. McAloney, who pointed out that easy ntrance not only facilitates passengers entering but also hus increases schedule speed. Braking facilities was he subject of the discussion by P. V. C. See, who tressed the point that it was of the utmost importance hat a bus be provided with two braking systems working ndependently of each other.

Both carload and l.c.l. handling of freight were ana- yzed at the freight luncheon, held on Thursday under he sponsorship of Julian M. Bamberger. Charles H. ones spoke on co-operating with steam railroads in the eveloping of territory and interchanging business. He old of developing new industries both as the means of ecuring new business and of securing better co- peration with the steam railroads. Mr. Jones em- hasized the need for giving freight service comparable o that offered to passengers. By offering store-door lelivery service, the Lehigh Valley Transit Company has ncreased its freight business 50 per cent in the past two ears, according to F. A. Burkhardt.

Interurbans Must Foster Freight Business

"The salvation of the interurbans is in their freight usiness," commented S. B. Way. He emphasized the mportance of speed in shipping and gaining the recog- nition of the steam roads as a carrier. "Meeting the com- petition of trucks is the principal problem of the electric ailways in the central territory," stated Arthur W. Brady, "and to compete successfully with them you must ffer better service." David R. Thomas told of the ad- antages of co-ordinating the freight activities of inter- onnected systems, also the method of distributing ick-up and delivery charges among the roads carrying single shipment.

Mr. Thomas also commented upon truck competition n his territory, and described the Bonner Rail Wagon vith which his company is experimenting. The con- luding remarks were made by Julian Bamberger, who liscussed the need for better terminal facilities and for egislation which would enable the electric railways to ompete with trucks.

H. B. Potter presided at the luncheon on management, The discussion centered largely on pension and retire- nent plans. There was considerable difference of opinion s to how a fund should be set up for the purpose. Alonzo R. Williams told of methods he has used in umanizing the service in Providence. He believes that ersonal contact between men and management is essen- ial to success.

Big Turnout of Canadians

A MEETING of the Canadian Electric Railway Asso- ciation was marked by the attendance of a large umber of our northern neighbors. C. H. Dahl, presi- ent of the association, presided. Greetings of the American Electric Railway Association were extended by eslie Vickers. In addition to a small amount of routine usiness there was lively discussion concerning the loca- ion of the next convention of the Canadian Association. A resolution was passed expressing the appreciation of he Canadians for the courtesies extended by A.E.R.A.

Registration at 48th Annual A.E.R.A. Convention

	1929	1928
Operators	1,723	1,989
Manufacturers	2,578	2,862
Men Guests	1,260	1,490
Ladies	1,481	1,109
Total	7,042	7,450

Foremen's Training Conference Well Attended

SPONSORED by the committee on education and arranged under the direction of J. S. Hyatt, engineering assistant to the vice-president Chicago Rapid Transit Company, Dr. H. W. Rowland, educational director Milwaukee Electric Railway & Light Company, and Prof. H. H. Norris, educational adviser Boston Elevated Railway, the foremen's training conference course held daily sessions during the five days of the convention. Some 22 men—supervisors, instructors and educational directors of representative electric railways—took the course, which was directed by W. C. Durgin, director of public relations, Commonwealth Edison Company, Chicago. He was assisted by David W. Gordon, director of service improvement Chicago Rapid Transit Company, Jay Barton, of the Peoples Gas, Light & Coke Company, Ernest G. Cox, of the Chicago, North Shore & Milwaukee Railroad, and P. W. Melton of the Commonwealth Edison Company.

In the course of the program these in attendance were addressed by Mr. Durgin on such general subjects as "Personal Service Development," "The Fundamentals of Conference Technique," "Service Sampling," "Building Conference Courses," and "Characteristics of a Conference Leader." Mr. Melton took as his subjects "Who Leads and Who Attends Conferences?" "The Mechanics of the Conference," "Devices, Schemes and Other Aids," "Lessons, Plans and Manuals," and "Motivation." Messrs. Cox, Barton, Gordon and volunteer leaders took turns in leading demonstration conferences, and the entire group participated in the general criticism and discussions.

It had been the original intention to conduct the meetings in two general groups, one to be composed of the advanced students, including those who had taken the course last year, while the other would be made up of those attending the meetings for the first time. After the first meeting, however, it was decided to continue as one group, and the program was carried forward on this basis. In this manner the more experienced men were able to aid the others by precept and example.

During the course of the conferences a number of executives attending the convention took advantage of the opportunity to drop in on the meetings and watch proceedings from the side lines. At the final meeting of the Transportation & Traffic Association a group conference demonstration was staged, with D. W. Gordon as leader and a number of trainmen from the Atlantic City & Shore Railway participating.

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World-Wide Transportation Problems Discussed

On Advisory Council Night was given a symposium of transportation problems in various countries through talking movies. South Shore Line awarded Coffin Prize

J. N. Shannahan

TRANSPORTATION in many lands was told about in the evening session held under the auspices of the Advisory Council. An outstanding feature was the presentation of the Charles A. Coffin award to the Chicago, South Shore & South Bend Railroad, which won out of a field of contestants all of which had excellent presentations. In accepting the award the general manager, Charles H. Jones, said that he regretted only that all the employees of the road who had made it possible to win could not be present.

Mr. Shannahan Speaks for Progress

Speaking for the Advisory Council, Chairman Shannahan told of some of the problems of the industry. Mr. Shannahan said in part:

There is no mystery regarding the cause of the change in the public's conception of what it is willing to consider satisfactory transportation service. The rapid and remarkable development of the automobile created new standards of speed, convenience and even luxury in transportation. At the same time, rapidly rising costs of materials and labor made the most rigid economy imperative and prohibited sweeping replacements of physical property.

Because the people as a whole agreed to assume the cost of adequate roads and highways, they have made possible the development of the automobile as we know it today. When the public understands that obsolete methods of dealing with its local transportation problems constitute the primary causes of many of the difficulties faced by cities of various size throughout the country, the road will have been opened to that rapid development and improvement of community transportation facilities which is so badly needed today.

During the past four years there has been relatively rapid progress toward modernization of thought within this industry. We do not ask the public to give intelligent consideration to its local problems simply to help these companies or even those thousands of men and women who have invested their savings in our securities. We ask it in order that we may be enabled to give that volume and character of service which the public has a right to expect. We ask it in order that the transportation companies may be enabled to keep pace with growing community requirements; in order that an intelligent policy and consistent program with respect to transportation development may be worked out in the interests of the public itself—of those millions of people who are inconvenienced and endangered by inadequate transportation facilities and consequent congestion.

On our part we have been proceeding rapidly with the job of putting our own house in order. We have been developing equipment that approaches in speed, comfort, attractiveness and performance the standards set by an automobile-minded public, and which in safety exceeds them. Only a casual examination of the wonderful exhibit at this convention is sufficient to establish that fact.

The time has passed long ago when any single company can afford to hold aloof from the effort to overcome general difficulties which affect the entire industry of which it is a part. I feel that the best report for the council consists not of anything which I may say, but of the revived spirit and the definite evidence of progress in the industry during the period since it came into being. Much of the council's work has necessarily been intangible. But it has been of far-reaching importance nevertheless.

The talking movies were used to introduce several noted speakers, including Secretary R. P. Lamont, the Right Honorable Lord Ashfield, chairman of the board Underground Electric Railways Company of London; Herr Ernst Reuter, chairman of the board Berlin Transportation Company, and A. W. Robertson, chairman of the board Westinghouse Electric & Manufacturing Company. Abstracts of these addresses follow.

Officials of the South Shore Line, Winners of the Coffin Prize

B. J. Fallon
Vice-President

Britton I. Budd
President

C. H. Jones
Vice-President

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Transportation Affects All Business

By ROBERT P. LAMONT
Secretary of Commerce of the United States

R. P. Lamont

OBVIOUSLY, the business of providing local transportation to American communities is a basic utility service which is of vital importance not only in our economic life but in our social and political structure as well. The rapid concentration of people into great industrial and commercial centers is one of the outstanding phenomena of the age in which we live. Our continued progress and well-being under these conditions is dependent upon an adequate and efficient circulatory system for these great communities; that is to say, upon adequate facilities for the easy and rapid movement of people and commodities. Unless this is assured it is apparent that one of the most important factors responsible for the growth of business centers—increased convenience for the conduct of business—would be eliminated.

From the standpoint of the general social welfare it seems important likewise that convenient, speedy and safe communication be available between outlying residential zones, and between these zones and business and industrial districts. Otherwise the living conditions of the workers in great cities would become quite impossible. Public health, morals and general well being would be bound to suffer. It is to you gentlemen who are experts in the business of providing transportation service that the nation must look for guidance in the determination of sound policies for the development of new facilities to meet growing requirements.

In many respects the difficulties of traffic congestion and the resulting inconvenience, hazard and economic loss involved seem closely related to the business in which you are engaged. I presume that in your deliberations you are giving attention to these questions.

I feel, therefore, that you gentlemen are engaged in a business that affects our economic and social life in many ways. For that reason I feel that your efforts to rehabilitate your properties physically and financially should receive the sympathetic attention and interest of your communities. I am sure that you may expect the necessary co-operation provided that through your association activity and otherwise you bring about that degree of self-regulation which will enable you from within the industry to take into your hands the condemnation of unsound practices.

It is my understanding that you are engaged in furnishing local public transportation service not only with street cars, rapid transit lines and electrified trains, but that you are also heavily interested in the operation of buses and in some instances taxicabs to supplement your other services. In this I feel that you are moving wisely and in the public interest. It seems quite clear that under proper public regulation, co-ordination of transportation facilities is in the direction of efficiency and waste reduction.

I am considerably impressed with the importance to all business of the reduction of congestion and the adjustment of deficiencies in available local transportation. These factors have a most important bearing upon the accessibility of existing business centers and business property. In some cities there seem to be marked trends toward the shifting of business centers which must have an important bearing upon existing investments and property values. Many lines of business show a marked trend toward the establishment of branches more accessible to residential districts and relatively free of down-town congestion.

The thought occurs that this may be having a marked effect upon distribution costs and upon the overhead cost of conducting business. Certainly it is a subject that merits the attention of thinking business executives.

Solving Berlin's Traffic Problems

By ERNST REUTER
Chairman of the Board Berlin Transportation Company
Berlin, Germany

Following a five-week trip visiting American cities, including Boston, New York, Cleveland, Chicago, San Francisco, Los Angeles, Philadelphia and Baltimore, Herr Reuter is convinced that co-ordinated transportation, with the surface car as the chief vehicle, is the best means of servicing the population of Berlin. —EDITOR.

I HAVE just completed one of the most interesting experiences of my life. In company with my colleagues, I have spent the last five weeks visiting outstanding city properties in the United States. I came here to study your problems because I believe they forecast our problems of the future. Our problems are multiplying daily. Berlin is growing rapidly. It now has 4,300,000 inhabitants and the population is increasing at an average of 80,000 persons per year. Our traffic problems also are increasing on account of the automobile. Ten years ago there were probably not more than 10,000 motor cars in Berlin. Today there are 100,000. The day is not far distant when there will be a million.

At present we are utilizing subways, surface cars and buses. Our local transportation is co-ordinated under a single management. After visiting your great cities, I am convinced that co-ordination of these vehicles, under a single management, is the solution of local transportation problems. You are following along this line in the United States and it is this line that we are going to follow not only in Berlin but the rest of Europe.

I am convinced that the electric car will remain the chief vehicle in the movement of mass transportation. I have been especially impressed by the progress that your electric car manufacturers have made in improving their product. My outstanding recommendation upon returning to Berlin will be wider use of electric cars in mass transportation. I am going to recommend that both cars and streets be improved. Our cars must be made larger. Our streets must be straightened so that more direct routes can be provided.

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We have been using the bus and will continue to use it, but in a supplemental manner. Berlin now is utilizing the bus in outlying districts and on boulevards. We shall continue to use buses in these sections. We have no intention of substituting buses for electric cars in our congested centers. We believe that electric cars will do this work better.

Traffic congestion problems in the United States have been of great interest but fortunately we shall be spared some of them in Berlin. Doubtless many of your problems here arise from the presence of the skyscrapers in downtown sections. Berlin has no skyscrapers. Its highest building has less than ten stories. Furthermore, there never will be skyscrapers in Berlin nor will any kind of building be permitted which will cause such congestion of population as you have in your leading American cities. The German people believe in spreading out their population. They believe in having parks and resting places in the downtown sections. The city of Berlin owns about half of the ground space that the city occupies and it is going to use this space for beautifying the city with something besides buildings.

I feel that local transportation is a world problem. Even before the excellent plan of co-ordinated transportation was thought of all countries had a common interest in providing public rides. But now that the wisdom of co-ordinated transportation has been demonstrated both in this country and abroad our problems are more in common than ever. We still are in an experimental period. We can be of great help to each other As you have been of great help to us, I hope that in the near future you will permit us to be of some assistance to you.

London's Transportation Difficult

By THE RT. HON. LORD ASHFIELD

Chairman of the Board
Underground Electric Railways of London, Ltd.

Lord Ashfield

WHEN my friends in America wrote me that those attending the convention wished to have a five-minute film showing me in action in London it would have added enormously to your entertainment this evening if, instead of talking about London transport, it had been suggested that this "command performance" should take place on a golf course where I could have given an exhibition of golf which, if viewed from the varieties of style or from that of a picturesque—and even startling—vocabulary, would, as I have already said, provide not only for your entertainment this evening but add to your knowledge of that fascinating game. But I must obey my definite instructions.

Five minutes is too short a time in which to make any useful observations upon the problem of London traffic for the problem is about as big as the London area itself. This covers approximately 1,820 square miles, has a population of about 8,700,000 who are served by 118 route miles of underground railways, 346 route miles of tramways and about 5,500 omnibuses. It is also served by a very extensive system of suburban railways. In 1928, these several forms of transport carried roundly 4,000,000,000 passengers, which is equal to about 510 journeys per head of the population. Private automobiles also play an increasingly important part in transport and there is at present about one car for every 45 inhabitants, a record far short of that of any section of America.

All the railways, both surface and underground, practically all the omnibuses and a part of the tramways are company-owned, but the larger part of the tramways is owned by the municipalities. The total capital invested is roundly $540,000,000, of which 85 per cent is company and 15 per cent municipal.

In recent years the only passenger transport which has been self-supporting is the omnibuses; they alone have the proud distinction of having not only earned profits but of having given substantial financial aid to the underground railways and to a part of the company-owned tramways.

With a view to restricting competition with other existing forms of transport, especially trams, and reducing congestion upon the streets, further omnibuses are prohibited but it is recognized that to limit one form of transport in favor of another will not provide a satisfactory solution to the problem. On the other hand, it is generally agreed that free and unrestricted competition between one form of transport and another is not in the public interest. Underground railways, trams and buses are not of the same economic value. Each plays an essential part in a complete and effective system of transport but the London situation is further complicated by the fact that the ownership and operation of the several undertakings is vested partly with companies and partly, through public money, with the municipalities concerned. The problem, therefore, is to devise a plan which without disturbing the existing ownerships will provide for the operation of all of the different undertakings under a single management so that each form of transport—underground railways, trams and buses—may be used to the very best possible advantage in providing a unified system of transport and, through a common financial interest, secure to each undertaking its fair and equitable share out of the aggregate net earnings of the combined undertakings.

It is not easy to find a solution to this problem since we must venture into the realm of politics when dealing with it, but I am glad to say that some progress has been made these last few years and I live in the hope that an enlightened government will bring its powerful influence to bear in finding a solution to the problem.

From what I have said in these few remarks, you will, perhaps, say that "Ashfield has nothing on you" and that your problems are in some aspects not unlike ours; I can only venture the wish that you will be as successful in solving your problems as I hope to be in solving mine.

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Coffin Award

Won by

South Shore Line

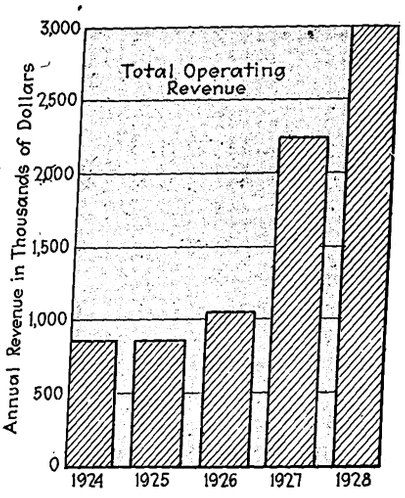
Rehabilitation of 90-mile interurban road considered "a distinguished contribution" to the progress of the industry. Increased traffic and revenue shown by all competitors in contest. Substantial economies made in operation. Improved public relations and effective safety work reported. Presentations summarized in this article

WITHIN four years, the Chicago, South Shore and South Bend Railroad, usually called the South Shore Line, has moved figuratively from the scrap heap to the front rank among electric railways of America. In recognition of this achievement the company was awarded the Charles A. Coffin Prize for 1929. This is the seventh annual award to "that electric railway company which, during the year, has made a distinguished contribution to the development of electric railway transportation for the convenience of the public and the benefit of the industry." Previous winners were: Chicago, North Shore & Milwaukee Railroad in 1923; Northern Texas Traction Company, Fort Worth, in 1924; Pittsburgh Railways in 1925; Pennsylvania-Ohio Electric Company, Youngstown, Ohio, in 1926; Grand Rapids Railway in 1927; and Virginia Electric & Power Company, Richmond, Va., in 1928.

As in past years six principal factors were considered in making the award: More riders and more revenue; a friendly public; lower costs and increased reliability of service; increased safety for riders, employees and the public; co-operation between management and employees; and financial accomplishments. This year seven electric railways submitted briefs. They were: Community Traction Company, Toledo; Chicago, South Shore & South Bend Railroad; Detroit Department of Street Railways; El Paso Electric Company; Houston Electric Company; Northern Texas Traction Company, Fort Worth; and Youngstown Municipal Railway.

Losses Converted to Profits on South Shore Line

Taking over a badly depreciated and insolvent property in 1925, the present management of the Chicago, South Shore and South Bend Railroad thoroughly rehabilitated the line within four years, and completely justified the investment of $13,000,000 of new capital by the conversion of large losses into substantial profits. The South Shore Line is a 90-mile interurban electric railroad, giving a high-speed service with the most modern equipment directly into the heart of Chicago, in the face of keen competition of nine Class A steam railroads, and heavy private automobile traffic over the many good roads which are to be found in the same territory.



In 1928 the South Shore Line showed a gain in operating revenue of 257 per cent over 1924

The revenue passengers numbered 2,787,190 last year, representing an increase of 8½ per cent over 1927, or 24 per cent over 1924. An increase of more than 150 per cent in freight car-miles was effected from 1927 to 1928, there being 2,992,162 freight car-miles operated last year. The operating revenue was $3,060,540 in 1928, an increase of 34 per cent over 1927 and 257 per cent over 1924.

In addition to operating daily 78 trains now, whereas the old management operated only eighteen trains per day, the schedule speed has also been greatly increased. The 90 miles between Chicago and South Bend was covered in two hours and 55 minutes in 1924; two hours, 30 minutes early in 1928; two hours, fifteen minutes in May of last year; two hours, five minutes in October of last year; with one train making the trip in one hour, 59 minutes at the end of 1928. Trains were operated 93.68 per cent on time in 1928, as compared with 93.09 per cent in 1927, and 75 per cent in 1924.

A large carload freight business has been developed by the use of modern equipment operated on fast schedules, with interchange tracks with thirteen steam railroads. The less-than-carload freight service with over-night delivery between Chicago and cities on the line, properly

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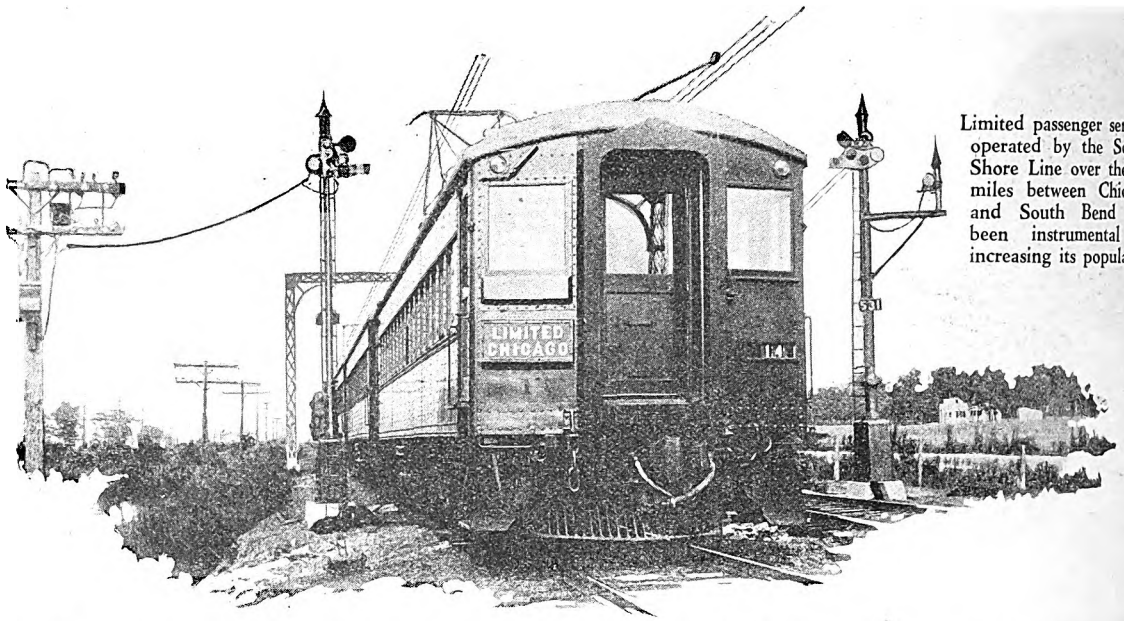

Limited passenger service operated by the South Shore Line over the 90 miles between Chicago and South Bend has been instrumental in increasing its popularity

advertised, has proved popular with the many industries located along its lines. This l.c.l. freight service gives third morning deliveries to cities of the Mid-West and Northwest. Seven receiving stations are maintained in Chicago, the freight being handled on tractor-trailers from the receiving station to the downtown terminal.

The South Shore Line has carried on a progressive program, in co-operation with Chambers of Commerce of the cities along its line, to stimulate industrial activity and passenger traffic. It has investigated and analyzed the nearby natural resources, and constant encouragement given industries has resulted in the location of fifteen new factories along its line, all of which are served by its side tracks. Progressive merchandising methods applied to its passenger service resulted in 250 special train movements being arranged, which carried 15,000 passengers during the year 1928. Monthly and bi-monthly posters artistically depicting the natural beauties along its right-of-way have been used widely.

A definite effort has been made to meet public favor in operating changes. For instance, freight operation in the streets of South Bend has been eliminated by the laying of a private right-of-way; 2 miles of track has been rebuilt in Michigan City; and plans have been made for relocation of East Chicago tracks.

The completion of the installation of automatic color-light block signals over the entire open right-of-way, 12 miles of which was installed in 1928, was largely responsible for a remarkable safety record for such high-speed service. In 1928 there were no fatal passenger accidents in the operation of 3,822,232 car-miles of high speed passenger service.

A high degree of co-ordination has been effected by through ticketing arrangements between the South Shore Line and the Chicago, North Shore and Milwaukee Railroad, and the Monon steam road. Co-ordination of rail and motor coach service, giving patrons the optional privilege of riding on the South Shore Line or on coaches between Michigan City and Chicago, has decreased the duplication of service by these two carriers.

The fact that 90 per cent of employees bought stock in the last stock issue testifies to the friendly feeling between the management and its employees. Company group insurance, a bowling team, a men's chorus and an arrangement with the engineering extension department of Purdue University, by which the management paid one-half of the tuition of all employees who took night school courses, are among the projects sponsored by the company for its employees. A better business campaign resulted in 757 suggestions from employees, which brought in an estimated total of $7,700 in new business last year.

Budgetary control of construction and operation accounts, employment of an engineering accountant to place final distribution of accounts, and many operating economies were responsible for reduction in operating expenses from 37.1 cents per car-mile in 1927 to 34.2 cents per car-mile in 1928. This compares favorably with an operating expense of 36.3 cents per car-mile in 1924 when lighter equipment was used, and much slower operating speeds were in effect.

Before the present management took over the road, it was impossible to secure outside capital. Since the Midland Utilities Company loaned the money necessary for the rehabilitation program and furnished it expert engineering and purchasing facilities, it has been possible to sell 15,000 shares of 6½ per cent cumulative preferred stock and $3,500,000 of cumulative Class B preferred 6½ per cent stock, 415,000 shares of no-par common stock, and first and refunding mortgage 6 per cent bonds.

Detroit Extends and Improves Transportation Service

IN THE face of severe traffic congestion and jitney competition which first robbed the railway of many passengers and then suddenly ceased and dumped all its traffic upon the street cars, the Department of Street Railways, Detroit, reports in its Coffin prize presentation an increase in the number of passengers carried, an improvement in speed, and a remarkable decrease in accident tolls in 1928.

The most interesting achievement of the year was the inauguration and operation of what is claimed to be the fastest urban surface line in the world, the Jefferson Avenue express. During the year this line maintained an average speed of 18.5 m.p.h. over its 4.3 miles of route. Local stops are made in the downtown area, beyond which express stations are at spaced intervals

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of 0.9 mile. In the district served by the express stops, local transfer buses operate giving free transfers to express cars upon payment of the 6-cent fare. This remarkable speed was maintained by the use of good equipment, careful schedule-making, efficient performance by the platform men, and most of all, probably, by gaining control of automatic traffic signal lights on Jefferson Avenue through an arrangement with the Police Department. Signal control equipment similar to that used in Louisville, Ky. and described in this paper on page 835 of the September issue, is used on the Jefferson Avenue signal system. By means of contactors on the trolley wire, the street car automatically throws the light in its favor when it approaches the intersection. When the car passes, another contactor returns the light to its original control which in this case is by a master timer regulating all the other signals on Jefferson Avenue. Because the headway is so short that the street cars could easily keep the green lights continuously lit, one of the relays has an adjustable element which can be set from one second to 30 minutes as the longest period of continuous movement on this street.

The fact that 11,466 additional passengers travel over Jefferson Avenue cars daily attests to the popularity of this line. The traffic director of the Detroit Police Department believes that its express features speeded up traffic on Jefferson Avenue from 40 to 60 per cent.

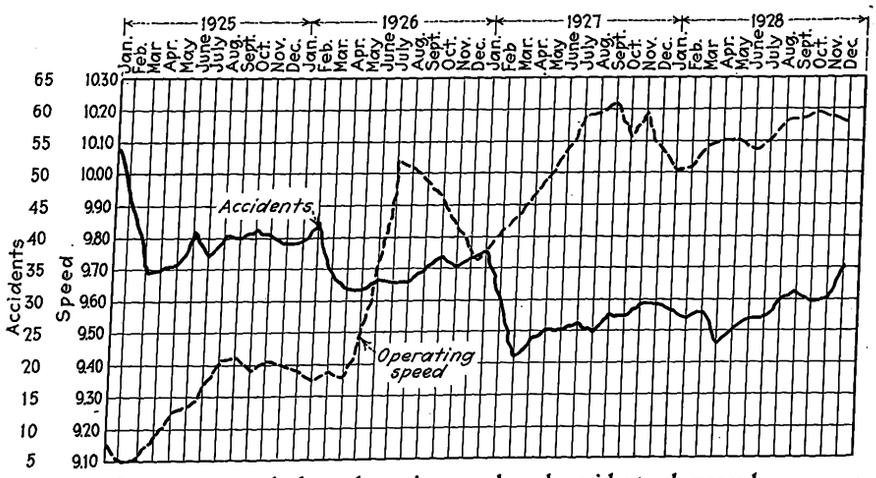
In May of last year the movement of cars and coaches through the downtown area was greatly facilitated at the busiest rush-hour point in the system by an improved loading scheme applied to Capitol Park, the downtown terminus of the Grand River, Fourteenth and Myrtle lines. The plan divorced street cars from vehicular traffic, and provided a safety zone of the steel post type, with ropes strung between the posts permitting three aisles of entrance and egress during the 4 to 6 p.m. period. It is estimated that movement of the 200 cars which pass through the loop during this two-hour period has been accelerated 50 per cent.

Jitney operation, much of which was by "wild-cat" operators, and which had been conducted for six years under the protection of a series of injunctions, was terminated on Oct. 24 when the Michigan Supreme Court upheld the city ordinance banning jitneys. At that time 1,000 jitneys were being operated daily; they constituted genuine and ever-increasing competition. On the morning of Oct. 26 some 40,000 former jitney customers used the street cars. With the coming of November, and the Christmas shopping crowds, the downtown merchants began to wonder if their customers would be transported as well as in the era of jitneys. They called a meeting and asked the department about it. Every bit of available rolling stock was already in service, including 75 new Peter Witt cars purchased in 1928 and 22 cars and trailers rented from Cleveland after the defeat of the jitneys.

But it was feared that the railway system would be swamped with the Christmas rush, so on Nov. 16 the department announced that it had ordered 160 de luxe parlor coaches. Beginning three days later seven new coaches were delivered and placed in service daily until Dec. 24, the climax of the Christmas rush, when the entire fleet of 160 was rolling over Detroit's streets, calling forth much praise, and causing the people to forget entirely the departed jitney.

Along with the safety activities of the railway which reduced the number of accidents 41 per cent in six years to 28.3 per 100,000 car-miles operated, a new method of handling claims was inaugurated. This reduced claims payments to only 2 per cent of the gross passenger revenue during the year 1928.

A new operating center built on Coolidge Highway in the northwest section of the city is expected to result in a $500,000 annual saving in the elimination of waste car-mileage.



Operating speeds have been increased and accidents decreased on the Detroit Street Railway

Safety zone with steel posts and awnings provided for street car passengers in Detroit

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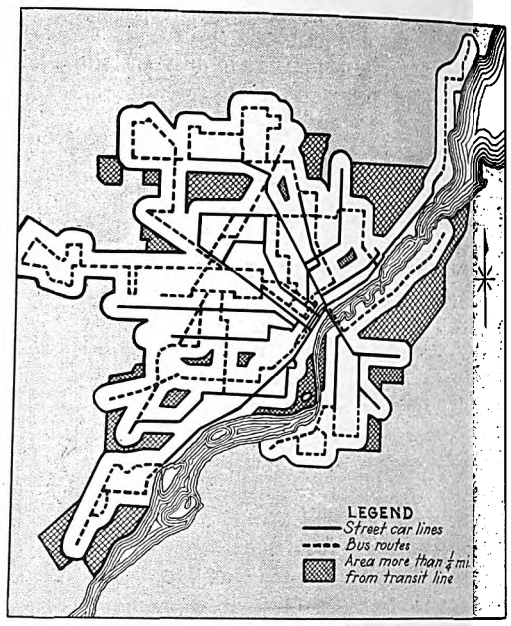
Transportation Service Reorganized in Toledo

EFFECTING a complete change from the public antagonism which in 1919 was responsible for the removal of street cars from Toledo's streets to a spirit of mutual understanding between the city, its citizens and the railway, the Community Traction Company secured a favorable service-at-cost franchise and a steady increase in traffic.

The problem which faced the management of the Community Traction Company and the city officials of Toledo was one of extreme complexity. Constant wrangling had characterized their relations since the original Milner franchise was passed in 1920. Apparently, the franchise had been written with correct principles in mind, but was unsatisfactory because of its vague stipulations. From the railway standpoint, the matter of bus competition was particularly irritating. The city maintained, on its part, that the company was not doing its fair share in a comprehensive street rebuilding program, and had presented to the railway bills for $267,769 representing paving claims dating from Feb. 1, 1921.

Although there had been many earnest efforts made to solve the transportation problem, no results had been obtained. During the first half of 1928 constructive steps were taken in the form of conferences between the city and the company officials. As a result, a new agreement was negotiated, which the City Council approved and the Mayor signed on June 5, 1928.

Substantially a five-year modification of the original Milner ordinance, the new franchise gives the railway almost a monopoly of Toledo transportation service by prohibiting any competition within ¼ mile of a Community Traction Company car or bus line. A disputed power bill amounting to $150,000 was credited to the company, and represented a 1¼ cent per kilowatt-hour reduction. In exchange for these terms, the company agreed: To pay old paving charges to the sum of $185,241 with 6 per cent interest; to pay for a $25,000 traffic survey; to set up a five-year reconstruction program amounting to $560,000; and to make certain concessions in connection with the depreciation fund. The railway agreed to reroute existing lines, to abandon nonessential lines, and to expand its service into new areas.



Revised routings of the Community Traction Company provide convenient car or bus service to every section of the city of Toledo

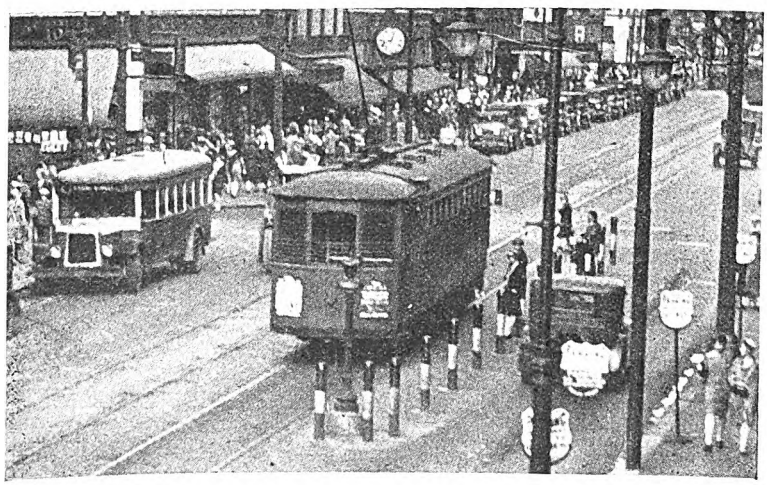
In 1928 there was an increase of 7 per cent in revenue passengers over 1927, and an increase of 7½ per cent in operating revenue. This was accompanied by a substantial expansion of service as indicated by the rail and bus route mileage, which increased from 61.43 miles in 1926 to 124.79 miles in 1929. Systematic co-ordination of car and bus service provides buses to replace weak trolley car lines, to serve as feeders for the street cars and to develop new routes.

Under the terms of the ordinance the independent bus lines were forced to sell out to the railway company. The six lines operating on June 30, 1928, were purchased from the independents on a property valuation basis under the terms of the ordinance. Although a few of the 40 buses bought were serviceable, the company bought a total of 88 new buses during 1928.

By adding two extra 35-hp. motors to the 68 Peter Witt cars already equipped with two motors of that size, the company was able to speed up its service on several lines. An improved scheduling system eliminates needless stops, and varies headways, layover times and speeds during the day to meet traffic demands.

A sharp reduction in operating ratios has resulted from operating economies accompanied by increased revenue. An increase in one-man operation of both cars and buses from 45 per cent to 70 per cent since 1927 was an important factor in the reduction of railway operating expenses from 36.7 cents per mile in 1927 to 34.6 cents in 1928. The railway operating ratio was decreased from 85.3 per cent in 1927 to 79.5 per cent in 1928, while the bus operating ratio was decreased from 105.4 per cent to 93.6 per cent in the same period. Increased efficiency possible in a new modern garage for 150 buses, which was built on an old carhouse site at a cost of $135,000, helped considerably in reducing bus operating expenses.

With improved public relations, the company now pays claims without legal process only when it is clearly at fault, feeling reasonably sure of a fair deal by going into court when not at fault. The total cost of the claims



Bus and street car services have been scientifically co-ordinated in Toledo to render the best service to the greatest possible number of people

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department was reduced from 4.3 per cent of the gross revenue in 1927 to 2.97 per cent in 1928. In spite of the limitations of a service-at-cost agreement on one side and a strong union organization on the other, good relations exist between employees and management.

Although these achievements cover a relatively short period of time, the Community Traction Company believes that there is every indication that success will be permanent. A comprehensive article telling in detail of the accomplishments of the company was published in the July issue of ELECTRIC RAILWAY JOURNAL, page 701.

Scientific Fare Schedule Instituted at Houston

BY MEANS of a scientific fare schedule which automatically varies the rate charged, making it commensurate with the frequency of use and time of demand, the Houston Electric Company, Houston, Texas, another property competing for the Coffin prize, offers each class of patrons the minimum fare to which it is entitled. This fare system offers a steadily decreasing rate as the use of the service increases. The regular rider, using the service several times a day both on and off peak periods, buys a 25-cent weekly ticket which entitles him to ride as often as he wishes on payment of a 5-cent fare. The occasional rider buys four tokens for 30 cents.

A fine example of community co-operation existent in Houston is evidenced by the elimination of jitney competition by popular vote, and by the adoption of the new fare schedule which appreciably increased the gross income of the company at a time when people were generally opposed to an increase of rates in another utility.

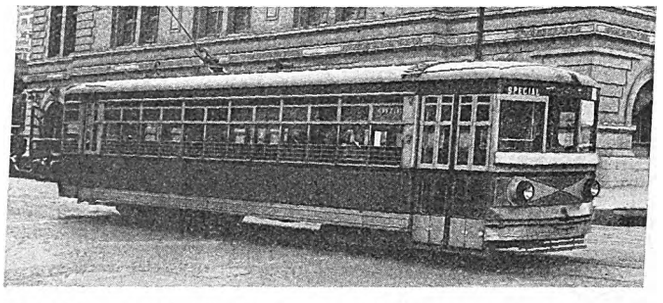
Transportation needs are quickly recognized and analyzed in the communities served by this railway. By scientifically supplementing street railway service with bus service, using the bus to test out the potential traffic of new sections of this rapidly growing city, and eliminating unprofitable car service, the company has increased its operating ratio 9 per cent over that of 1927, or 32 per cent over 1924. Every request for transportation service is carefully studied and the service is furnished if it can be given profitably; where profitable service is impossible a full explanation of the absence of service is given to the citizens interested.

Employees of the Houston Electric Company have been schooled to understand the company's business and to express such knowledge freely to the company's patrons. The company has followed the far-sighted policy of frankly advertising full information on its financial problems through the newspapers and its employees. The results of a carefully planned campaign of employee contacts and newspaper advertising were the ousting of all competing jitneys and the granting of a virtual monopoly of transportation business to the railway by the winning of a popular election on the question.

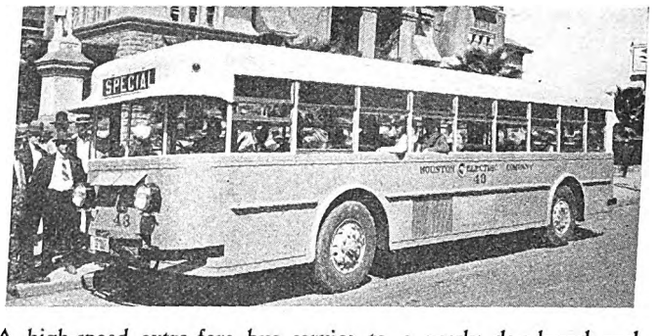
The claim presented by this company in its brief includes an increase of 1 per cent in 1928, or 14 per cent over 1924, in the total number of passengers carried. In 1928 the operating revenue increased 9 per cent over that of 1927, or 32 per cent over 1924; while the total investment is steadily increasing, the investment per dollar of gross revenue is constantly decreasing. The net revenue shows a steady increase with the operating ratio decreasing from 68.3 per cent in 1924, to 64.2 per cent in 1927, and 61.6 per cent in 1928.

In addition to placing twenty new one-man, single end, treadle exit cars in service last year, the company has accomplished a complete modernization of its old railway cars. The modernization program included conversion of old cars for one-man operation, the installation of treadle exit doors, and the use of original and attractive car colors.

A high-speed extra-fare bus service to a newly developed and distant suburb of Houston is popular among the passengers. Their willingness to pay the extra fare evidences the popular understanding of the street railway problem. Off-peak slumps have been partially alleviated by increased special business which was developed by a consistent and regular advertising program, using 30 in. of display space once a week in each of the three daily Houston papers; and also billboards, motion pictures, programs, year books and pamphlets.



The Houston Electric Company placed twenty new one-man, single-end, treadle exit cars in service last year, in addition to modernizing all its old equipment



A high-speed extra-fare bus service to a newly developed and distant suburb of Houston has proved popular

An extensive safety program which was organized in 1927 resulted in a safety record for 1928 which was the best in twelve years, the number of accidents being reduced 27 per cent from those of 1927. The number of accidents per 10,000 miles was reduced 29 per cent in the same period, with the accident cost per mile reduced 6 per cent. As a supplement to classroom study of accidents and accident prevention, a safety contest awarding a gold star to operators with a clear accident record for one year, and $5 bonuses to operators with 60-day accident records clear, has been effective in stimulating operators to their best efforts in accident prevention.

Particular attention has been given street traffic conditions. Complete co-operation of the Police Department has been secured in handling traffic, and allowing street inspectors to act as traffic police has facilitated street car movement. A scientific study of traffic has been instrumental in perfecting schedules and increasing speed.

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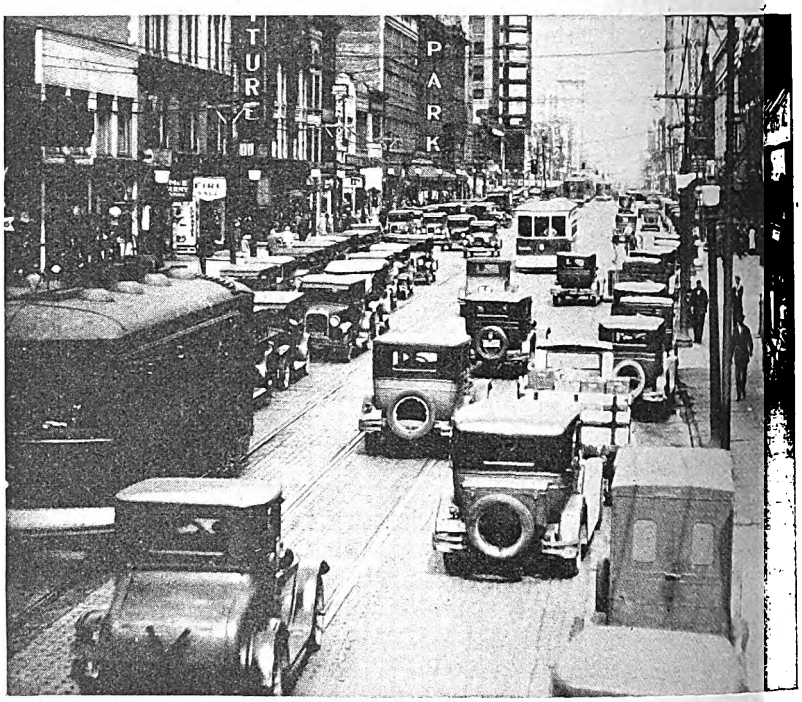
New Franchise an Outstanding Achievement at Youngstown

EMBODYING principles long recognized as sound, but which are often neglected in the preparing of city-railway agreements, the franchise consummated between the city of Youngstown, Ohio, and the Youngstown Municipal Railway marked a great stride in the history of franchises. The new arrangement provides a flexible rate of fare, relief from many tax burdens, protection from all new competition, and genuine co-operation between the city and the company.

While the franchise was actually passed in January of this year the work of preparing it was done in 1928 and the public understanding which made possible the passage of a measure so favorable to the railway had been built up in years preceding. The company has worked on the assumption that if good public relations are to continue, it must take advantage of all the developments in the art. The franchise was drawn up entirely without haggling.

It was recognized from the start that close co-operation was needed between the city, the company, and the public when the City Council appointed in May, 1928, a committee of Youngstown citizens who were leaders in their fields of business, finance and manufacturing to draw up a franchise. This committee met conscientiously during 1928, at each meeting thrashing out the questions with tireless efforts; every meeting was attended by the president and general manager of the Youngstown Municipal Railway. The co-operative franchise as drafted was finally submitted to the City Council of Youngstown which heard it read during three successive meetings, passing it on May 22. It was signed by the Mayor three days later.



Local transportation service in Youngstown has been put on a sound basis by the enactment of a new franchise

The provision in the franchise that all the expenses of the street railway commissioner's office be borne by the city is an interesting indication of Youngstown's acceptance of the principle that the transportation of a city's citizens is a civic problem. Another provision which constitutes an advance in the relationship between a municipality and a railway is that which permits the company to lay tracks over any bridges and viaducts of the city by paying only the expense occasioned by the tracks. Another relieves the company of its contracts in the franchise should the City Council allow any new competition to appear in Youngstown.

Recognition of the dual fields of the street car and the bus and of the value of properly co-ordinating the two carriers, is responsible for the complete service given all parts of the city. Bus lines have been extended from time to time in order that every part of the city might be served by mass transportation facilities. This property has also been progressive in the matter of modernization, ruthlessly scrapping old equipment and maintaining the highest standards of cleanliness and paint. The average age of the company's cars is ten years. There is not a single obsolete car on the property.

A number of experimental bus lines have been operated in Youngstown. The fact that the experimental line was to be operated was thoroughly advertised to the people of the locality interested. When it was found necessary to give up such service because of failure to produce proper revenue, a complete explanation was given the people.

A complete safety program, developed consistently since 1919, resulted in the company's being awarded the Anthony N. Brady gold medal in 1927 for the best accomplishment in accident prevention. The safety program which was responsible for a 22 per cent accident reduction in 1927 and an even greater record in 1928 included: central, intermediate, and group safety committees, representing all departments; a general safety supervisor, who gives all his time to the promotion of safety work; a department of instruction which makes sure that all employees are instructed in safe practices; safety contests whose details are changed occasionally to preserve interest in the results; and a bonus system which has aroused the co-operation of all employees. Bonus awards were made to 96 per cent of car and bus operators in 1928.

By pursuing a policy of holding down as low as possible the number of extra men, while at the same time giving them enough work to make a living, and by efficient scheduling and assignment of runs, the company has been able to increase its number of miles run per operator from 16,255 in 1924 to 21,475 in 1928. Similar economies have been made in its mechanical departments and in the number of platform men with the result that the total amount paid employees decreased 20 per cent from 1924 to 1928, while the gross revenue per employee increased 33.7 per cent. The payroll was reduced not by cutting wages, but often in spite of increasing them. Operators' wages, for instance, were increased 12½ per cent in the five-year period.

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El Paso Railway Active in Popularizing Service

INCREASED net revenues on railway and bus lines and a substantial increase in traffic are reported by the El Paso Electric Company, El Paso, Texas, in its presentations for the Coffin prize. This was possible largely because of the high degree of co-operation which existed between the management and its employees. Every effort was made to individualize the work of the employees and to stimulate them to their best work. A detachable metal plate with the operator's name on it was placed on the fare box of each operator, increasing public good will and assisting him in transportation salesmanship. Employees aided in popularizing the service, acting as speakers before civic bodies.

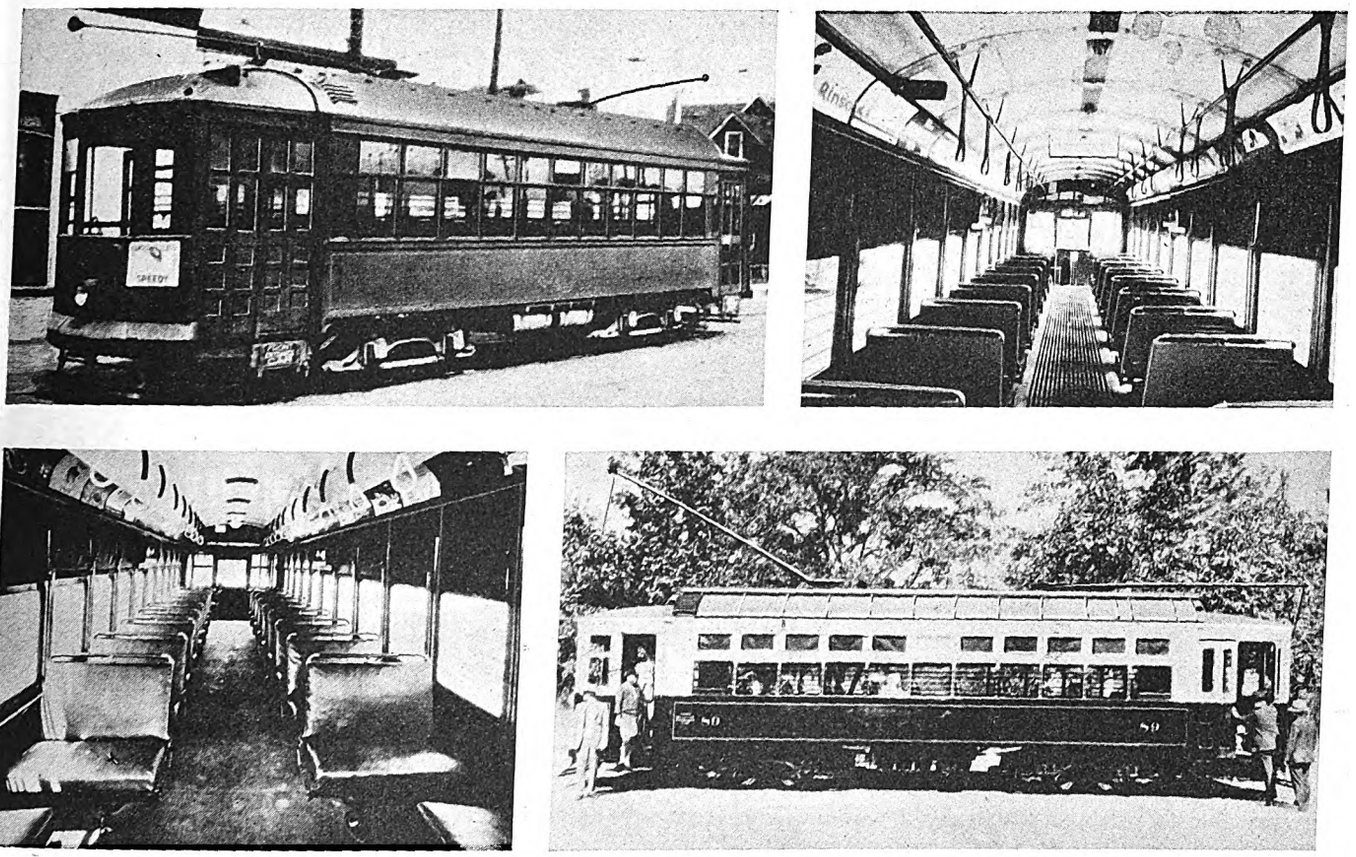
The 2 per cent increase in railway revenue passengers last year over 1927 and the 1½ per cent increase in operating revenue were due also to an organized advertising campaign carried on in dashboard posters, inside car-cards, hotel publications, Chamber of Commerce pamphlets, distinctive newspaper layouts, and in "Personal Transportation." The latter is a booklet with street maps, street car and bus routings, and information on local points of interest, which proved to be a good advertising medium.

A 75 per cent reduction in the number of street car accidents within eight years in the face of a 41 per cent population increase and a 73 per cent increase in the number of El Paso automobiles is the accident reduction record of the El Paso Electric Company. The number of accidents per 100,000 passengers was reduced from 3.16 in 1924 to 2.42 in 1927 and 2.35 in 1928. Safety slogans, safety contests, "zero day" contests, honor rolls and a gold star system have enabled the company to better its accident record during 1928 after winning the Anthony N. Brady safety medal in 1926. A monthly honor roll lists the operators who have gone without an accident for the past month; three months on it gives a man a day off with pay, and each consecutive month he remains on he gets a day off in the same way.

Serving many Mexican people who do not read or speak English, the company has met the complications of this international aspect of the transportation problem by displaying some signs in the Mexican language and befriending the people from the other side of the border in every possible way.

A modernization program included the complete remodeling of twelve cars of older type, installing rear exit treadle-operated doors, changing the fare box arrangement, improving the lighting equipment, upholstering the seats, and attractively painting all cars. Improvement of service was accompanied by a 7 per cent reduction of car-miles operated, principally by speeding up schedules.

The loyalty and efficiency of the company's employees were not secured by a mere wave of the hand. An extensive program for improving company employee relations includes welfare work, a loan fund which is available to employees, club rooms, meetings, home study encouragement and an Employees' Benefit Association providing medical service and insurance, an annual picnic, safety and sports contests, dances, safety banquets and various other events sponsored by the company. The management encourages home-study by refunding the cost of all correspondence courses completed.



The modernization program of the El Paso Electric Company included re-upholstering of seats, installation of treadle exit doors, and attractive painting as may be seen by comparing the upper two views with the lower two

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Notable Financing Achieved at Fort Worth

BY PROPERLY advertising in advance its sale of three-year 6 per cent secured gold notes, the Northern Texas Traction Company, Fort Worth, another of the competitors in the Charles A. Coffin contest this year, distributed more than $1,000,000 of the issue to local people within six days. The success in selling these notes was largely due to public confidence which had been built up by the company in the preceding several years. The annual saving in reduced interest charges on this issue is a great advantage, although the railway management feels that the largest benefit will be the increased good will fostered through customer ownership of securities.

This property has been progressive in the rehabilitation of bus lines. By developing and employing efficient methods of rebuilding bus bodies, engines and chassis, it was able to produce practically a new machine from an old run-down bus at a total average cost of $2,130. Bus equipment which it thought was obsolete was discarded and eleven new buses purchased to replace it; the new equipment was introduced with a parade which attracted much favorable public interest. Hand in hand with improving the service on the Fort Worth-Dallas bus line, was an increased fare which riders accepted without protest.

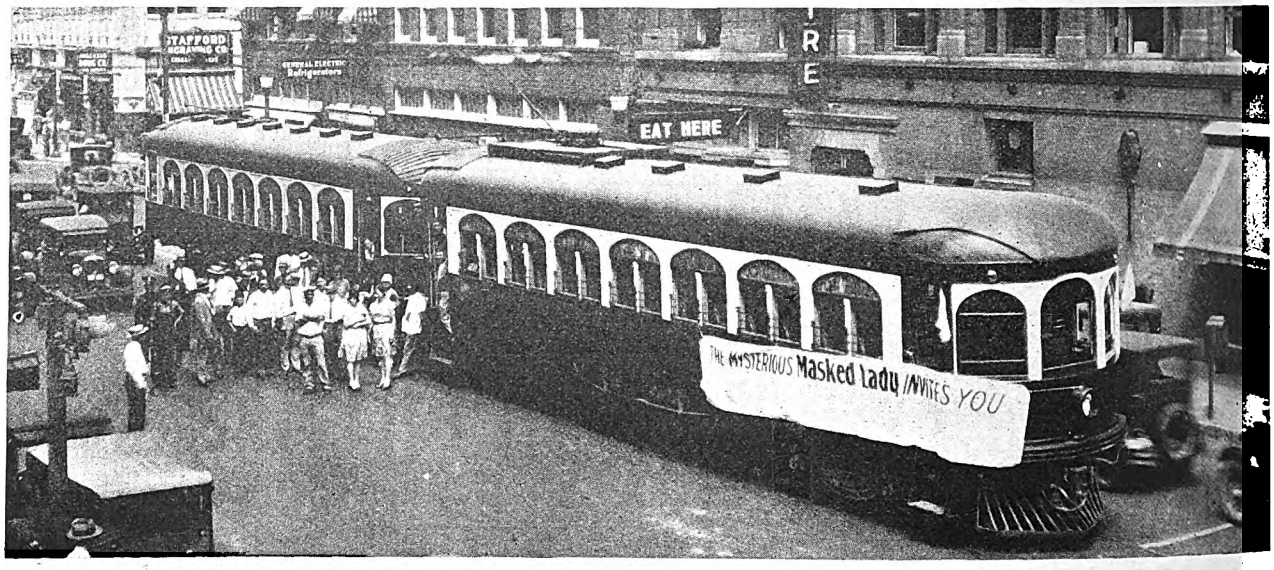
Reorganizing the safety campaign of the Northern Texas Traction Company by dividing the trainmen into teams, giving a bi-monthly dinner and entertainment for the one with the best safety record, and awarding distinguished service insignia to trainmen with a clear record, resulted in a reduction of 6.9 per cent in the total number of accidents from the figure of 1927, and a decrease in the cost of claims settlements in spite of increased traffic density in Fort Worth.

When the company decided to sell the notes locally, the first problem was to perfect an organization. It was decided that since good understanding and friendly relations existed between the company and its employees, the latter could be asked to assist in the note sale. The slogan of "Every Employee a Salesman," was adopted and general meetings of employees were held in which the purpose of the note issue and the procedure to be followed were explained. Each employee was given the necessary forms to sign up the prospect.

In talking to the different passengers boarding their cars, the trainmen attempted to interest them in the note sale, and after working-hours made calls on those who had indicated an interest. When a person was interested, but not ready to sign, his name was turned over to the inspectors of the division, who personally called on the prospect or turned in the name at the general office.

A group of employee solicitors consisting of one or more members of each department signed the employees who wished to buy notes. Due to the partial payment plan, a large majority of them purchased notes. A total of $127,900 of the entire issue sold and exchanged was absorbed by employees, demonstrating the friendly feeling of the employees for the company.

Of the $1,000,000 worth of notes distributed locally, $500,000 worth was reserved to exchange for the 7 per cent notes due March 1, 1928. The sale of the first $500,000 in notes started on Jan. 26. Beginning on Jan. 22, dash signs were carried on all street cars, and on Jan. 24, the first advertisement appeared in the papers. On Jan. 24, circulars giving the particulars of the issue were mailed to more than 40,000 persons in the surrounding territory. Telephone calls and letters reserving the right to purchase notes were received daily after the first publicity appearance. The demand for the notes was so great that in only four days the amount was oversubscribed, and a new record for the sale of securities among Stone & Webster companies was established.



Part of an advertising campaign of the Northern Texas Traction Company which was effective in attracting public attention

The rapid sale of this note issue may be interpreted as a recognition by the people of the need of a first class street railway and of the stability of the industry; also the position of the company has been strengthened with the local banks, and new money may be borrowed as the need arises.

The Northern Texas Traction Company has advertised consistently throughout the past several years. Most of the advertisements were planned with the idea of actually selling rides, rather than merely building "good will." It was also found that personal solicitation in selling its nickel pass established a contact with the people of the city which was valuable in dispensing information, and in getting suggestions.

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New Equipment and Maintenance

Keynote of Engineers' Activities

F. H. Miller

LATEST developments in railway equipment, track construction and maintenance, both from an operating standpoint and from an economic point of view were given in the papers read and in the discussion that followed in the meetings of the Engineering Association. On Tuesday and Wednesday afternoons separate meetings were held by the Power, Way and Structure, Rolling Stock and Shops, and Purchases and Stores Divisions. On Tuesday morning and Thursday afternoon general meetings of the Engineering Association were held.

Officers of the Engineering Association for the ensuing year were elected at the Thursday afternoon session. They are:

President, W. W. Wysor, chief engineer United Railways & Electric Company of Baltimore.

First vice-president, L. D. Bale, superintendent of power Cleveland Railway.

Second vice-president, Charles H. Jones, general manager Chicago South Shore & South Bend Railroad, Michigan City, Ind.

Third vice-president, P. V. C. See, superintendent of equipment, department of railways, Northern Ohio Power & Light Company, Akron, Ohio.

Members at large are F. McVittie, electrical engineer New York State Railways, Rochester, N. Y.; E. M. T. Ryder, way engineer Third Avenue Railway, New York City; Howard H. George, superintendent of way Cleveland Railway; A. T. Clark, superintendent of rolling stock and shops United Railway & Electric Company of Baltimore.

The general meeting of the Engineering Association held on Tuesday morning opened with an address of President Frank H. Miller, in which the necessity of adequate maintenance was stressed. Due to the inability of Mr. Miller to present his paper personally, it was read by W. W. Wysor, vice-president. It was pointed out that the problem of the engineer is to give the operator of an electric railway that type of equipment, track and power which will permit the public to be served most economically with the highest speed consistent with safety and comfort. The problems confronting the engineer in car and bus design are weight reduction, noise elimination, improved lighting and appearance, comfort in boarding and leaving, and more rapid acceleration and braking, he held. The motor bus industry is becoming larger every year, and has brought about progress in design and operation, maintenance and housing, which are entirely different from the standard electric railway practices.

A. T. Clark, chairman of the judges of the maintenance contest conducted by ELECTRIC RAILWAY JOURNAL, awarded the prizes to the Cleveland Railway and the San Diego Electric Railway. A report of this award was published in ELECTRIC RAILWAY JOURNAL for August. After the presentation of the awards, H. H. Adams, superintendent of rolling stock and shops Chicago Surface Lines, read his paper "Car Design and Equipment Development," an abstract of which appears elsewhere in this issue.

Results obtained with conical and cylindrical wheel treads were given in a motion picture, which showed clearly the contacts made by the two types of wheel treads with the rails. The photographs recorded tests over new as well as old track.

At the Thursday general session a report was presented by E. P. Goucher on the work of the committee on co-operation with the U. S. Department of Commerce. It was approved without discussion.

Edwin W. Ely, chief of the division of simplified practice, Bureau of Standards, read a paper on "Synchronism." The electric railway industry is comparable in magnitude to some of the other manufacturing industries in the United States, he said. The electric railways are engaged in manufacturing—producing transportation in terms of either ton-miles or revenue car-miles. In 1928 alone the industry produced 2,190,000 revenue car-miles, representing an increase of 65,000,000 per year since 1922 despite a deletion of 3,000 miles of single track. Such a manufacturing schedule as that depends for its success on a well-balanced program of construction and reconstruction; additions to and amplification of power plants, substations and line equipment; purchase of new cars and car equipment and reconditioning of the old, and studied co-ordination of bus and car operation. The exact moment for undertaking each of these steps involves not only co-operation of people but synchronization of operations. That the planning in 1928 was sound is borne out by these facts: wages reached their highest point; receiverships dropped to a minimum, and the trend of credit pressed upward. Not only the association executives but people on the outside look optimistically into the future.

Since 1921, the division of simplified practice has assisted in synchronizing the efforts of these main elements of industry in the matter of eliminating waste, stated Mr. Ely. There are today in effect 105 simplified practice recommendations which, through surveys conducted by the various groups, contain the best thought

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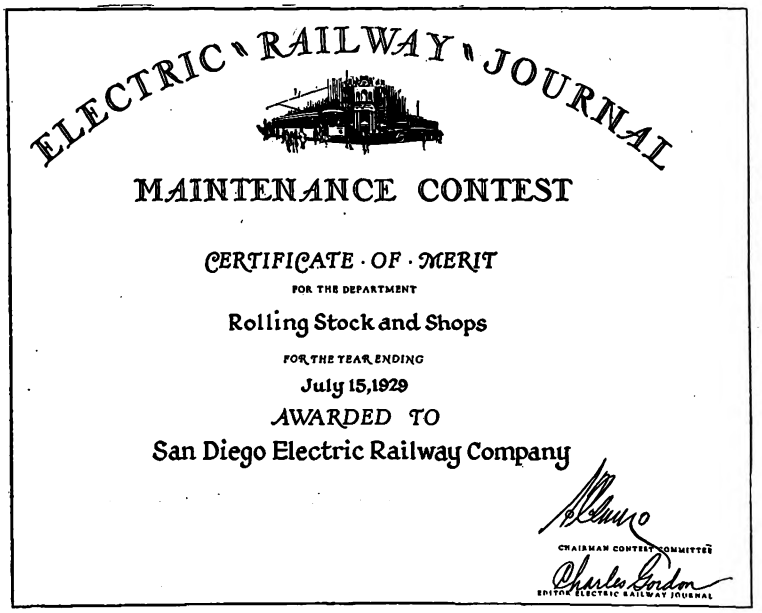
and practice. The list includes, for example, a 35 per cent elimination of plow bolt sizes and an 85 per cent reduction in the varieties of sheet steel.

Periodic re-surveys and audits keep these simplified lines abreast of changing conditions. Fifteen commodities, recently measured, showed that an average of 89.8 per cent of the volume had been produced in accordance with suggested practice.

Charles Gordon, the newly appointed managing director, assured those present that the engineering problems of the electric railway would still have his full attention. Mr. Gordon pointed out that G. C. Hecker, heretofore special engineer of the association, would be, temporarily at least, succeeded by A. W. Baker, who for several years has been Mr. Hecker's assistant and is familiar with the work of the engineering committees.

Mr. Hecker emphasized the fact that in his new capacity of general secretary he also is secretary-treasurer of the Engineering Association and thus will be in contact with it continually.

A. E. Harvey, engineer of way and structures of the Kansas City Public Service Company, presented a paper on "Some Comments Concerning Standards and Recommended Practices for Track Paving."



Certificate of merit presented to San Diego Electric Railway Company

In the discussion of Mr. Harvey's paper the question of whether the municipality should stand the expenses of track paving or whether these costs should be borne by the railway operator caused much comment. Those present were in favor of having the municipality install the track pavement after the track had been laid, which had been done in only a few instances, one case being in Atlantic City. E. M. T. Ryder thought that the conditions presented in the paper were about the same in every city, with only minor variations. Mr. Harvey stated that in Kansas City 75 miles of concrete pavement is installed and also a great deal of granite and asphalt, the latter being more expensive than concrete not only in first cost but also in maintenance. Brick pavement was said to give good results but is not superior to concrete.

The report of the committee on resolutions was approved, together with the report of the committee on nominations. Selection and installation of the new officers followed.

R. H. Dalgleish received the past-president's badge for Mr. Miller, and in behalf of Mr. Miller thanked the Engineering Association for the co-operation given him during the time he was president.

Rolling Stock

A. T. Clark, chairman, presided at the meetings of the Rolling Stock Division. He presented the report of the standing committee, which was approved. Special committee reports were presented by the chairman or vice-chairman, as follows: Manual review, W. C. Bolt; motor coaches, P. V. C. See; roller bearings, W. C. Bolt; limits of wear, W. T. Vivian; lubrication, J. H. Lucas; automatic coupler specifications, P. V. C. See; fire hazards in shop practices, E. J. Jonas; welding wheel flanges, W. C. Bolt; current-collecting devices, Hugh Savage. Progress reports only were presented by the committees on roller bearings, limits of wear, and fire hazards in shop practices. The completed reports were approved by the meeting. The one on current-collecting devices created considerable discussion. It was suggested that a standard length trolley pole be adopted, but it was held that this is not practicable.

The report of the committee on heavy electric traction was presented by H. F. Brown. This report was approved at the meeting.

The second session opened with a paper by W. A. Keller, on "Seeking Ideal Car Performance." The actual meaning of performance was interpreted to intend "production of results." Explaining the meaning of "ideal car," he stated that several of the qualities found in the present-day automobile should be found in the design of a modern street car. Much stress was laid on the appearance of the car body so as to give satisfaction from the standpoints of comfort, convenience, appearance and economy. Paramount importance was accorded the reduction of noise, as this was considered vital if the automobile-minded public was to be retained as car riders.

P. V. C. See started the discussion with a comparison of automotive acceleration and retardation with those of electric railway operation. He felt that if faster acceleration is obtained, higher braking rates are of vital importance to make operation safe. In discussing the weight of cars in relation to energy consumption, attention was called to the fact that with lighter cars, energy consumption may be decreased even though the speed is increased.

H. S. Williams, Detroit Street Railways, read the report on car design, which was approved without discussion. Mr. Adams then read in abstract a supplementary report just received from the Bureau of Standards in Washington. A lengthy discussion took place on the desirable speed in city operation.

The report of the committee on noise reduction was abstracted by H. S. Williams and received great attention. In the discussion which followed it was found that satisfactory results are being obtained in silencing wheel noise by welding a soft iron ring under the side of tread. Extensive tests were made by the committee with a number of silent brakeshoes placed at their disposal. It was found that the use of such a brakeshoe eliminated practically all of the sound caused by the

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B. J. Yungbluth

Edwin W. Ely

W. W. Wysor

Speakers Who Helped to Enliven the Engineering Meetings

clattering of the shoe against the wheel. Various other means of sound deadening were discussed, and it developed that the resilient wheel showed the best characteristics, followed closely by a wheel to which a lead ring was added.

Way And Structures

Chairman E. M. T. Ryder of the way and structures division introduced W. W. Wysor, who commented on the improved condition of the industry, and stressed the duty of the engineer to assist in this improvement. High-class construction and the use of labor-saving equipment are needed to obtain efficiency, both as to cost and quality.

The report on special trackwork was presented by E. M. T. Ryder, who commented on the new standard switch, and the interest manifested therein, which extended as far as France. Various users of the new standard switch stated that it had proved very satisfactory.

The report on wood preservation was presented by C. A. Smith. He recommends that, so far as the subject relates to car construction, it be handled by a special committee to include members from the Rolling Stock Division.

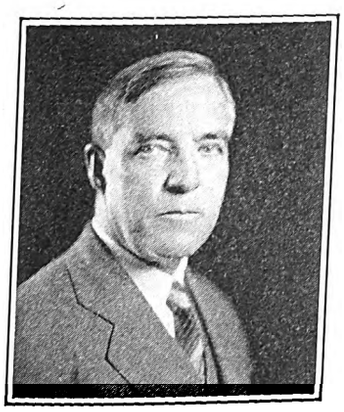
The report on pavement was presented by A. E. Harvey, chairman, who on account of difficulty in getting co-ordinated results from various railways suggests that the subject be treated in the future by considering principles of design rather than actual contours and plans, to include also specifications for material and workmanship.

Mr. Ryder reported on the activities of the committee on welded rail joints, which has confined itself at the present time to tests made on small specimens rather than on full-sized joints. This work is being carried on with the co-operation of the Bureau of Standards.

The second meeting was held on Wednesday, Chairman E. M. T. Ryder presiding. H. H. George presented the report on alloy steels other than manganese for special trackwork, in the absence of A. T. Spencer. N. Salsich explained a new compression drop test machine mentioned in this report. Motor bus garage design was the subject of the report presented by M. W. Rew. W. W. Wysor, chairman of the committee on rail corrugation, introduced Prof. D. D. Ewing who presented a report on track construction. This report brought forth considerable discussion, particularly in reply to an inquiry by C. A. Smith as to the comparative effects of corrugation on rigid and non-rigid track construction. The report on light section rail was presented by R. E. Miller in place of C. A. Alden. C. H. Clark made an oral report showing the difficulties of designing a track gage applicable to all rail sections, which was discussed extensively. H. F. Merker, chairman, reported on foundation and supporting structures for steam railroad crossings. C. F. Gailor, chairman, presented the report on arc welding.

Power

The first session of the Power Division was opened by chairman W. E. Bryan. J. W. Allen presented the recommended Manual changes and Dwight L. Smith abstracted the report of his committee on specifications for overhead material, but aside from a statement by J. F. Neild as to the great value of the latter, there was no discussion or comment.



J. R. Blackhall

S. B. Cooper

J. F. Neild

Men Who Contributed Stimulating Thoughts Before the Various Engineering Divisions

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Mr. Neild, presenting the report on braking devices for trolley wire reels, emphasized that it was of less importance what other method was used so long as friction was not applied to the wire itself, and C. R. Harte pointed out the importance of the recommended practice and similar moves that substitute mechanical means for hand labor and overhead work.

On conduit specifications W. S. Quinn, chairman, started a discussion about ventilation. W. E. Bryan felt that the small size of the manholes was apparent only so long as they were used solely for railway service. S. B. Cooper, responding to a question in his paper, "Power Requirements of City Cars as Affected by Gear Ratio," said no general rule could be laid down for balancing of speed against resultant power costs because of the large number of variable conditions involved and the fact that a real value of any increase in speed is so difficult of specific determination.

The session was closed by Mr. Neild's paper, "Comparisons of Operating and Maintenance Results." The close relation of a specific case used in the report on trolley wire wear led to the recommendation by Chairman Bryan that the two subjects be discussed together.

The reports considered at the second session of the Power Division developed important and extended discussion. Power rectifiers, it was generally agreed, have proved satisfactory within a limited field, opinion varying, however, as to the extent of that field. A. W. Baumgarten, Harley Swift, L. D. Bale and L. J. Turley cited experiences.

Trolley wire wear, presented by J. F. Neild in the absence of Chairman H. S. Murphy, led to comment by L. R. Wagner that the cost of preventive measures must be weighed against their worth from operating and public policy standpoints, as well as simply maintenance matters, while W. T. Trautman stated that the regular live force could effect the necessary protection at little additional cost by consistent inspection and smaller repairs.

The subject of greatest interest was the report on proper trolley voltage for congested city districts. Dwight L. Smith questioned whether the disadvantages of 400-volt operation did not outweigh the economies to be anticipated. This question was argued pro and con by a large number.

Purchases and Stores

With A. A. Ordway in the chair and a representative group in attendance the meetings of the Purchases and Stores group got under way Tuesday afternoon. The paper of R. C. Cram, "Engineering Aspects of Purchasing," abstracted elsewhere in this issue, was generally commended. The speaker expressed the opinion that there should at all times be the fullest co-operation between the engineering and purchasing departments in the interest both of efficiency and economy.

The mechanics of the stores department, particularly as regards the receipt and storage of materials, was thoroughly covered by W. S. Stackpole, general storekeeper Public Service Co-ordinated Transport, Newark, N. J., the subject of his paper being "The Importance of a Good Stores Receiving System."

President-Elect W. W. Wysor spoke of the importance of a definite understanding which should obtain between purchasing agent and engineer. "In order to function properly," he stated, "the purchasing agent must have definite information, and he should receive that information from the engineer."

At the luncheon meeting a paper by B. J. Yungbluth, president International Railway Company, Buffalo, N. Y., was read by W. R. Young. Mr. Yungbluth, who for many years was connected with the stores and purchasing departments of several electric railways, pointed out the importance of the purchasing agent in any organization, and expressed his opinion that the man holding that position should familiarize himself with the details of practically every department in the company in so far as their ordinary requirements are concerned.

At the meeting on Oct 2 the principal address was by Edwin W. Ely, chief of the simplified practice division, U. S. Department of Commerce, who spoke on "The Advantages of the Simplified Practice Movement." The speaker stressed the willingness of his department to co-operate and assist in the advancement of the simplification and standardization movement. Standards, he explained, should be the servants of industry.

Engineering Aspects of Purchasing

By Roy C. Cram

Assistant Engineer Third Avenue Railway System, New York, N. Y.

In an address delivered before the Purchases and Stores division the point was made that nowhere is co-operation of more importance than between the engineering and purchasing departments.

R. C. Cram

NO ENTERPRISE of magnitude was ever long successful without co-operation. The engineer and the purchasing agent must recognize this fact and work together willingly and pleasantly.

The engineer can co-operate with the purchase and stores department in many ways that will greatly aid in keeping his own departmental costs somewhere near what his estimates and budgets call for. He should constantly endeavor to keep his specifications up to date, and his drawings for parts must be correct in showing those changes and revisions that use has made necessary.

When some device or material new to the property is being considered, a talk with the purchasing agent or the storekeeper will aid. They must be advised where to make price inquiries, and the question of where material is to be stored must be settled. It is better to do this before purchase than to handle the article several times.

Perhaps the greatest co-operation can be given in connection with obsolete material. The engineer does not worry much about such stock, perhaps because it is carried in the Material and Stores Account until used. Meanwhile it is eating its head off in overhead expense,

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and if it should be used the engineer wonders why it costs so much. The engineer should see to it that obsolete material is used up or scrapped. It occupies space better used for storing active materials.

The co-operation should extend to the constant endeavor to utilize association standards to the fullest possible extent, while the various simplified practices promulgated by the U. S. Department of Commerce should be jointly studied and applied to the property. Where these things have been done, some remarkable economies have resulted.

Undoubtedly the engineer may help the stores department. He can aid in questions of design of buildings, selection of yards, interior arrangements and design of economical means for receiving, handling and storing.

The financial officer must have certain information if he is to provide for fluctuation in expenditures due to seasonal conditions. The more liquid he can keep his assets, the more readily can he provide against the emergency demands for purchase funds. Hence the engineer, by endeavoring to keep his stock requirement at reasonable amounts and by means of his construction and maintenance budgets, is in a position to advise along these lines. If there is no co-operation between him and the purchase department, very likely either too much money may be tied up in materials, supplies and emergency stocks or extraordinary costs may result due to unseasonal or inopportune timing of rush purchases.

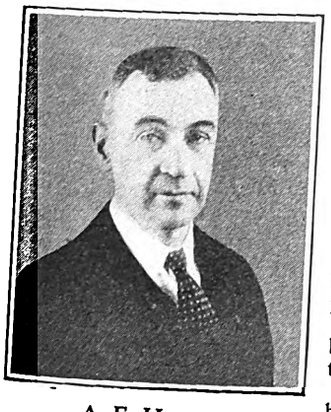
Sealing Track in Paving

Is Vitally Important

By A. E. HARVEY

Engineer of Way and Structures
Kansas City Public Service Company

That foundation is all important in track construction is the view presented in this paper, read before the general meeting of the Engineering Association.



A. E. Harvey

IN DESIGNING a pavement suitable for use on car tracks a few basic principles and requirements should be adhered to:

1. The track structure must be sound and so tamped that there is no appreciable movement under the load.
2. The paving foundation must be of sufficient strength to support vehicular traffic.
3. Paving foundation should be sealed around base of rail so that it is watertight.
4. The wearing surface should be of material suitable for the prevailing traffic and of proper sealing quality.
5. The paving should be sealed to the rail and watertight.
6. The contour of the surface should lie in a plane through the top of the rail as nearly as may be practicable.
7. All parts of the track and paving should be assembled and placed so there may be no appreciable movement of the various parts.

The foundation of any pavement must be sufficient to carry the loads imposed on it and there are ample statistics and information in regard to this so far as pavements themselves are concerned. Our problem is to build this pavement in connection with the track structure so as to insure its stability. This, to a certain extent, depends on the track structure and its foundation, as the paving base is either superimposed upon the track structure or built in connection therewith. As to the material for this base, there can be scarcely any question, as concrete is used almost universally. The specifications as to aggregates and mixing are fully covered by standard specifications.

In the placing of the concrete base in and around the track structure, however, assuming that the base is of sufficient thickness to carry the loads, we must take into consideration what effect, if any, the presence of the ties and rails in the base may have upon its strength and make special provision to reinforce it by additional depth of material or in changing some detail of the design.

Laying down rigid specifications and design as to the kind of paving surface that should be used in car tracks or defining the details of its construction is impracticable, as there are innumerable conditions as to service required, types of track construction, rail sections, climatic conditions and questions of finance, cost and local policy that must be considered by the individual company, but specifications should be available covering the quality and manufacture of each kind of paving material that may be considered, with information as to the comparative wearing qualities of each class under various conditions.

In the installation of these various kinds of pavement, secondary only to wearing quality is the matter of the proper sealing of the pavement. In the case of granite or brick there is a question as to the proper filling of joints. This is accomplished either by the use of cement grout or asphalt tar or other plastic material. As to the merits of each, there is a wide divergence of opinion, and any specification or recommended practice must be broad enough to include both methods.

Most excellent results have been obtained along this line in many cities where ballasted track is used with rail 7 in. and 9 in. in depth and where a deep foundation of concrete has been used that comes well above the base of the rail. This last point is exceedingly important. A base course that must stop at the base of the rail will not give the results in the way of protecting the structure against water, or in binding the various parts of the structure together, that is secured by bringing the concrete base well above the lower flange of the rail.

In order to secure the most satisfactory results in car track pavement it must be kept in mind that the life and efficiency of such pavement are dependent upon its being placed on a sound track structure and assembling that structure in such a way as to conform to the principles which have been mentioned; that the pavement and foundation must be sealed and watertight around the rail and that there may be no appreciable movement of one part in relation to the other. It is recognized that design and material have an important bearing on the quality of the work, but the most important matter to be considered is the character of the workmanship. With the most complete design and specifications and use of the best materials, indifferent results will be obtained unless these are assembled carefully under rigid specifications as to detail of workmanship.

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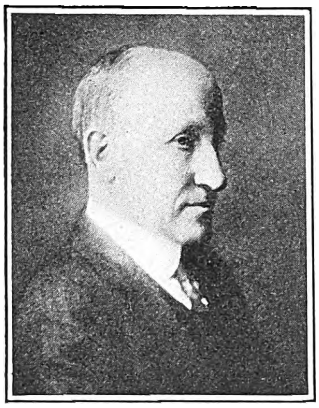
Competition and Rate Making

By PHILIP CABOT
Professor of Public Utility Management Harvard University, Boston, Mass.

That electric railways must abandon the accepted practice of determining price from cost, and reverse the order, is the view presented in a paper read before the Transportation & Traffic Association.



Philip Cabot

PRICE determines cost in practically all the competitive trades and even in those trades which are not literally competitive. Although the electric railway industry is regarded as a monopoly, no man familiar with its history can doubt that it is one of the most competitive and therefore the conditions which determine price in competitive markets must determine your prices also. The condition in which many of the companies now find themselves is due to their failure to recognize this fact.

Though your business is strictly competitive you continue to act as if it were a monopoly, using costs to determine and to justify your prices and allowing the regulating commissions to use them in determining whether your prices are just and reasonable. Such methods are now unsound and should be abandoned. There may have been a time when the formula of property value multiplied by a fair return as a method of determining the reasonableness of your profits was favorable to the railways but I think this is very doubtful.

By the continued use of an unsound principle the whole industry is being forced on to a service-at-cost basis which is against the interests of the public, for it means that competition, which is the best known regulator of price, has been excluded and that within limits the buyer must pay for the blunders and incompetence of the producer. This the buyer only allows if he is blind to his own interests and it is extraordinary to observe the number of cases where the owners of electric railway properties have been saved from the consequences of their own mistakes by service-at-cost franchises. Such devices are contrary to the public interest because they really amount to private ownership of the property with government operation, a division of responsibility which combines the most disadvantageous factors of both public and private ownership. The service-at-cost franchise at best is the equivalent of government operation, for when the spur of competition is removed nothing can prevent an operating organization from sinking into a bureaucratic lethargy.

But if such is the case, you may properly ask me what is to be done. If government regulation of the industry is to continue, what other method of determining price except by the cost can be employed? Is there any precedent in any regulated industry for the use of another method? It can hardly be said that there is, although there are some indications of one. In general, government price regulation of public utilities seems to be based upon the dogma that cost determines price and so far as the commissions really do regulate prices they assume to do it in this way. But it is worth noting that in the gas, electric, telephone and telegraph utilities price regulation is hardly attempted. An attempt is made to regulate profits but the making of specific prices is left very largely to the judgment of the companies. In the case of these other utilities cost as a method of determining the price of any particular service is rarely put to a practical test and in your business it is only used when it happens to coincide with the prices which competition has determined. Here, I think, we have a clew to the way out of the dilemma.

The time has come when we must face the facts and recognize that we also are dealing with a competitive industry. If this fact were really accepted and acted upon it would make two radical changes in the policy of railway managers: first, they would use value to the customer instead of cost to determine the best prices, as all men must in competitive trade; and second, they would study the desires and even the whims of their customers and would offer them a greater variety of services to suit their needs.

First as to price: this presents no more difficulty in your business than in any other. As the problem commonly presents itself money has already been invested in a railway system which is a going concern with established prices at which the service is being sold and it may be presumed that the owners want to make as much profit as possible. If this were an ordinary competitive enterprise they would experiment by making estimates of the profit which would result if various prices were charged. Such estimates, commonly called budgets, if made up by competent persons are particularly serviceable to electric railway rate-makers at the present time because they provide a clear view of the future unobstructed by consideration of past investments in property which is partly or wholly obsolete.

In this method of fixing prices the value of the service to the customer is the determining fact and the prices arrived at will be those which will give the owners of the property the largest aggregate profit. It will also show the largest volume of service which can be provided at a profit to the customers.

The unwillingness of capital to enter the electric railway field, from which car riders all over the country are suffering, is at least partly due to unskilful government price regulation, which is the inevitable result of the methods that have been used and both the public and the companies will continue to suffer until a new and sounder method of price regulation is employed.

It may turn out, however, that so far as the prices of your present service are concerned, competition has already done its work and that the use of a more intelligent method would not alter them materially. I therefore turn to the second effect which should follow a complete acceptance of the fact of competition: namely, the alertness of mind which characterizes competitors and leads them to recognize and study the

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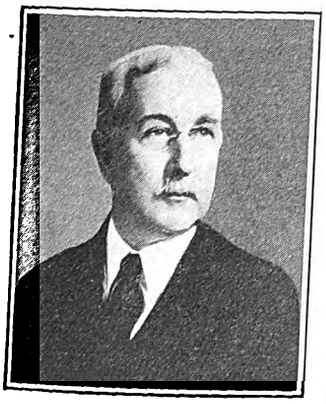
wishes of their customers. Failure to do this has been almost universal in your business. You have continued to supply one kind of service—and one which it so happens can not be sold at a profit. In the face of the fact that your customers clearly wished for a more comfortable form of transportation and were willing to pay for it, you have offered them a disagreeable and even unhealthful service at a low price. In short, to a great mass of buyers demanding an article of high quality you have offered low quality at a low price. It is true that your competitors have forced upon you the use of buses, but this was not done on your initiative but on theirs and you have done it grudgingly.

Where competition is active you must cater to your customers or they will leave you. You must spend great sums in studying their wants and trying to meet them or the investment which you have made in your business will continue to be unprofitable. The industry is thoroughly competitive. Competitive methods must therefore be employed and these rest in the last analysis upon value to the buyer and not upon cost to the producer. You must know what your customer wants and what he will pay for it. When this principle is clearly recognized and intelligently used by all parties the business of surface transportation of passengers will stand upon a sound basis and not till then.

Cars to Meet Today's Demand

By HARRY H. ADAMS
Superintendent of Shops and Equipment
Chicago Surface Lines

The author told the Engineering Association of developments which have been made to produce a street car of fairly light weight and which will give rapid acceleration and braking.



Harry H. Adams

IN THE early part of the campaign to modernize, all efforts were bent toward new cars following to a great extent the designs that had been in use for a number of years. Today's efforts are made in an endeavor to produce a car that will not only be new but will have rider appeal in the broad sense of the word. That is, new equipment to be truly modern today must have an ability to accelerate at a rate enabling it to keep up with automotive traffic. Hence it must be as light as possible, consistent with strength; it must be designed with an idea of reducing noise, and last, but not least, it must afford comfortable and safe transportation for the traveling public who make use of it.

In a number of modern sample or experimental cars aluminum has been used in many ways to reduce weight. According to estimates, the cost of securing such reduction in weight varies from 20 to 35 cents a pound.

Reducing weight is one of the first steps toward noise reduction. Another noise-producing item is the car wheel. Most experimental wheels have made use of rubber or other non-resonant substance as a sound-absorbing medium. Frequent braking raises the temperature of the wheel so that any material affected by heat is subject to deterioration.

The new cars are for single-end use because greater seating capacity can be obtained in the same space at lower cost per seat. In the design of the new 60-seat car as compared with the 51-seat car of three years previous many benefits have been obtained.

In selecting the electrical equipment entirely new motors were necessary. The problem was turned over to the electric manufacturing companies with the requirement that an increase of at least 10 per cent in schedule speed over that possible with our last equipments be secured with a motor to be used with 26-in. wheels. Their efforts resulted in 50-hp. motors rated at 70 amp., 900 and 995 r.p.m. at 600 volts and weighing approximately 2,200 lb., as compared with 60 hp., 85 amp., 725 r.p.m., at 600 volts, and 2,500 lb. for the previous motor which was used with 28-in. wheels on the last group of cars purchased.

As a result of our general study of car design and equipment developments it might be said in conclusion:

First—That a reduction in unsprung weight materially reduces the noise in street cars.

Second—That a reduction in the total and unsprung weight of the car may be secured, together with an increase in the horsepower applied, with no appreciable increase in energy consumption, when operated on comparable schedules.

Third—That with low-floor cars there is a definite need for the elimination of body brake rigging and a development of adequate independent air brake equipment on each truck.

Fourth—That while progress is being made, a satisfactory substitute for tread brakes has not yet been developed. Drum brakes and propulsion shaft brakes which have been tested with composition shoes are not satisfactory due to shortness of life obtained from the shoes.

Fifth—That the success of the high-speed, light-weight motor seems assured, but a light-weight truck with a minimum of unsprung weight is desired in order to secure the fullest benefits from the use of the high-speed motor, and while we have experimental trucks with such qualifications in service, further developments and improvements along this line can be expected in the near future.

Sixth—That it is believed to be thoroughly practical to substitute plates, shapes and some castings, when not too complicated, in design, with aluminum for similar steel members.

We believe that development in car design, electrical equipment and trucks, generally, has progressed far enough to warrant the industry in taking active steps in the replacement of existing equipment or the purchase of new equipment on a modernization program, and, further, it is our opinion that the industry can best be served by the replacement of old equipment with new, thus obtaining the advantages of higher schedule speeds, modern appearance and added comfort rather than attempting to remodel existing equipment.

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Lively Discussions at

T. & T. Sessions

Address on competition and rates stirs group. Other important subjects presented were traffic, merchandising, equipment specifications, passenger needs and desires, and employee relations

THOSE who attended the three sessions of the Transportation and Traffic Association were well repaid, for a number of valuable papers and committee reports were presented, all followed by interesting discussions. Probably the outstanding feature of the entire program was an address by Philip Cabot, professor of public utility management of Harvard University, on competition and rate making. Professor Cabot expressed some rather radical opinions which evoked spirited discussion from a number of the members present at the meeting. The principal refutation concerned his statements relative to service-at-cost franchises. Those present agreed with his views on learning the desires of the customer, but there seemed to be general disagreement with some of the theories he propounded on the fixing of costs after determining the price.

W. H. Boyce

Other features of the program included an address by Miss Mary A. Brennan of Pittsburgh on "Street Car Service from a Woman's Viewpoint," an address by Labert St. Clair, A.E.R.A. director of advertising, on "Merchandising," and a trainmen's conference, presented by employees of the Atlantic City & Shore Railroad. Four committee reports, covering the important subjects of movement of the vehicle, the equipment, the passenger and the employee, also were presented and discussed at the meetings.

Traffic and Publicity Opening Topics

Evidence of an increasing interest on the part of electric railway men in the movement of all vehicles through the city's streets was shown at the opening session on Tuesday by the lively discussion which accompanied the presentation of the committee report on this subject. Two other high spots of the first day's program were an address by Labert St. Clair, director of advertising of the American Electric Railway Association, and a movie relating the story of local transportation. The meeting, which was attended by more than a hundred transportation men, was presided over by President W. H. Boyce, commercial manager of the Pittsburgh Railways.

In his presidential address, W. H. Boyce outlined the complete program of the association for the three days and told of the work done by the association committees during the past year. He emphasized the vast importance attached to the reports to be presented, and urged that those suggestions whose adoption promises improvement along the lines with which they are concerned be put into practice.

Commenting on the subject of movement of vehicles Mr. Boyce referred to the traffic movement as one of the greatest problems of thickly populated communities today. "So difficult has this problem become," he stated, "that managements of transportation companies know that their ability to attract revenue is dependent upon their success in moving their vehicles with regularity and adequate speed. It is not a problem in which transportation companies alone are interested, but one with which the entire community is vitally concerned. Much work of a remedial nature has already been accomplished in many sections through the co-operation of city officials and electric railways, but much remains to be done before the use of street space is based upon effective, scientific methods of traffic control and before beneficial laws and ordinances are properly enforced."

In closing, Mr. Boyce expressed the opinion that the future of the industry depends more upon the improvement of the vehicle than upon any other single factor. "We must insist," he said, "upon a type of vehicle which will adequately meet the requirements of our service in regard to rapid and smooth acceleration and braking, comfort, quiet operation, appearance and economy."

"There is no use merchandising with nothing to sell, but you have the goods and the salesmen, so why not sell?" With this forceful query, Labert St. Clair, the A.E.R.A. director of advertising, started a lively talk on publicity and merchandising. "We must merchandise intensively," he continued, "and ask the people often to buy our goods if we are to be successful in getting results. Persistency is the first thing in selling. A second important point to remember is that we must engage the attention of the customers with those subjects in which they are interested."

Mr. St. Clair named six subjects for the electric railways to sell: safety, tax reduction, traffic relief, business aid, property values, and rides, both retail and wholesale. Show the happy side, was his advice in preparing safety copy. On the subject of tax reduction, he mentioned

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that it is the politician who will relieve the railways of taxes and that the politician to obtain results needs a defense for his action to take to his people. He also urged that the railways point out to merchants, civic organizations and all property owners, the value of a good transportation system to their interests.

Mr. St. Clair, in commenting on the selling of rides, stated that the industry would probably profit by selling rides in wholesale quantity and receiving payment for them at the end of the month. He also proposed that cities be divided into sections with a business manager in charge of each, to study the customers in every detail and to merchandise the service to them.

In the report of the committee on the movement of the vehicle, presented by Chairman D. L. Fennell, general superintendent of transportation, Kansas City Public Service Company, four specific subjects were developed: the control of parking; signals, traffic control, and boulevard stops; coach and car stops, and equipment. The several phases of parking control were outlined and discussed in the report, and a detailed account given of the results obtained by the Chicago Surface Lines on parking conditions in a busy community shopping center.

Various methods of traffic control were studied by the committee for its analysis of signals. The committee commented on the general practices and expanded somewhat on isolated signal lights, co-ordinated signals and through-street signs. The selection of coach and car stops and the use of safety zones and loading platforms occupied the third portion of the report. The report listed the factors to be considered in the selection of stops and named the several advantages of using safety zones and loading platforms. The section devoted to equipment was confined to a discussion of the specifications recommended by the committee on service betterment in its 1928 report, to make street cars suitable vehicles to fit into present-day street traffic. The report appears in abstract elsewhere.

The high points of each section of the report, as presented by Mr. Fennell, were discussed by several delegates. Those who participated were: J. B. O'Connel, division superintendent, Chicago Surface Lines; R. N. Graham, manager of railways, Penn-Ohio System; Adrian Hughes, Jr., superintendent of bus transportation, United Railways & Electric Company of Baltimore; F. A. Cummings, vice-president, Eastern Massachusetts Street Railway; A. R. Williams, vice-president and general manager, United Electric Railways; E. D. Merrill, president and general manager, Washington Rapid Transit Company; G. B. Anderson, manager of transportation, Los Angeles Railway; A. S. Scott, division superintendent, Boston Elevated Railway; J. A. Stoll, United Railways & Electric Company of Baltimore; J. B. Stewart, Jr., general manager Cincinnati Street Railway, and Paul E. Wilson, vice-president Cleveland Railway.

Following the presidential address the reports of the executive committee, the secretary-treasurer, the committee on resolutions and the committee on nominations were presented. Those selected by the nominations committee and who were elected to serve for the coming year are:

President—Samuel Riddle, vice-president Louisville Railway, Louisville, Ky.

First Vice-President—Paul E. Wilson, vice-president and secretary Cleveland Railway, Cleveland, Ohio.

Second Vice-President—George B. Anderson, manager of transportation Los Angeles Railway, Los Angeles, Cal.

Third Vice-President—R. N. Graham, manager of railways Penn-Ohio System, Youngstown, Ohio.

Secretary-Treasurer—G. C. Hecker, general secretary American Electric Railway Association, New York, N. Y.

Executive Committee—F. L. Butler, vice-president in charge of operation Georgia Power Company, Atlanta, Ga.; Adrian Hughes, Jr., superintendent of bus transportation United Railways & Electric Company of Baltimore, Baltimore, Md.; D. L. Fennell, general superintendent of transportation Kansas City Public Service Company, Kansas City, Mo., and C. H. Evenson, superintendent of transportation Chicago Surface Lines, Chicago, Ill.

Unusual Rate Views Presented

Although the second session of the Transportation and Traffic Association on Wednesday consisted of but one paper and one committee report, the meeting proved to be an extremely interesting one because of the views expressed in the address and the importance of the committee report. The meeting was again presided over by President W. H. Boyce.

Speaking on the subject of "Competition and Rate Making," Philip Cabot, professor of public utility management Harvard University, stressed the fact that although the electric railway industry is regarded as a monopoly it is one of the most competitive, and because of this, the conditions which determine price in competitive markets must determine electric railway prices also. Mr. Cabot scored the use of costs to determine prices and stated that by the continued use of this unsound principle the whole industry is being forced on to a service-at-cost basis, which is against the interest of the public, for it means that competition, the best known regulator of price, has been excluded and that within limits the buyer must pay for the incompetence of the producer. The address appears in abstract elsewhere in this issue.

Mr. Cabot's paper brought forth a considerable amount of lively and profitable discussion. Among those who participated were Paul E. Wilson, Cleveland Railway; Hudson Biery, Cincinnati Street Railway; H. W. Barnum, Boston Elevated Railway; Walter Jackson, fare and bus consultant; W. T. Rossell, Pittsburgh Railways; W. W. Holden, San Antonio Public Service Company; S. B. Way, Milwaukee Electric Railway & Light Company; R. N. Graham, Penn-Ohio System, and John Beeler, Beeler Organization. They concurred in the ideas of Professor Cabot relative to learning more about the desires of the customers, but did not agree with some of his statements concerning service-at-cost franchises. They maintained that although there were existing forms of competition the basic form of transportation, namely, mass service, had no substitute. They also held that unrestricted competition was not always in the interest of the public, and that although charging what the traffic will bear might be sound economically it is impossible to overlook the political and practical sides.

Three distinct phases of the subject were treated by the committee on equipment, whose report was presented by Chairman Adrian Hughes, Jr., superintendent of bus transportation, United Railways & Electric Company of Baltimore. These were the study of the facilities that should be provided on modern or rehabilitated car and bus equipment to provide the comfort and convenience required by the passenger; the determination of the general size, type and character of public

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transportation vehicles most suitable for various classes of service; and the outlining of a method of accounting or cost keeping to provide needed data regarding the results of the operation of individual lines for both cars and buses in order to furnish a guide for efficient transportation management. The report appears in abstract elsewhere.

In the discussion which followed the presentation, Horatio Bigelow, South Carolina Power Company, told of the advantages of accounting analysis by lines on his property. "The cost of making up the monthly estimate is negligible," he stated, "and from it we are able to tell from day to day whether the system collectively or in detail is paying its way." He added that distribution is made as maintenance of way and structures; car maintenance; power cost; conducting transportation; traffic and general expenses; and cash, ticket and miscellaneous revenue.

A Woman's Viewpoint

Two features of the third session of the T. & T. Association, held on Thursday afternoon, were a trainmen's conference demonstration by employees of the Atlantic City & Shore Railroad and an address by Miss Mary A. Brennan of Pittsburgh on "Public Transportation from a Woman's Viewpoint." Two important committee reports, "The Passenger" and "The Employee," also were presented at this session.

Mary A. Brennan

Labert St. Clair

Speakers Who Addressed the T. & T. Sessions

In her presentation of "A Woman's Viewpoint" Miss Brennan portrayed a typical American family, the "Browns," and told of the riding habits and requirements of the individual members of this family and their various points of view of what constitutes attractive street car service.

"The principal use of street cars for Mrs. Brown is to go downtown for shopping," Mis Brennan related. "She cannot understand why the cars are not kept cleaner. She has decided opinions about the attitude and appearance of the trainmen and is at a loss to know why companies permit some of the men to appear as they do. She objects to the lack of courtesy on the part of the trainmen and would like a civil answer when she asks a question instead of being humiliated by being given scant courtesy before other passengers.

"Mrs. Brown would do more of her shopping downtown if the item of carfare were not present in the cost. It is possible that an arrangement might be made with merchants by which they would pay carfare, if the amount of the purchase was sufficiently large. A lower rate of fare applying only between the morning and evening rush hours might be effective in getting her to start home earlier, before the employees of offices and stores, and she would probably have a seat in the car. A lower rate of fare in the middle of the day would probably also fit in with a plan for downtown merchants to pay carfare and would stimulate additional riding where shopping was not the object of the ride."

The trainmen's conference demonstration, in which twelve employees of the Atlantic City & Shore Railroad participated, was led by David W. Gordon, director of service improvement Chicago Rapid Transit Company. Mr. Gordon asked the question "What is good information?" and received a number of interesting replies from the trainmen. The demonstration showed the manner in which subjects are developed and settled by the conference method of group meeting.

President Barnes Addresses Meeting

The work of the officers and committees of the T. and T. Association during the past year was praised by President Barnes of the American Association in a brief but pointed talk before the group. He spoke of the association's activities in developing better trainmen and commended in particular the educational conferences being held during the convention. "The trainman," he stated, "is the contact man of the railway, the one who best can sense the public's reaction, and the seeking of his advice on service by managements has been one of the most significant moves of the industry."

It was felt by the committee on "The Passenger," whose report was presented by Chairman W. W. Holden, manager traction department, San Antonio Public Service Company, San Antonio, Tex., that more attention should be given to the actual needs and desires of the traveling public. Accordingly the committee devoted most of its work to "Market Analysis," a consideration of definite investigations into the views of the riding public on street railway service.

To make a market analysis, the report stated, three phases of the situation should be considered: the source of the information, the agency by which the information is gathered and the method used to obtain the information. The three general sources of information available to transportation companies to determine the attitude and desires of the riders, according to the committee, are the general public, the car riders and the platform employees. The agencies by which information for a market analysis can be secured are confined to the company organization and the independent organization. The report is abstracted elsewhere.

Among those who entered into the discussion of this report were C. D. Palmer, Pittsburgh, A. Shapiro, Washington Rapid Transit Company, and D. J. Locke, United Railways & Electric Company of Baltimore.

The report of the committee on "The Employee," was presented by Chairman R. W. Emerson, vice-president and general manager, Cleveland Railway. The several aspects of the employee problem were considered under the headings of selection, training, informational education and accident prevention. In the discussions of present methods, improving selection and suggesting new methods, the committee brought out some valuable points on the selection of employees. The report is abstracted elsewhere.

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Accountants Consider Depreciation *and* Bus Accounting

O. H. Bernd

IN HIS address upon opening the first meeting of the Accountants' Association president O. H. Bernd reviewed the work of the association for the past year, and made a plea for more individual memberships. In concluding he said: "I do not believe there was ever a time in the history of our association when the demands upon the electric railway accountant were more exacting, and the problems confronting him more perplexing, than the age we live in today. Increased taxes, increased wages and material prices, changed working conditions, the rapid improvement of our highways, the increasing use of the private automobile, the substitution of buses for rail cars, and the abandonment of rail lines, all seem combined in a relentless struggle to prevent electric railways from having satisfactory net results."

A detailed report was submitted by W. L. Davis on the proceedings of the 1929 convention of the National Association of Railroad and Utilities Commissioners. Reports were made by M. W. Glover for the committee on standard classification of accounts, and by E. A. Tuson for the sub-committee on bus accounting.

In an extended discussion on methods of accruing depreciation, C. Bancroft Hill of the United Railways & Electric Company of Baltimore advocated present-day undepreciated reproduction value as the base for the accrual, stating that adequate protection to the stockholders' equities could only be given by that method.

Dr. Thomas Conway, Jr., read a paper on "The Depreciation Problem From the Viewpoint of an Electric Railway Executive," which is abstracted elsewhere.

At the Thursday session G. J. Bunting, vice-president Illinois Central Railroad, in his paper "Electrification and the Modern Auditor," compared the accounting officer to the physician who counts the pulse beats of the corporation. Mr. Bunting said that statistical analyses of income, operating expenses, construction costs and other data serve as a barometer of the health of the corporation, and the accountant should be able to diagnose the case sooner than any other officer and be first to sense the success or failure of any particular method or undertaking. The speaker called attention to the extensive programs of electrification of steam lines and to the consequent increasing interest of steam railroads in proper accounting for their electrical operations. "The principles of accounting technique of interest to accounting officers of steam railroads are coming more and more to be in common with those involving purely electric lines," he said.

The responsibility of the accountant to the other officers of his corporation was stressed. In conclusion Mr. Bunting gave as his conception of the prime responsibilities of the accountant, those of the lawyer who interprets and obeys the laws, the doctor who diagnoses the ailment and prescribes the remedy, and the policeman who guards the rights and property of the stockholders and the public.

Reports were made by the committee on fare collection, the joint committee on purchases and stores, and by the resolutions committee. A special tribute was paid C. P. Glover and T. P. Kilfoyle, past-presidents of the association, for their regular attendance of meetings, and aiding in the work of the association. As the new officers were installed, they were called upon and made brief remarks. In the absence of E. H. Reed, the new president, C. E. Yost, first vice-president, received the gavel for the incoming administration. In accepting the gold badge presented to past-presidents, O. H. Bernd expressed his appreciation of the tribute of the association and said he would continue his active interest in association affairs as in the past.

G. J. Bunting, who addressed the accountants

The following officers were elected for the ensuing year:

President, E. H. Reed, assistant comptroller West Penn Railways, Pittsburgh, Pa.

First vice-president, C. E. Yost, treasurer and assistant secretary Delaware Electric Power Company, Wilmington, Del.

Second vice-president, J. E. Heberle, assistant to president, Capital Traction Company, Washington, D. C.

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Third vice-president, E. A. Tuson, general auditor Public Service Co-ordinated Transport, Newark, N. J.

Members of executive committee: C. R. Mahan, L. T. Hixon, R. A. Weston, R. O. Crowe.

Secretary, Guy C. Hecker.

At the Accountants' luncheon, held on Wednesday, the discussion covered questions and answers relative to depreciation in a number of its phases, methods of fare collection, income tax difficulties, accounting for renewals and for leased line betterments, how, why and when weather conditions affect passenger receipts, and a number of other subjects.

H. N. Tyre, traffic auditor of the London General Omnibus Company, was present and compared the methods of fare collection he has found in effect in this country with the ticket receipt system used in London. Mr. Tyre is seeking information on a number of operating questions and expects to visit the properties in a number of the larger cities in various parts of the country.

Canada was represented by J. A. Wilson, chief accountant for the Montreal Tramways, and answered questions relative to their service-at-cost franchise.

The meeting was presided over by O. H. Bernd.

Depreciation Accounting
a Major Problem

Good business practice demands safeguarding the investment, said the speaker before the Accountants' Association. He made a searching analysis of the I.C.C. proposed regulations

By Dr. Thomas Conway, Jr.
President Cincinnati, Hamilton & Dayton Railway
Chairman Sub-Committee on Depreciation, American Electric Railway Association

THE problem of depreciation accounting is, in part, one of good business practice—of safeguarding the investment of the corporation—and in part one of complying with the regulations and requirements of the state commissions and of the Interstate Commerce Commission in so far as they respectively have jurisdiction in the premises. From both points of view the executive officers of the company, its board of directors and its stockholders are vitally concerned.

Dr. Thomas Conway, Jr.

The management of an electric railway property is charged with the very great responsibility of safeguarding its assets, as well as of making those assets productive. The problem of safeguarding the assets of a railway company is not essentially different from that of a bank. In the case of the railway, however, the turnover of its assets is exceedingly slow, a period of 30 years or more being required on most properties for the complete cycle of renewals. In the case of the bank the turnover is rapid; its capital is loaned out either upon demand or for short periods of time; its investments consist largely of securities having a determinable market value. Only a small part of its resources, as a rule, are invested in its banking house and fixtures or in other real estate. Under such circumstances it follows that the executives and board of directors of a bank are brought face to face at frequent intervals with the problem of evaluating the institution's assets to determine whether its surplus is increasing or decreasing, and of considering the problem of making provision against wasting or doubtful assets.

The obligation to make adequate provision for currently accruing depreciation is one resting squarely upon the executives and board of directors of every electric railway company. The fact that more attention is not paid to this matter is doubtless due in part to the meagre and subnormal earnings of most electric railway properties, and in part to the complex difficulties incident to and attendant upon any such investigation and determination. However, the fact that the determination is difficult does not absolve us from the obligation to make it.

We must always keep in mind the fact that the only valid purpose of accruals through charges to operating expenses for depreciation is to preserve, maintain and safeguard the integrity of the investment and of the physical property represented thereby. If we apply this test to every proposal with respect to the method by which the desired end is to be attained, most of the difficulties with respect to the matter will be minimized or entirely disappear.

By preservation of the investment and the physical integrity of the property, I mean that a sufficient sum must be set aside and either reinvested in the property by way of additions, betterments and improvements, or invested in securities, constituting the reserve fund, to offset accruing depreciation so that a valuation of the property, if honestly and equitably made from time to time, will show that the equity of the stockholders is at all times unimpaired, and that a sufficient sum has been set aside to enable the corporation from time to time to replace units of property when necessary as

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the result of wear and tear, decay, obsolescence or inadequacy.

In practice, current accruals for depreciation are based largely, if not entirely, upon calculations founded upon estimated physical lives. In other words, the accrual is, in reality, based upon the assumption that in most cases the various units of physical property will be used and useful until they wear out or decay and therefore have to be retired for physical reasons. It is true that in stating the method employed we frequently find the assertion made that due consideration has been given to the factors of obsolescence and inadequacy in determining the amount of the current accrual, but as a matter of fact if we carefully check through the calculations upon which the accrual is based, we very frequently find that little, if any, consideration has actually been given to these most important factors.

Insufficient Consideration of Obsolescence

In addition thereto, the requirements of many state commissions and of the proposed system of accounting for steam railroads tentatively promulgated by the Interstate Commerce Commission, give little or no consideration to the factors of inadequacy and obsolescence. In its original order in the steam railroad case (No. 15100) the commission outlines its position in the following language:

> The choice is between permitting such an industry to charge rates which will enable it to make its depreciation charges large enough to meet every conceivable contingency and holding its depreciation charges down to a more moderate basis, but permitting the industry, in the case of some sudden and unexpected development, to spread the cost of retirements over a period in the future. In our opinion the latter course is the preferable one. . . .
>
> In estimating life expectance, it will be desirable for the reasons stated in an earlier part of this report to resolve doubts in favor of a longer rather than a shorter life. . . .
>
> In defining "depreciation" we have recognized that there are certain causes of the retirement of property which cannot properly be regarded as factors in depreciation. Such are contingencies, like fires, which cannot be foreseen and against which insurance is the appropriate means of protection, and also sudden and unforeseeable improvements in the art or similar public requirements. But while such causes of retirements ought not to be taken into consideration in determining prospective service lives, simplicity in accounting demands, we think, that when such retirements occur the full loss in service value should be charged to the depreciation reserve. Compensation for such charges, which the depreciation reserve will theoretically not have been built up to meet, may be obtained in two ways.
>
> In the case of a retirement due to a cause which is not recognized as a factor in depreciation but against which the carrier is protected by insurance, compensation may be obtained by crediting to the depreciation reserve the full amount of the insurance recovered.
>
> In the case of a retirement due to a cause which is not recognized as a factor in depreciation and against which the carrier is not insured, if it can be shown by the carrier that the charge to the depreciation reserve resulting from the retirement will unduly deplete that reserve, the amount charged to operating expenses on account of depreciation may be increased, with our approval, over a period of years in the future to the extent necessary to make good such depletion. This will in effect be similar to the present rule, which permits retirements that would unduly distort the operating expenses of a single year to be spread, without approval, over the operating expenses of a period of years.

Commissioner Eastman's proposed revised order, promulgated on Aug. 13 last, does not recommend any substantial change in the commission's position on this point.

It is obvious that such a system of accruals for depreciation, even if expectable physical lives could be determined with accuracy, will not provide sufficient funds to enable the corporation to renew its properties before the expiration of the physical lives if and when obsolescence and/or inadequacy make this necessary or desirable, and the executives and board of directors of the corporation must, therefore, assume this hazard and presumably make provision therefore, either out of surplus or, in the manner recommended by the commission, through larger accruals in later years.

Let us examine the reasons given by the commission for its attitude on this question. The commission states, in its original opinion at page 313:

> Some considerable period of time ordinarily elapses after inventions before they are perfected for commercial use. Advance information is thus possible as to the time when changes in the art are likely to render changes in property advisable. Nor is it beyond reason to anticipate the time when business will outgrow existing plant or when various requirements will be made by public authorities.

Apparently the commission fears that if the officers and directors of the steam railroads are permitted to discount the future contingencies of obsolescence and inadequacy, the charges made to passengers and shippers will be inordinately high. The commission evidently prefers the alternative of accruals which may prove inadequate and spreading the deficiency out over future years rather than running the risk of allowing the corporation to set up more than may later be required. The soundness of such a theory is open to very serious question.

Commissioner Eastman in his opinion recognizes the fact that the procedure contemplated by the commission in this respect may place the carrier in the embarrassing position of never being able to recoup the losses resulting from inadequate accruals by offsetting the deficiency in future years through higher accruals for depreciation. The decision of the Supreme Court of the United States in Board of Commissioners *vs.* New York Telephone Company, 271 U. S. 23, while not dealing specifically with this matter, strongly supports the view that each year must stand by itself and that past deficiencies cannot be charged to patrons in the future. In discussing this case, Commissioner Eastman makes the following very frank, if comfortless, statement:

> If a company has charged too little for this purpose in the past, it is out of luck, and on the other hand, if it has charged too much, it is in luck.

The dangers of such a situation are obvious if and when such an order, applicable to the steam railroads and the electric railways, is promulgated. Unless and until this plan of depreciation accounting is modified by the courts, the carriers would be in the embarrassing predicament of being unable to make adequate provision against obsolescence and inadequacy, for the interstate commerce commission act provides that

> the carriers subject to this act shall not charge to operating expenses any depreciation charges on accruals of property other than those prescribed by the commission, or charge with respect to any class of property a percentage of depreciation other than that prescribed therefor by the commission.

The practical effect of this situation, as I see it, is that the carriers may be forced, for a time at least, to make provision for obsolescence and inadequacy by charges to surplus rather than to operating expenses or, in other words, by setting aside a part of their net return for this purpose of safeguarding their investment against these hazards.

In so far as this industry is concerned, we are in a period of great uncertainty as to the economic life of many of our more important classes of property. If the industry is to prosper, there must be a tremendous technical development within the next few years as regards cars and many other classes of property. As we look

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back over the history of the last few decades, we are struck by the fact that our retirements were prompted in large part by obsolescence and inadequacy, by municipal requirements and other circumstances having little or nothing to do with physical life. Estimates with respect to the useful life of property under such circumstances are bound to contain a large factor of error, no matter how carefully they may have been prepared, and frequent readjustments upward or downward in the accrual must be made. Therefore, it follows that the prudent executive and careful board of directors will insist upon periodical re-examinations and restudies of the amount which should be set up for depreciation for the purpose of making such corrections in the accrual as may be necessary.

As a practical matter, it is almost impossible to determine and set up an accrual which, in the light of subsequent experience, will exactly accord with the amount which actually should have been set up during that period. The factors of obsolescence and inadequacy can be guessed at, but cannot accurately be foretold. As the Interstate Commerce Commission stated in its original order the determination of prospective service life

> is after all, the crux of depreciation accounting. . . . The accuracy of the record with respect to the consumption of property in service which such accounting is designed to afford, is wholly dependent upon the accuracy with which prospective service lives are estimated.
>
> . . . It is by no means an inevitable conclusion that service lives in the future will be the same as they have been in the past. Not only do types of property change in construction and character, but the conditions under which they are used change, often very radically. . . . There seems, indeed, to be no way in which prospective service life for the future can safely be estimated through an automatic or mechanical process. The estimate must needs be made by combining the results of actual past experience with the best available engineering advice as to the probabilities of the future.

In view of the admitted and inevitable inaccuracy of estimates of service lives and of the resulting accruals for depreciation, it seems to me that, as a practical matter, the mathematical refinements incident to a large part of the calculations upon which accruals for depreciation are often based, are apt to create a feeling of accuracy and infallibility which, in fact is not justified. For the same reason, I am inclined to believe that the interests of investors will, in the end, be better safeguarded under most circumstances, through the use of the straight-line method of accruing for depreciation than under the so-called sinking fund method. The latter postpones a large part of the accrual to later years, relying upon the earnings in the depreciation reserve to accumulate a substantial part of the required amount. If service lives are over-estimated, the danger is multiplied because the relief upon accruals in the reserve fund in later years will not be forthcoming. In advancing this suggestion, I want it to be clearly understood that in so doing, I do not mean to infer that the straight-line method is universally preferable; there are more circumstances under which the sinking fund method is most appropriate. The point I desire to stress is that at best depreciation accounting is but an approximation and that any attempt to make it an exact science is bound to be fruitless.

Taking Commissioner Eastman's tentative revision as the basis for our analysis, it seems clear to me that, if and when it is adopted by the Commission and thereafter applied to our industry, it will work a revolution not only in our present methods of accounting but in the financial affairs of many of the companies subject thereto. I believe that it will be only a short time until substantially similar orders are promulgated by most if not all of the state commissions.

As you know, the Interstate Commerce Commission's proposed system of accounting transfers a large part of what we have heretofore regarded as "maintenance" into the field of "depreciation." Such property as ties, rails, other track material, ballast, right of way fences and paving, which we have heretofore renewed through maintenance, would, under the new system, be replaced through charges to depreciation. In other words, our maintenance expense would be gradually reduced and in place thereof would appear a much larger accrual for depreciation than any company of which I have knowledge has heretofore set up, covering not only accruals against the items of property which we have formerly replaced through the depreciation reserve but also charges to cover replacements of the classes of property which we heretofore have replaced through maintenance.

Comparisons of financial results and of operating statistics covering periods before and after the change in accounting methods would be difficult if not quite impossible, and, what is of even greater importance, the possibility of elasticity in our operating expenses, which we have heretofore achieved through reduced maintenance programs in lean years, would be greatly reduced if not entirely eliminated. Such a change would be a serious matter for many companies whose earnings fluctuate widely throughout the year and throughout the business cycle. The sub-committee on depreciation has consistently urged, and proposes to continue to urge with all the force at its command, the necessity for flexibility in the annual accrual for depreciation, both as a matter of necessity and because it believes it can demonstrate that it is scientifically correct.

System of Depreciation Accounting Proposed by I. C. C. Would Have Crushing Effect

A system of depreciation accounting such as that proposed for the steam railroads would fall with crushing effect upon this industry, which has been struggling to continue operation and carry its fixed charges in the face of adverse conditions which have unbalanced our budgets by reducing our revenues beyond our ability to cut expenses. I believe that sound public policy dictates that the serious difficulties of this industry be recognized and that no arbitrary accounting requirements for electric railways be imposed which would have the effect of bringing about wholesale receiverships and financial embarrassments and which, in very many cases, would prove to be the last straw which would break the camel's back. The stockholders, and indeed the bondholders, of a large proportion of the electric railway properties realize that their investment is in hazard. They understand the difficulties of the industry, the fact that many lines may have to be junked and other financial sacrifices made, against which they cannot now be insured by depreciation accounting or by any other device.

We are in the grip of an inexorable economic situation in which the life of a substantial part of the industry is at stake. What part of the industry will survive is a question which time alone can tell. Every opportunity should be afforded to it to carry on the struggle for existence and to endeavor to reestablish its economic equilibrium. This view I am sure, will be strongly urged upon the commission when it comes to consider the electric railways as a group.

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Negligence Laws

Interest Claims Association

L. F. Wynne

THAT claims men of electric railways should make a united effort to secure modification of certain existing statutes which are considered too harsh was the viewpoint expressed by L. F. Wynne, president of the Claims Association, in opening the meetings of that organization.

Mr. Wynne advanced the belief that to attempt to secure the enactment of certain statutes modifying the existing common law with reference to common carriers would do more harm than good at the present time, as such action would probably intensify the opposition to the railway's cause instead of securing beneficial changes. He pointed out that a reaction might occur which would aggravate the present situation.

He did feel, however, that where an effort is being made by certain classes of lawyers, who desire legislation advantageous to themselves, to secure the enactment of outrageous statutes, the railway claims men are justified in employing every reasonable and honorable means to prevent it.

Mr. Wynne also pointed out that safety in operation is of such importance and so positive in its results that the direction of this work should be under executive control. He advocated the organization of a general safety council in each railway composed of the heads of the departments, who, in turn, should organize the foremen and supervisory forces. The latter should be responsible for seeing that the men in their departments do their work safely. He pointed out that startling reductions in public accidents have been effected on properties adopting this plan, and that the reduction of preventable accidents is of paramount importance from an economic point of view.

In his paper on "Efforts of the Bench and Bar To Correct Ambulance Chasing Evils in New York City," A. C. Mayo, trial attorney of the Third Avenue Railway System, stated that while this evil is not yet a dead issue in his city, nevertheless, the ambulance chasers are declining in numbers every year. The decade between 1917 and 1927 was really the "golden age" for this ignoble "profession," according to Mr. Mayo.

Bert C. Wood, general claim agent, Pennsylvania-Ohio Public Service Corporation, Youngstown, Ohio, called attention to the fact that similar efforts to curb the practice of ambulance chasers had been made in Youngstown, but that at first they were unsuccessful due to a lack of harmony and co-operation upon the part of those seeking to bring about the reform.

"The number of cases filed against our company has decreased about 40 per cent in the past year," Mr. Wood said. "We have every reason to believe that the good results obtained will be permanent because our local Bar Association passed certain rules which prohibit the solicitation of any cases whatsoever."

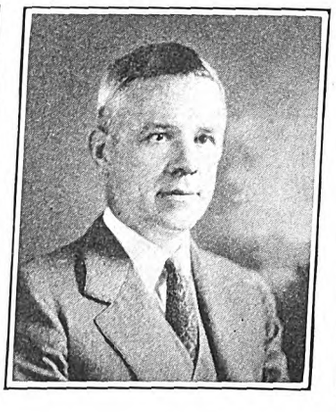
"What a Claim Agent Can Do for His Company and His Community Through a Public Safety Campaign" was the subject of a paper prepared for the last session by C. E. Redfern, claim agent of the United Electric Railways Company, Providence, R. I. In his absence the paper was read by Bert C. Wood of Youngstown, Ohio.

It is Mr. Redfern's contention that the claims man can do much to minimize accidents by taking an active part in city-wide safety campaigns, by helping to organize a safety council if there is no such organization in his city, and by impressing upon his own company's employees the absolute necessity for eternal vigilance.

Speakers Who Presented Papers Before the Claims Association

C. E. Redfern

P. W. Klabunde



Phillip Carlton

Seth W. Baldwin

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W. Muir, who also addressed the Claims Association

Wallace Muir, general attorney of the Kentucky Traction & Terminal Company, Lexington, Ky., presented a paper on "The Importance to Companies of the Attendance of the Claims Men at the Annual Conventions of the American Electric Railway Association," in which he pointed out that all street car equipment has a standard value—a fixed price—but the only guide the claims man has is experience and the advice of those in the same line of business. "This advice can only be obtained in meetings of this kind," said Mr. Muir, "and every man who comes here goes back home with new ideas, new methods of handling his affairs, puzzling questions solved and knowledge received, resulting in a saving to his company many times greater than the cost of sending him here."

The association adjourned following the presentation of the past president's badge to L. F. Wynne.

The following officers were chosen for the coming year:

President, W. E. Foley, claim agent Third Avenue Railway System, New York, N. Y.

First vice-president, C. E. Redfern, claim agent United Electric Railways of Providence, R. I.

Second vice-president, J. W. Giltner, chief claim agent Northern Ohio Power & Light Company, Akron, Ohio.

Third vice-president, L. H. Butterworth, claims attorney Boston Elevated Railway, Boston, Mass.

Members of executive committee, Seth Baldwin, Bert C. Wood, Trevor Neilson, J. A. K. Caskie.

Efforts to Correct

Ambulance Chasing Evils

in New York City

By A. C. Mayo

Trial Attorney Third Avenue Railway System
New York, N. Y.

Ambulance chasing is by no means a lost art in New York City, according to this statement made before the Claims Association, but the "Golden Age" is unquestionably past.

ALTHOUGH it was perfectly apparent to a majority of the members of the bar, and certainly to every member of the trial bench, that the negligence business was flourishing on such a large and increasing scale, and that so much of it was in the hands of a few attorneys that ambulance chasing was rampant, no move was made by either the bench or bar to check or discourage it until millions of dollars had been crookedly extracted from the pockets of defendants. When the final exposé came so many lawyers had become involved that the impression was created in the minds of the public generally that the legal profession as a whole was dishonest.

In 1926 there were approximately 30,000 cases on the Supreme Court calendar in New York County alone, and all of the calendars in the lower courts were clogged. This situation engaged the attention of the Bar Association of the City of New York and a special committee, known as the special calendar committee, was appointed to devise ways and means of relieving this congestion. It was found that a great majority of the cases on the Supreme Court calendar in New York and Bronx Counties were founded in negligence and that a great many of them were brought by a comparatively few attorneys. At the urgent suggestion of this committee, the New York Legislature passed a bill increasing the fees before a trial from $6 to approximately $40. From that time on the number of Supreme Court actions began to decrease by leaps and bounds.

A. C. Mayo

An examination of the records of the Third Avenue Railway shows that in the year 1926 there were 797 Supreme Court actions brought against it. In 1927 there were 437 actions and in 1928 the number fell to 225, a reduction of more than 72 per cent from the year 1926. As I view it in retrospect, it was the work of this committee which was the real beginning of the movement which finally culminated in bringing dismay into the ranks of the ambulance chasing fraternity. Composed of the leaders of the bench and bar, its conclusions and recommendations were accepted and acted upon and finally paved the way for what followed.

Acting upon the petition of several bar associations in the counties of New York and the Bronx, the Appellate Division designated Justice Wasservogel to conduct an investigation of the illegal and improper practices in connection with negligence in the First Judicial Department, comprising those two counties. In the fall of 1928 Justice Wasservogel filed his report, in which he cited 74 lawyers for disciplinary action. As a result of a similar investigation by Justice Faber in the Second Judicial Department eighteen lawyers were cited for disciplinary action. These records do not give much comfort to the ambulance chaser.

In the early part of 1929 the Appellate Division of the First Department made special rules regarding application, solicitation, champerty and maintenance, statement as to retainers, deposit of collections notices, compromise of claims or actions belonging to infants, combining or grouping of claims, prohibition of communication with adverse party, preservation of records of claims and actions, penalties for violating the foregoing rules and jurisdiction of special terms.

The most important of these rules are those pertaining to retainers and jurisdiction of special terms. The requirement under the first one—that a notice of all retainers be filed with the clerk of the court within ten days—in my judgment will act as a great deterrent to ambulance chasing activities.

The second named rule provides the machinery for future investigations of this character when and if the

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occasion arises. The knowledge on the part of attorneys with ambulance chasing proclivities that there is already in existence a tribunal clothed with the power of subpœna before which they may be hailed upon proper application, will, no doubt, deter a great many and dampen the ardor of even the more daring.

The chief results of all these regulations and investigations so far as they have affected the work of street railway claims departments are a reduction in the number of suits brought and in the lessened activities of "runners" immediately after the happening of a serious accident. There has been a reduction in suits brought in all courts against the Third Avenue Railway and associated companies of almost 30 per cent since 1927.

Another result of the investigation has been to divert a great many cases from the hands of the regular negligence lawyers into the hands of a number of lawyers whose names are new in this line of work. This is no doubt an advantage to the claims department as past experience has shown that it takes, with rare exceptions, a number of years for a negligence lawyer to develop to a point where he can frame his cases with any high degree of success, and it is the clever "framer" who is the thorn in the side of the claim agent.

Ambulance Chasing Checked

in Youngstown

By Bert C. Wood

General Claim Agent
Pennsylvania-Ohio Public Service Corporation
Youngstown, Ohio

The general public is interested in curbing the activities of ambulance chasers and will take action when aroused, according to a statement made before the Claims Association.

Bert C. Wood

FOR the past twenty years there have been numerous attempts made to correct the ambulance chasing activity in the city of Youngstown. Most of these have been short lived; some seemed to result in increasing ambulance chasing. It might be fairly said that the reason for our failure in Youngstown in the past to correct the ambulance chasing activity has been due to a lack of harmony and co-operation upon the part of those seeking to bring about the reform. In the past small groups, at different times, upon the spur of the moment, without the proper preparation and without the proper organization, have sought to combat this evil. Those efforts in the past have been short lived.

From year to year the number of ambulance chasers had been increasing to a great extent. About half a dozen lawyers or law firms had been gradually building up powerful organizations. These reached the high point of their career about two years ago, when their efforts in solicitation extended not only throughout the state of Ohio but even into Pennsylvania, New York, Indiana and Kentucky.

With the ambulance chasing business progressing and extending by leaps and bounds and with large verdicts being returned for the plaintiff in personal injury and wrongful death cases the situation finally came to a point where the individual citizens rebelled against the injustice which the transportation and public utility companies had been tolerating for years. This primarily was brought about by the fact that from year to year the bureau of underwriters fixing the rates for liability insurance in Youngstown had been increasing the rates.

About the first quarter of 1928 the leading insurance companies compiled statistics comparing their experience in Youngstown with that in other cities of larger size in Ohio and other states. The figures revealed that the claim frequency was considerably higher in Youngstown than in any other city and that the claim costs on the average were higher in Youngstown than in most of the other cities.

About this time both newspapers in Youngstown united in giving much publicity to the high cost of insurance rates. This naturally led to propaganda to curb the ambulance chasing evil, which was regarded as the real basis for the high cost of insurance and for the high verdicts. Then the various civic clubs throughout the city took up the fight. Next the Bar Association joined in, trying to correct the evil, and the courts became very severe in criticising "fee witnesses" testifying for the ambulance chasers. In 1928 our fight against the chaser seemed to be succeeding.

While the matters just stated above refer more particularly to cases involving accidents with automobiles and also to insurance rates, the public utility and transportation companies also benefited by the reform brought about. The general benefit which was felt we believe is a lasting one because in the midst of the fight there was organized a citizens committee composed of persons experienced in claim work and persons from various civic organizations, all having a community interest at heart. The citizens committee conducted its campaign in order to maintain the benefits obtained in ousting the ambulance chaser.

The citizens committee upon making its investigations and giving suggestions reported to the master commissioners, a body composed of fourteen lawyers appointed by the judges of the Court of Common Pleas of Mahoning County.

During the activities of the citizens committee and the master commissioners, the ambulance chasers were almost completely exterminated. During the last half of 1928 and to date in 1929, there have been rare instances of an ambulance chaser being active when we have been proceeding to settle cases brought against our company. Of course we do run into this situation at different times, but compared with what it had been before the campaign started early in 1928 it is practically negligible.

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Executives Review

A.E.R.A. Committee Work

PRESENTATION of committee reports was the principal business of the session of the executive committee of the American Association held on Sunday evening, Sept. 29. After conducting routine business, relating principally to the convention, President J. P. Barnes called on the chairmen of the committees for summaries of the work carried out during the association year. Formal reports were not presented by certain of the standing committees. Abstracts are given below of the formal reports which were prepared for publication in the proceedings of the association.

National Relations

DURING the year the national relations committee forwarded as much as possible the movement to obtain legislation from Congress on two major projects, clarification of the interstate commerce act in its relation to electric railways and the regulation of motor buses engaged in interstate commerce.

The bill more clearly to establish the status of electric railways under the interstate commerce act has been the subject of frequent conferences with the Interstate Commerce Commission and the state railroad or utility commissioners. Conferences with the two commission groups are still being held for the purpose of composing the differences in viewpoints and a new bill covering this subject will no doubt be introduced at the next regular session of Congress.

Various minor matters are constantly arising in Washington that require the action of the committee.

Publicity

DURING the year the activities of the advertising section were expanded along the lines of motion pictures, posters, newspaper advertising and company organ news service. There now are six reels of motion pictures available, dealing with safety, traffic congestion, readiness to serve, use of the electric car, advantages of the electric car over private automobiles and new types of cars.

The loose-leaf advertising folder has been expanded, now containing about 8,000 advertisements and posters. Two new features were added to the poster service during the year, one a series for carhouses intended to increase courtesy and neatness among employees; the other a single sheet series urging people to use local transportation.

Personal counsel is available at association headquarters in connection with particular campaigns and through a special arrangement with Barron G. Collier, Inc., the advice of its sales, copy and art organizations also is available without charge. Under a new arrangement with the Collier organization at least one space in the racks of every car in the United States was devoted to a special card urging the use of electric cars. The cards were prepared, printed and placed without charge by the Collier organization.

Insurance

THREE lines of action have marked the work of the committee on insurance during the past year. It has been in constant touch with the insurance rating authorities, it has continued the securing of the insurance experience of the industry and it has increased its efforts to emphasize the importance of fire prevention.

In conference the representatives of insurance companies expressed the opinion that the records afforded justification for reconsideration of existing schedules used for making rate applications. Assurances were given the railway group that the insurance representatives would bring this situation to the attention of their executive boards. Negotiations were continued during the current year and a revised edition of the schedule for rating traction properties was presented to the committee, accompanied with specific illustrations that showed favorable consideration of numerous items contained therein. Quite sweeping alterations had been brought about. The proposed action was designed broadly to benefit electric railways, particularly through reductions in the basic rates for buildings and rolling stock and in deficiency charges.

The committee recommends that the revised schedules be studied carefully and that through insurance agents and brokers applications be made for benefits accruing under the new schedules to which members may be entitled. Outstanding items are: (1) The base rate "A" for incombustible buildings has been reduced 50 per cent; (2) the base rate "B" on other structures has been reduced 16⅔ per cent; (3) more favorable treatment has been accorded buildings of superior construction (rated under base rate "A") and deficiency charges for such buildings have been lowered in numerous instances; (4) occupancy charges for motor buses have been lowered 25 per cent and 20 per cent respectively and other charges have been reduced 50 per cent; (5) watchman deficiency charge has been reduced 50 per cent when base rate "A" is used; (6) external protection charges (items 33-40) are reduced one-half when base rate "A" is used; (7) deductions have been introduced for semi-steel cars; (8) a 33⅓ per cent reduction has been allowed in the basic rate for rolling stock on tracks and in yards; (9) charges covering defective wiring and heaters for cars on tracks have been reduced 50 per cent under stated conditions.

Success in fire prevention, states the committee, as in any other sphere of operation, can be attained only by

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Chairmen of American Association Committees

1. James P. Barnes—Charles A. Coffin Foundation Prize.
2. J. H. Alexander—Membership.
3. Ralph R. Bradley—Interurban Legal.
4. G. A. Richardson—Street Traffic Economics.
5. Lucius S. Storrs—Co-operation with Motor Vehicle Industry.
6. H. L. Geisse—Taxation.
7. Dr. Thomas Conway, Jr.—National Relations Committee; Sub-Committee on Depreciation.
8. Edward Dana—Industrial Relations.
9. C. E. Morgan—Publications.
10. F. W. Doolittle—Finance.
11. Edwin C. Faber—Transportation.
12. A. W. Robertson—Research.
13. J. H. Hanna — National Relations and Exhibit.
14. Frank R. Coates—Co-operation with State and Sectional Association.
15. E. F. Wickwire—Manufacturers' Contact.
16. W. H. Sawyer—American Committee on Inductive Co-ordination and Location.
17. T. A. Kenney—Subjects and Meetings.
18. H. B. Potter—Insurance.
19. Walter A. Draper—Public Transportation Co-ordination.
20. Charles R. Ellicott — Manufacturers' Advisory Committee.
21. G. H. Clifford—Financing New Equipment and Fare Structure.
22. Barron Collier—Publicity.
23. Paul Shoup—Policy.
24. J. N. Shannahan—Advisory Council.

perseverance. It cannot be taken up today and lost sight of tomorrow. But if persisted in it will eventually yield abundant returns for the time and effort expended on it. The committee then goes on to list several elements in fire prevention, including correct building construction and location, fire protection equipment and maintenance.

A number of tables in the appendix give insurance statistics showing the experience of electric railways in 1928 as compared with 1927.

Industrial Relations

OUTLINE of a program for future work was the principal feature of the report of the committee on industrial relations which is the successor to the committee on education. The outline of the field of industrial relations was prepared by a special research sub-committee of which Leslie Vickers, economist of the American Electric Railway Association, was chairman. According to his report, it is felt that the first two things necessary in connection with industrial relations work of the association are (1) to emphasize in the strongest possible way to the industry the importance of industrial relations work and (2) to set forth the desirability of having in every organization some highly placed executive in charge of the industrial relations work of the company who can speak with at least as much authority as those who manage and control the physical affairs of the organization. Mr. Vickers states that he is personally convinced that the proper analysis of the problem of industrial relations starts with the focal point of the employee as a unit and studies him in his various relations. This has the advantage not only of being the simplest approach, but also of being the one most liable to clarify our thinking and bring about the clear statement of problems. This proposal is, therefore, that the employee be studied from the five following points of view: (1) In relation to his work; (2) in relation to his fellow-worker; (3) in relation to his supervisors; (4) in relation to his employer, and (5) in relation to the public.

The field is so broad, he states, the tasks are so numerous and the responsibility so great that they merit the serious attention of a highly placed executive whose authority in this field will be unquestioned. The executive in charge of personnel relations will need the help of trained specialists in several branches, such as an engineer, competent to provide proper shops in which to work; a medical staff conversant with the duties to which men are to be assigned and experienced in the effect of the work upon employees; and a personnel specialist, possibly having the co-operation of a psychologist, to select and train employees and then to determine from their reactions their suitability for remaining in those tasks, for transfer or for promotion. He recommends that five separate sub-committees should be appointed to deal with the five problems of the worker enumerated above.

The sub-committee on employment, remuneration and advancement, including pensions and thrift, states that present-day competition requires a higher type of employee than in former years and that employment procedure in industry as a whole is becoming more scientific due to a recognition that methods of previous years were of the "hit-and-miss" variety. It is recommended that the employment official be a highly qualified, if not technically trained, man and that the remuneration for the employment official be commensurate with the responsibility. It is also recommended that the employment office have appointments equal to those of the general offices of the company and that some form of mechanical or psychological test be used, supplemental to the general employment procedure, in order to secure the highest type men, particularly for positions of trainmen and coach drivers.

Other sections of the report give

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a digest of the records of personnel activities of the American and affiliated associations for the past twenty years, a list of former members of the several committees dealing with these subjects and references to recent articles and books on personnel or industrial relations.

Street Traffic Economics

CONTINUING the analysis begun last year, the committee on street traffic economics investigated several subjects, such as the principles of city growth and development, the use of staggered hours in business and office practice, analysis of taxicab operation and practices in use of streets. Adequate reports on these subjects cannot yet be made, states the committee. This year's report, however, covers statements of principles on the usefulness of signals and on the problem of parking control.

The effectiveness of streets is dependent on the elimination of wastefulness and the promotion of the greatest good to the greatest number by adequate administration of the rights of street users. Application of the principles expressed in these two sections will result in improved traffic conditions, in betterment for business and in greater convenience for an overwhelming majority. The third section is a brief presentation of potential improvements in traffic convenience at intersections of streets or of highways adjacent to cities. It is intended to illustrate the possibility of eliminating most of the intersection interferences by construction of a traffic circle at a very low cost. The possible traffic flow along a street can be tremendously increased if the major intersections are fitted with traffic circles, and the delays or inconvenience at such intersections become negligible.

The mere existence of delay to some vehicles or to pedestrians at outlying intersections does not justify signal control, in the opinion of the committee. Many intersections should be equipped with "through street" stop signs requiring stops on one or both streets instead of having the existing signals. The delay would be less and yet all vehicles would enter the intersection under control and so safety should be adequately provided. However, there comes a time when the density of travel is such that the delay due to the interlocking of trails of the vehicles or of vehicles and pedestrians is measurably greater than would occur under the orderly movement of the streets in alternate periods of time with signal control.

A measure of this volume of traffic has been set up in Chicago after very careful analysis. The established standard is that the intersection of two roadways each having two free lanes for movement in each direction must have at least 1,200 vehicles passing through it in the maximum hour, and at least 25 per cent of this in the lighter travelled street to justify the installation of signals for use only in rush hours. If the intersection has this standard in rush hours and at least 16,000 vehicles in a sixteen-hour period, the signals may be operated all day. If the volume of traffic falls below 800 vehicles per hour, the signals should not be operated for such periods and an illuminated "stop" sign or "caution" sign should be displayed.

The length of cycle should be kept short. For a single intersection the green for one direction should be just long enough for those vehicles and pedestrians which are substantially in position waiting to cross to clear the intersecting street. When a signal is part of a system, the length of cycle is established for the needs of the group of intersections and when properly arranged the vehicles moving at the speed for which the system is set will pass through the successive signal control intersections without delay. The most efficient length of cycle will range between 40 seconds and 100 seconds. Accuracy in fitting the length of cycle and the split of the cycle between the two streets is a determining factor in the success of the signal in serving its purpose of minimizing delay while promoting safety and convenience. Properly adjusted signals create better freedom of movement than can be obtained by having officer control, states the committee. Pedestrians have particular advantage at signal-controlled or officer-controlled intersections because the vehicular movement occurs on only one street at a time. Police officers are necessary at many intersections having signal control in order to insure observance of the traffic regulations and so to expedite traffic.

Much discussion of the method of changing from a "green" or "go" indication to a "red" or "stop" indication has failed to develop a standardized practice. The use of the amber at the end of the red period serves several definite and useful purposes, principally to assist pedestrians to complete the crossing of the street and to prepare vehicle drivers for the impending change to the "go" signal.

On the subject of parking the committee states it is not correct to make the general statement that parking should be prohibited in all sections on all streets or to say that uniform general regulations as to length of time allotted for parking should prevail. It is not important that vehicle drivers be saved all cost for the use of storage space, because when a driver is willing to spend from 8 to 15 cents per vehicle-mile he can well afford to pay an additional reasonable fee for the safe-keeping of his machine in off-street storage. The solution of the parking problem lies in a proper balance between the use of the streets for movement and their use for storage purposes. Without movement there can be no inter-communication within the city and therefore no business activity. Without suitable terminal facilities for motor cars of all kinds the utility of these vehicles is lessened.

From a legal standpoint there is little question as to the status of parking. It is purely a privilege and not a right. With reasonable restrictions parking presents few hazards. Primarily it is a problem of a business character and any restriction or regulation of the parking privilege must be considered in the light of the effect which such regulations will have upon the general facility of traffic and transportation movements. Where the parking of vehicles does not interfere with primary travel requirements, there is every reason why it should be permitted under such regulations as are requisite to provide for an equitable distribution of the available storage space among those who require its use. On the other hand, where such storage use of public ways does interfere with travel requirements, its elimination or restriction is not only possible from a legal standpoint but highly desirable from the standpoint of business activity.

Several methods for the relief of congestion are discussed, such as the providing of orderly traffic control methods, readjustment of routings and loading positions of the utility vehicles or electric cars, clearing the streets of obstructions, prohibiting parking in certain sections of the streets, arbitrary prohibition of certain types of traffic, regulation of delivery of goods or unloading of

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materials, widening of existing streets and creating additional streets or added levels.

There is not only competition for street space between stored vehicles and moving vehicles but there is likewise a competition between various individuals who desire to use the available curb area. Statistics are quoted to show that the number of persons entering department stores in the central business district of various cities is a comparatively small part of the total customers. It is apparent, then, that the importance of the curb space as an accommodation to motorists has not been so great as popularly supposed. A discussion of the various types of parking and relative importance in the traffic problem is given and regulations are proposed for the manner of parking.

Comparisons are given of treatment of important intersections which are "bottle-necks" by means of grade separation as compared with traffic circles. The committee states that traffic circles are very satisfactory and can be established at a cost very much less than that for grade separations.

Taxation

THE committee on taxation wrote to operators asking them to tell exactly how they were affected by taxation and imposts and to relate their experiences, whether successful or not, in obtaining relief. Several meetings were held for the purpose of considering the material which was collected.

By utilizing the services of the staff of the association, means of approach to problems and avenues for relief were suggested. The committee emphasized the splendid work done by Mr. Vickers in gathering and interpreting material in furtherance of this tax study.

The committee believes that its work is only the beginning of a movement to reach the automobile-owning business man who seldom uses public transportation services and has not been awakened to a consciousness of the part that local transportation plays in his community. Many of these men are astounded when they learn of the extent to which their street railway services are taxed and of the illogical and indefensible burdens which they still bear. In some small measure the committee has been able to create a sense of civic responsibility and to renew the hope in the minds of some of the best business men of our communities that they can have a good local transportation service if they will give to its needs the same thought that they give to other civic enterprises. It is in the creation in the minds of business men of the concept of our business as a civic enterprise that the hope of relief lies.

The committee is convinced that to effect this two things are necessary:

1. The sympathetic interest must be gained of those important and influential local bodies such as the Chambers of Commerce, etc., whose business depends in large measure on the successful carrying out of our service obligations.

2. Efforts must be made to obtain or set up some tax and impost relief plan to which the industry as a whole could subscribe.

The committee suggests that not only in the national organization, but in every state and sectional association, there should be special committees set up to study this subject; and further, that where possible in every community where tax and impost charges are burdensome the local companies use every possible means, by publicity or by committees drawn from other organizations or by personal contact, to stress the unfairness of the burdens and point out the intimate connection between taxation relief and service betterment.

Depreciation

DEVELOPMENTS relative to the Interstate Commerce Commission's proceeding on depreciation charges of telephone companies, depreciation charges of steam railroads, general revision of accounting rules of steam railroads and depreciation charges of electric railways were reviewed from Nov. 2, 1926, when the commission first prescribed a plan of accounting for depreciation and for setting up accruals as a part of operating expenses to offset accruing depreciations, to the present date. The most significant development reported was a proposed order by Commissioner Eastman, submitted on Aug. 15, 1929, and modifying substantially a number of the most important administrative provisions of the previous orders. A comparison of the most important differences of the former orders and the proposed orders was prepared and included in the report.

The changes recommended by Commissioner Eastman do not modify the commission's position as regards the necessity for making provision for accruing depreciation through charges to operating expenses, but do modify substantially a number of the most important administrative provisions of the previous orders. The proposed modifications, in the judgment of the committee, are in the main helpful to the carriers immediately concerned and if extended to the electric railways would be of great benefit thereto.

Research

THE committee has made a survey of the research activities conducted by operating member companies and also of such work conducted by the association through its committees and headquarters staff. With this in view, a questionnaire was sent to operating companies explaining the purposes of the committee and asking for a statement from each company indicating both the character of work in which they were engaged and any suggestions they might care to make regarding work which should be undertaken.

In response to this inquiry the association received letters from 61 operating companies, all of which have been carefully reviewed. In addition the committee has reviewed the committee activities of the association during the past few years, and the activities of the association staff—as for example, the work of the bureau of information and service.

The principal conclusion of the committee is that there is available to members a wealth of information resulting from the research activities of both members and the association itself. The committee wishes to commend operating companies upon their initiative and originality in undertaking various kinds of research disclosed in the replies to the questionnaire. It believes that it is unquestionably the prerogative and privilege of the operating companies to conduct such studies. It believes, however, that it is important that the industry as a whole should be promptly advised of these studies conducted by individual properties and that so far as possible the association should act as a clearing house for this purpose. The committee has prepared a complete summary of research activities conducted by individual properties and a comprehensive review of these activities conducted by association committees and staff members, all of which is available in the form of association bulletins upon request by members.

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Much Progress Made by

Engineering Committees

COMMITTEE WORK of the Engineering Association during the past year has been fruitful of results. Many projects have been taken up and progress is reported along all lines. The number of standards promulgated for approval by the association indicates healthy activity in all departments.

Reports of the committees which have completed the major portion of their assignments for the year are reviewed briefly in this article, although there are several committees which did not prepare formal reports.

Chairmen of Engineering Association Committees

1. H. F. Brown—Heavy Electric Traction.
2. E. D. Dreyfus—Engineering Accounting.
3. A. T. Clark—Electric Railway Journal Maintenance Contest.
4. H. H. George—Subjects.
5. E. P. Goucher—Co-operation with U. S. Department of Commerce.
6. E. M. T. Ryder—Engineering Manual.

Heavy Electric Traction

SEVEN projects were reported on. Manual Section W101-15, protection of contact rail where protected third rail is used, was revised for advancement to the grade of standard.

The sub-committee on track and third rail bonds for heavy traction work continued the subject during the year jointly with committee No. 12 of the American Railway Association. Considerable information concerning rail joint clearance and its effect on rail bond design was collected. It was recommended that these data be presented to the rail committee of the A.R.A. with a request that bonding of the rail joints be taken into consideration when designing the splice bars.

A summary of the experience of seventeen railroads using oil-electric locomotives and a table showing orders of rail motor cars and trailers for the past seven years were included. Further information on articulated trains was presented in a tabulation showing installations throughout the world.

Data on electrified railroads and electric locomotive tonnage were tabulated and a diagram gave the total mileage of steam railroad track electrified, along with the total electric locomotive tonnage. A comprehensive table showed the electrical and mechanical characteristics of all electric locomotives in service throughout the world. Complete statistics were given on 2,136 alternating-current units and 1,217 direct-current units.

ROLLING STOCK DIVISION

Manual Review—Revisions were prepared of several of the sections in the Rolling Stock Division of the Manual. A number of corrections were made in equipment Section E 3-26, design of axles for electric railway motors. There also was included a design of a 6x11-in. axle and a table of static axle stresses for the A.E.R.E.A. standard axles. Several changes were made in Manual Section E14-27, dimensions of A.E.R.E.A. steel wheel designs.

* *

Motor Coaches—The subject of motor coach design and standardization was continued, co-operating with the motor coach division of the Society of Automotive Engineers. A code for testing buses has been started and a composite inspection schedule has been developed. The accessibility of wearing parts was discussed. A recommendation for desirable brake performance and a proposed inspection schedule for large bus companies were included as appendixes.

* *

Car Design—The study of car equipment with special reference to appearance, comfort and convenience this year has included car nosing, ventilation, the need of a thrust device for journal boxes and the relative economies of new types of car drives. Data on some of the latest types of car drives have been submitted by the equipment manufacturers. Computations have been made to cover a variety of conditions, based on 16,000-lb. and 22,000-lb. car bodies mounted upon conventional trucks and present standard equipment, as compared with the same bodies mounted on new trucks of various builders and equipped with lightweight, high-speed motors.

The committee recommends continuation of the investigation of gear efficiencies being conducted at the Bureau of Standards and the study of the applications of these new types of trucks.

* *

Lighting—During the past year considerable information was collected on signal lights, emergency lights and illuminated signs which it is proposed to include in Manual Section E121-28.

Methods of lighting motor coaches were investigated. Multiple lighting with 12-16 volts and the efficient use of reflecting accessories with automotive type incandescent lamps were

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recognized as essential for best results. An intensity of 6 foot-candles on the 45-deg. reading plane 33 in. above the floor is recommended. A brief review of battery and generator requirements for different sized coaches was prepared, although the committee feels that this latter subject should have a more comprehensive study. Appendixes give information on motor coach lighting and a table showing the comparative annual demand for street railway lamps, together with other information on lamps and lighting.

* *

Lubrication—Information was obtained on the use of light-bodied or low viscosity car oils. The advantages claimed include saving in energy consumption, lower bearing temperatures, less bearing wear, longer life of waste and in some cases economy through the use of the same oil in summer and winter. As the oil companies are prepared to offer low viscosity oils for experimental purposes it is expected that there will be more tests under actual service conditions in the near future.

* *

Automatic Coupler Specifications—Revision of the present M.C.B. automatic coupler specifications as contained in Manual Section E100-12 was considered. A proposed new recommended specification for automatic couplers for interurban cars was submitted as a revision of the present manual section. This specification includes parts of the A.R.A. specifications for standard "D" couplers, pertaining to manufacture, chemical and physical properties and tests, which were revised to 1925. It also includes drawings of the three types of drawbars now in use on interurban and freight cars, locating the position of the guard arm and the abutting wall, which have been added to the standard A.R.A. and M.C.B. couplers to prevent the radial couplers from buckling and pushing cars around short radius curves.

* *

Noise Reduction—Tests on cushioned wheels were reported, showing the proportionate amount of noise reduction that may be accomplished. A report is made of the relative value of the sound deadening of steel wheels accomplished by welding an iron ring to the under side of the wheel tread. Tests of silencing brake shoes show that this type of shoe improves conditions materially. Car wheels with a ring of micarta used as a deadening material inserted between the wheel hub and tire were tested by installing them on a car and operating it over a section of track. The car speed was recorded and the sound intensity measured. Comparison was made with standard steel wheels. It was found that the noise effect of the standard steel wheel being 100 per cent, that of the wheel deadened with micarta was only 90 per cent.

Tests performed on the silencing of the ringing of gears by the use of an iron ring welded to several points on the inner side of the gear ring showed that the welded iron ring has a value between a wood block and a lead insert attached to the gear.

Tests were also made on special brake shoes essentially of the same shape as the standard shoe but with spaces cored out of the wearing surface and filled with a compound of a nature similar to that used for brake blocks on automotive equipment. The use of such a brake shoe, it is stated, will eliminate practically all of the sound caused by the clattering of the brake shoe against the wheel. Its life and service are shown to be entirely comparable with that of the ordinary iron shoe with chilled ends.

* *

Welding of Wheel Flanges—Flange welding as carried on at the present time is generally satisfactory and economical, the committee states. Its use is increasing and improvements are being made. The mileage added to the wheel by flange welding instead of turning down the treads is from 35 per cent to 60 per cent. The total annual wheel cost is reduced on the average about 25 per cent by the roads reporting. The cost of welding and finish grinding ranges from $3 to $4 per wheel, including labor, material and fixed charges.

The report contains details of the methods used by several companies for flange welding and gives figures on the cost. A comparison is made between the cost of turning and welding. The cost of a wheel and two turnings was $22.65 for 38,000 miles, or 60 cents per 1,000 miles. With the cost of the wheel the same as before, with three weldings and finishings the total cost was $30.96 for 69,000 miles, or 45 cents per 1,000 miles. Thus the saving per 1,000 miles is 15 cents or 25 per cent.

* *

Current Collecting Devices—Designs and general information have been agreed upon. Specifications were prepared to be included as recommended designs for trolley wheels, trolley harps, and trolley bases. Diagrams were also prepared showing contact pressures for maximum and minimum heights and clearances at minimum heights and for the determination of pole lengths which it is proposed should be approved as miscellaneous methods and practices.

Rolling Stock Division Committee Chairmen

1. H. H. Adams—Car Design.
2. R. W. Cost—Lighting.
3. A. T. Clark—Standing Committee.
4. E. J. Jonas—Fire Hazards in Shop Practices.
5. J. H. Lucas—Lubrication.
6. W. T. Vivian—Special Committee No. 13—Limits of Wear.
7. H. S. Williams—Noise Reduction.
8. Hugh Savage—Current Collecting Devices.
9. P. V. C. See—Motor Coaches and Automatic Coupler Specifications.

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welding of various alloy steels suitable for use in electric railway track was given.

* *

Motor Bus Garage Design—Two projects were considered. The first was to continue co-operation with the National Fire Protection Association in arranging such revisions of bus garage regulations as may seem necessary before final adoption by the N.F.P.A. The association representatives on the committee of the N.F.P.A. co-operated in this work. It was recommended that the regulations presented in an appendix be adopted by the association.

A study of bus washing facilities was made and a questionnaire sent out to various properties. It was felt by the committee that considerable attention should be paid to cleaning of buses in order to make the service attractive and to improve the morale of the drivers, mechanics and supervisory force.

* *

Rail Corrugation—The collection of data was continued from companies which are now co-operating. The report contains an extensive experimental and theoretical study of the pressures existing at the wheel-rail contact, which indicates that (1) the pressure between wheel and rail is extremely variable; (2) the high pressure spots are spaced very much as are the waves of corrugation; (3) the decrease in modern car weights, accompanied as it has been by the use of smaller wheels, has not resulted in lower unit pressures at the wheel-rail contact areas. A survey of the subject of rail grinding sets forth the more recent types of equipment and methods of grinding which have been developed to combat corrugation. A report on car spring deflection indicates that (1) car spring vibration is only an indirect factor in producing corrugation; (2) equality of wheel loading may be affected by spring conditions; (3) an extensive study of the problem of car springing is desirable. In addition to this the bibliography which was presented in previous reports has been augmented and brought up to date. In an appendix a very complete summary of the tests on wheel-rail contact pressures made in Baltimore, Philadelphia and Detroit is given.

* *

Light Section Rail—Through the efforts of the committee a uniform system of rail branding has been adopted by the American Electric Railway Association and the American Railway Engineering Association. A revision of Manual Section W16-24, specification for carbon steel rails of standard section, was made and is presented as an appendix. As revised it is identical in substance with A.S.T.M. specification, serial designation A1-27, except for additions to cover 62-ft. rails and bond and tie rod holes and orders for small lots of rails.

Foundation and Supporting Structures—Foundation and supporting structures for steam railroad crossings were considered by this committee. Questionnaires were sent out and the work of the American Railway Engineering Association was studied. As a result Plan No. 721 of the A.R.E.A. was presented as information. It was recommended that the subject be continued to complete the assignment in regard to tie layouts for special trackwork.

PURCHASES AND STORES DIVISION

Manual Review—Particular consideration was given to the classification of scrap materials, Manual Section PS100-24. The advisability of preparing a detailed alphabetical index of the A.E.R.E.A. classification of materials and supplies, Manual Section PS200-26, also was considered. The scrap classification, Manual Section PS100-24, was arrived at after careful study and consideration, the committee states, of a number of classifications in use by electric and steam railways as well as the U. S. Department of Commerce simplified practice recommendation No. 58, "Classification of Iron and Steel Scrap." A proposed revision of the classification of non-ferrous scrap appearing in Manual Section PS100-24 is included as an appendix.

Purchases and Stores Division Committee Chairmen

1. John Fleming—Manual Review.
2. A. A. Ordway—Standing Committee and Methods and Practice for Keeping Price Records and Pricing Materials and Supplies.
3. W. E. Scott—Unit Piling and Standard Packages.
4. W. S. Stackpole—Investment in Material and Supplies and the Cost of Operating Stores.
5. W. H. Staub—Reclamation of Used Materials and Sale of Scrap and Salvage.

Unit Piling and Standard Packages—The committee has studied the advantages and economies of these items and is planning to follow out an equitable method whereby a standard package as approved by the committee will not only be of benefit to the larger company but to the smaller one as well.

* *

Investment in Material and Supplies and the Cost of Operating Stores—The work for the year was confined to a study of investment in material and supplies and the cost of operating stores with an analysis of the underlying data as to what is charged to the account of store expenses. The committee has worked on the Interstate Commerce Commission classification under Account 95. Replies to a questionnaire have been received tending towards clarifying its definition of this account.

It was recommended that the principle be established that the cost of keeping stores, price records, pricing and expending requisitions and distributing the cost of stores issues to primary accounts shall be charged to Account 95, Store Expenses, regardless of where such work is performed. A list of items of expense which should be included in this account and another list which should be considered as not chargeable to the account is included.

* *

Simplification and Standardization of Stock—A method for the simplification and standardization of stock is recommended for adoption as a Manual Section. A method of procedure is outlined which will keep the committee in touch with the work of and allow it to co-operate with the division of simplified practice of the U. S. Department of Commerce. The committee especially stresses the

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importance of delegating final authority on the disposition of materials to the standardization committee.

* *

Reclamation and Salvage — Reclamation of used materials and sale of scrap and salvage were studied. It was recommended that some system of reclamation of used material is desirable and that member companies should establish such a system in either one of the forms suggested under the supervision of the stores department.

POWER DIVISION

Manual Review—Several Power Division sections in the Engineering Manual were reviewed. The principal revision was that of Manual section D 10-26, specification for rubber insulated wire and cable for power distribution purposes, to conform to American Standards Association and composite messenger cables as well as insulators were studied. There also is a tabulation of catenary installations in America and elsewhere.

* *

Trolley Wire Wear—Data on trolley breaks have been brought up to date, using the methods of previous reports and also giving information on a car-mile basis. Causes of trolley wire wear and breaks, particularly those other than normal wear, were studied.

Tables give by companies the percentage of breaks occurring under three major headings: Causes other than normal wear inherent in the overhead line; outside causes such as pull-downs, etc., and failures due to normal wear. Another table classifies a six-year comparison covering per cent of failures due to causes other than wear, sub-divided as in the other tables. Breaks due to crystallization at normal wear are tending to hold a constant relation with a slight decreasing tendency. Breaks due to outside causes increased strongly from 1922 to 1927 but receded slightly in 1928. The over-all increase in this group, however, comparing 1922 with 1928, is more than 30 per cent. Many of the breaks are due to carelessness of the car operators and are within the control of the companies. It is rather discouraging to the line maintenance forces to realize that 35 out of every 100 trolley breaks are beyond their power to prevent.

* *

Trolley Wire Reels—Some of the reasons are set out why proper braking devices should be used on reels for stringing trolley wire and a general design is given for such a device. Two methods of using the device are shown, one for a square shaft, the other for a round shaft. The design and methods are proposed for inclusion in the Manual as a recommended design.

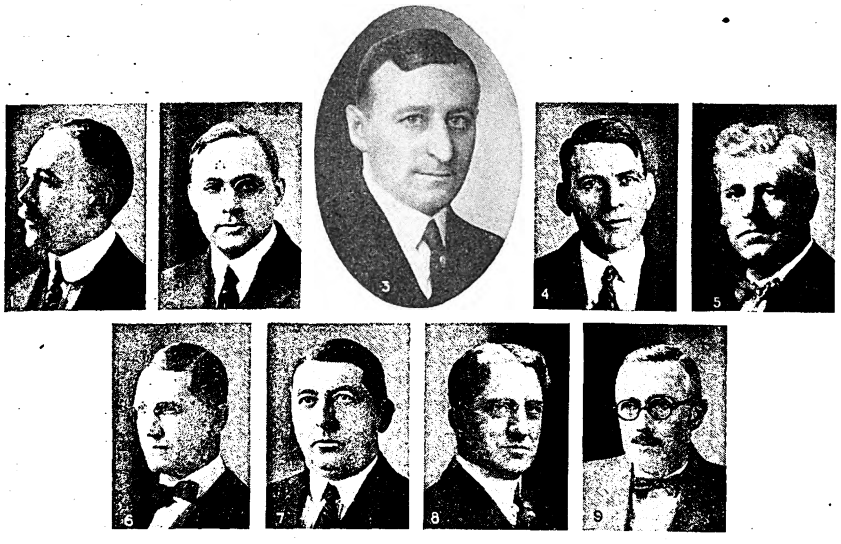
* *

Conduit Specifications — Manual Section D200-26, specification and form of contract for electrical conduit construction, has been given a comprehensive revision. New drawings are included showing a suggested standard line manhole, standard corner manhole, and standard crossing manhole.

* *

Proper Trolley Voltage for Congested City Districts—Trolley voltage for congested urban distribution has been studied from the standpoints of operation and economy, to include the determination of the lowest trolley voltage which is suitable in city areas where it is impossible to reach the normal operating speed of the car. This year's committee developed a plan of test and standardization of data to be secured. Tests were run in Chicago, Pittsburgh and Cincinnati, and other tests are planned in Detroit, Montreal and Philadelphia.

The committee believes (1) that the proper voltage for congested districts may vary from 400 volts to 540 volts, depending on the facilities for changing the trolley voltage; (2) that in frequent-stop service in congested city districts, calculations indicate that 400 volts potential will give the most economical energy consumption (actual service tests on several properties confirm this reduction of energy consumption with lower trolley voltage in congested districts); (3) that all urban districts have some congested territories which should be studied.



Power Division Committee Chairmen

1. J. W. Allen—Ferrous and Non-Ferrous Materials.
2. H. W. Codding—Mercury Power Rectifiers.
3. W. E. Bryan—Standing Committee.
4. A. J. Klatte—Proper Trolley Voltage for Congested City Districts.
5. H. S. Murphy—Trolley Wire Wear.
6. J. F. Neild—Trolley Wire Reels.
7. W. J. Quinn—Conduit Specifications.
8. R. H. Rice—Power Contracts.
9. D. L. Smith—Catenary Specifications.

specification C8dl. A copy of this proposed revision is included.

* *

Power Rectifiers—The emphasis of the present report is on the results of operating experience. A number of companies submitted a standard log sheet from Sept. 1, 1928 to date. A record of American installations and a bibliography on the subject have also been brought up to date.

* *

Catenary Specifications—Catenary specifications, Manual Section D102-21, were revised and combined with the specifications for catenary materials prepared in 1928. The new specification is proposed for adoption as a recommended specification. Alloy

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Affiliated Association Committees

Study Important Subjects

CONCENTRATING on five broad subjects for the year, the committees of the T. & T. Association developed a wealth of useful data and information for presentation at the convention. The subjects assigned were the small city, movement of the vehicle, the equipment, the passenger, and the employee. The small city committee report was not accepted by the executive committee because it had not yet secured sufficient information for making any general recommendations and, accordingly, was not presented to the members. The committee, however, is to continue its study during the next year to complete the good work it has started. The other four reports were formally presented and discussed at the regular sessions.

A report of the activities of the Accountants' committees and the abstracts of two Claims committee reports appear below the T. & T. reports.

Movement of the Vehicle

WITH the realization that no greater problem confronts large cities today than the movement of traffic through their streets and that the ability of urban transportation companies to attract revenue depends upon their ability to move their conveyances with regularity and adequate speed, the committee on the movement of the vehicle of the T. & T. Association pointed out in its report some of the things which may be done now by the street railway industry to improve traffic conditions generally and to better each company's operation. It is possible both to facilitate the regularity and greatly to increase the movement of vehicles by means of a more scientific and effective use of wasted street space, and the report in analyzing this problem detailed practices in general use and gave opinions of the results those practices indicated.

Four divisions of the subject were studied by the committee during the year: Control of parking; signals, traffic control, and boulevard or through-street stops; coach and car stops, and equipment. Editorializing on the control of parking, the committee stated that this problem is but one phase of what should be a comprehensive civic program devoted to gaining the maximum utilization of existing street facilities. It recommended that the matter of parking control be dealt with by a civic-minded committee composed of representatives of those businesses upon which the area is dependent for its continued prosperity and men competent to marshal the facts and present them to this group.

Chairmen of Transportation and Traffic Association Committees

1. W. W. Holden—The Passenger.
2. Ralph W. Emerson—The Employee.
3. D. L. Fennell—The Movement of the Vehicle.
4. Adrian Hughes, Jr.—The Equipment.

Four specific phases of parking control were analyzed by the committee: (1) Position in which the vehicle is permitted to park; (2) types of vehicle affected by parking restrictions; (3) locations in which vehicles may park, and (4) length of time vehicles are to be permitted to park. The last two phases, being interconnected, were broken down, in turn, into six classifications regarding parking restrictions: (1) Limited time parking, varying from no limit to half hour parking; (2) no parking within certain distances of cross-walks, intersections and fire hydrants; (3) no parking in front of certain business establishments at any time; (4) no parking on main thoroughfares of the district during morning and evening peak hours; (5) no parking in the central district during peak hours, and (6) no parking in the central district during normal business hours. In analyzing the effect of "no parking" ordinances the Chicago plan was referred to.

The best means that a transportation company has at its disposal to promote the proper control of parking, the report stated, is the ability to gather and present in forceful form statistical data which will prove decisively to the merchant and shop owner that uncontrolled parking in business centers is harmful, that the parking privilege is being abused by employees of his own establishment and that surprisingly few of his customers are actually making use of parking space, much to the inconvenience of the great majority. It should be proved to him that the relegation of parking to non-business streets in the vicinity, or other proper control measures, will add materially to the accessibility and therefore to the desirability of the neighborhood as a place in which to do business. It was with this end in view that the Chicago Surface Lines undertook to make a complete survey of parking conditions in a busy community shopping center. The report told of this survey, listing the field checks which were made, the procedure followed in acquiring the miscellaneous material, the method of tabulating and summarizing all field data and how these data were analyzed.

Signals, traffic control and boulevard stops were discussed from the angle of reducing the delays, eliminating confusion, facilitating movements and reducing accidents. Two important opinions were advanced—

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first, that traffic signals have been the subject of much discussion and of too much experimentation without engineering analysis on which to base installations and, second, that the cost of installations and of maintainance of the best signal system is very slightly more than that of the cheapest system.

As a matter of general information to be used in preliminary work in a study of the control problem the report discussed briefly certain types of signs and signals now in use. The co-ordination of signals was urged and particular stress was laid on the use of the flexible progressive system, to give the proper proportion of time to the through traffic and the cross-traffic at intersections.

In the selection of coach and car stops there are two major factors to be considered—stops frequent enough and so located as to serve the traveling public with reasonable convenience and stops far enough apart to enable cars or coaches to maintain average schedule speeds high enough to be attractive. Stops were discussed from the angle of average speed and the consideration of a number of factors in the study of any plan for a reduction in the number of stops was recommended.

On the subject of safety zones and loading platforms the advantages of safety zones to the automotive vehicle, the street car patron, the street railway and the pedestrian were pointed out and section 4 of the American Engineering Council committee's report relating to safety zones was quoted, with comments on the various recommendations and with additional recommendations.

In its study of the last subject, equipment, the committee reprinted sections of the report of the committee on service betterment for 1928, giving qualifications required to make street cars suitable vehicles to fit into present-day street traffic and commented on the specifications and gave additional information.

The Equipment

"ONE of the most pressing necessities of our industry today is new equipment. Before new equipment can be purchased the operator must know what to buy; the manufacturer must know what to build; and the price must be brought within the economic limits of the business." With this foreword, the equipment committee of the T. & T. Association delved into its first report, this subject formerly being confined solely to the Engineering Association. The assignment was considered under three headings, as follows: (1) The study of the facilities that should be provided on modern or rehabilitated car and bus equipment to provide the comfort and convenience required by the passenger; (2) the determination of the general size, type and character of public transportation vehicles, both car and bus, most suitable for various classes of service, and (3) the outlining of a method of accounting or cost keeping to provide needed data regarding the results of the operation of individual lines for both cars and buses in order to furnish a guide for efficient transportation management.

The report covers a preliminary consideration of the vehicle, both street car and bus, from the point of view of the comfort and convenience of the customer and its ability to meet the traffic requirements. The most important outcome of the year's study has been the development of a practical method of determining upon a few sizes and types of uniform vehicles which will permit manufacturing on a production basis with a resultant decrease in price to the purchaser.

A method of analyzing operating results by lines also is included. Such an analysis, the report states, is essential as a basis for the application of modern merchandising and research methods to the industry. The lack of such information has been a handicap to efficient management and it is recognized today that this simple, fundamental principle of economic control which has been applied in every other business must also be applied in the public transportation business.

Under the subject of facilities to be provided on modern or rehabilitated equipment is presented a specification in some detail of all the features to be considered in the production of the ideal vehicle for city service from the standpoint of comfort, convenience and appearance. The specifications, classified for cars under the headings exterior, interior, fixtures and fittings, signs, operators and operation of cars, are very comprehensive, covering every phase of car design. Particular emphasis is laid on the increase in the speed of braking made possible by the use of a quick-acting valve. In discussing the design principles and details for buses, the report points out that many of the features of design recommended for street cars apply also to buses.

Under the subject of the determination of the general size, type and character of public transportation vehicle, a method illustrated by several examples is shown for determining the economic size of vehicles for various classes of service. The authors refer to this study as a preliminary to the development of a more accurate method and to the actual determination of the fundamental economics of vehicle sizes.

Under the third subject is presented a suggested method of prorated costs to lines or individual parts of the transportation system, in order to obtain a detailed analysis of operating results. In the distribution of expenses to car routes, the report stated that greater accuracy would result by adhering to the following general recommendations: (1) That the I.C.C. classification of accounts be used; (2) that equipment and power costs be kept by groups of cars of similar type and age; (3) that direct charges be made to routes wherever possible, and (4) that such items of expense as prescribed by the I.C.C. classification which cannot conveniently be charged directly to routes be prorated according to the unit which best determines their variation. The units recommended in this suggested method are the car-mile, track-mile, operating car-hour, gross revenue and the car.

The Passenger

UNDER the subjects of "Merchandising Transportation" and "Service Betterment," the subject of "The Passenger" had been previously studied by the T. & T. Association. It was felt, however, that more attention should be given to the actual needs and desires of the traveling public. Accordingly this year the committee on the passenger concentrated on this phase.

In its preliminary comments the committee stated that a great many of the efforts made by public transportation companies to secure more passengers had been made without any particular understanding of the reaction they would have upon the prospective or potential passenger and that a more definite knowledge of the real attitude of the passenger to the street railway service should be secured. It was felt that definite investigations into the views of the riding public on street railway service would be of value in any given situation, and it was to a consideration of this investigation, which is termed

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"Market Analysis," that the committee devoted most of its work.

To make a market analysis, the report stated, the following phases of the situation should be considered: (1) The source of the information—the general public, the car rider and the platform employees; (2) the agency by which the information is gathered—the company organization or an independent organization; (3) the method used to obtain the information—preferably by some method of personal interview. Mention was made of the very broad factors upon which the attitude of the public as a whole depends, and it was pointed out that it is desirable to ascertain what the public sentiment in regard to the transportation company is in order to make a satisfactory market analysis. The value of personal interview also was emphasized because it tells a complete, accurate story and has the added value of showing the public the interest the company has in giving real service.

Three general subjects were listed for use in a market analysis, which is considered of first importance: (1) Analysis of the elements involving physical service, such as the construction and comfort of cars, the operation of a bus line on one street in preference to another street and the extension of bus or car routes; (2) analysis of all those factors entering into the broad head of personal convenience, such as a determination of headways entirely apart from that dictated by the seating capacity of a car, loop arrangements at the ends of lines and the installation of turn-back points on either car or bus lines; (3) an analysis of all other elements entering into the service given apart from those dictated by physical factors or the convenience of passengers, such as the impression made by the operators, their personal habits in regard to cleanliness or uniforms and their method of answering inquiries.

The report mentioned that several companies had given considerable attention to market analysis and listed a few significant results obtained by a house-to-house sales campaign of a western company and some interesting situations which were disclosed in a survey made by an outside organization for another company.

In an attempt to learn just what the passenger desired in his individual service, questionnaires were sent out for information to obtain a definite classification of these desires. The consensus of opinion was that speed was the first desire, with comfort and fares second and third, respectively.

Two other related fields were covered, the reasons for falling revenue and the methods of stimulating off-peak travel. The decreasing of revenue was attributed to the greater speed of competing forms of transportation, the creation of outlying communities and the general opinion of the street car service as a whole formed by those who ride principally during the rush hours.

Methods of stimulating off-peak travel discussed were increased speed, street car tickets sold on time, supply of tickets to be sold by meter readers, regular and effective advertising of car service, appeal to women, unlimited passes and adherence to schedule time.

The Employee—His Selection, Training and Service

GUIDED by the knowledge that there is a need of giving to the human force that same serious consideration which has long been expended upon the mechanical side of the industry, the T. & T. committee on the employeee proceeded to make a thorough study of this important phase of railway operation. We are engaged in a highly competitive business, the committee stated, which has as its fundamental problem that of obtaining more car riders and of winning back some that have been lost. For this task are needed not only the most carefully selected group of workers, but also that co-operation and interest which come only from an understanding of their problems on the part of the officials and an understanding of the company's problems on the part of the employees. For years managements have striven for and have obtained improvement in mechanical methods. The study of the human element has not kept pace with this development.

The committee named the favorable results obtained by transportation companies pursuing employee programs for definite periods and urged upon individual managements the necessity of waking up to the great importance of a full and balanced policy in obtaining and maintaining a body of thoroughly competent and interested employees. The report covered the employee problem under the four headings selection, training, informational education and accident prevention.

In answering the three questions, what are the present methods, how can selection be improved and what new methods can be suggested, the committee gave some valuable information to aid in clearing the ground for an understanding of the problem of selection. Reference was made in answering the third question to the interviewing of men by industrial psychologists.

Under the discussion of training the committee outlined the present training programs on the larger properties and urged that employees be trained as carefully as they are selected.

The committee expressed the belief, in developing the subject of informational education, that an intimate knowledge of the economic factors and managerial problems that determine the policies of a company is necessary in enlisting the sympathy of the employee, and added that information must be given continually to the employee in as attractive a way as possible, not only to keep him interested in his job, but to keep him abreast of the times in a constantly developing and improving industry.

Two important facts were mentioned as necessary to keep in mind: The need of properly organized follow-up work and the education of employees already in service. The actual nature of the informational education to be given to employees was outlined by the committee in connection with the follow-up of new men and the introduction of such methods with employees already in service.

The general principles underlying a suitable set-up were outlined under the heads: Material, Personnel and Methods. The committee left three fundamentals to be kept in mind in developing any educational program: (1) There must be an expression of sincere desire to give information, backed by an honest recognition of proper functional reaction; (2) the instructor must be well posted, and (3) the material must lend itself to practical application.

To secure suitable data to aid in the study of accident proneness, the committee inquired of several companies regarding the proportion of accident prone men, the handling of men who have accidents and the proportion of collision accidents which are charged to operators. The replies indicated that 27 per cent of the employees on an average have 53 per cent of the collision accidents, indicating that in all companies there is a certain pro-

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portion of accident prone men. The committee supplemented the procedure for investigating the causes of accidents and handling the men who have them with the suggestion that more intensive studies should be made of the past records, personality and operating habits of the high accident men and that the instruction which these men receive at the hands of superintendents should be supplemented by some special instruction on the job, either by the training department or by the supervisory force. The results of the inquiries regarding the proportion of collision accidents shows that accidents are viewed quite differently by officials and that there is need for the adoption of a uniform basis.

In connection with the study of accident prone men the report referred to the work being done in Boston and Cleveland.

ACCOUNTANTS' ASSOCIATION

Chairmen of Accountants Association Committees

1. Wallace L. Davis—Representative to Annual Convention National Association of Railroad and Utilities Commissioners.
2. Walter Shroyer—Freight Accounting.
3. E. A. Tuson—Bus Accounting Sub-Committee of Standard Classification of Accounts Committee.
4. M. W. Glover—Standard Classification of Accounts.
5. R. A. Weston—Stores Accounting.

NO FORMAL reports were presented this year by the committees on standard classification of accounts, and fare collections, nor the sub-committee on bus accounting of the Accountants' Association. The report of the committee on stores accounting was presented briefly, being in substance the same as the report of a committee of the Purchases and Stores Division of the Engineering Association, which has been studying the same subject.

CLAIMS ASSOCIATION

Chairmen of Claims Association Committees

1. John J. K. Caskie—Subjects.
2. Bert C. Wood—Safety.
3. J. S. Kubu—Uniform Negligence Law.

Safety

ACTING as a committee from the claims standpoint, the safety committee of the Claims Association, of which Bert C. Wood, general claim agent Pennsylvania-Ohio Public Service Corporation, was chairman, did not enter into the work of accident prevention from the operating angle. It was the belief of the committee that more could be accomplished where there is brought about a centralization of prevention work around and through which revolve the correlative values of the various departments and associations. "It appears to the operating man that the claims department is concerned in the settlement of claims only," the report stated, "and on some properties where individuals have participated in the accident prevention work, it has generally resulted in confusion through statistics assembled, methods of classification and procedure taken to bring about corrections. It is in an effort to avoid these complications and to remove the complexity of our work in its relation to other departments that we seek the consideration of the membership of the recommendations of this committee pertaining to the classification and definition of accidents."

The committee recommended the adoption by the several states of the Hoover conference on uniform traffic law as a safety measure in its uniformity and covering of vehicle traffic and the driver; that the president of the Claims Association appoint a committee to define "accident," to outline specifically what accidents shall be counted in the totals reported in competition for the Brady or other awards, to determine exactly what items of expenditure shall be considered in the calculation of total claim department costs now generally used in computation of percentage of the gross income, and to define what "gross" is to be used; that the operating or accident prevention departments compile and keep a detailed account of trainmen experience, recording all factors having to do with efficiency of operation and reduction of accidents; that a five-year comparison, under classification as to nature of occurrence, be made of accident causes, and that members compete for the Brady and other awards for safety and claims work.

Uniform Negligence Law

THE report of the committee on a uniform negligence law was presented to the Claims Association on Wednesday afternoon by J. S. Kubu, chairman. The committee drafted an act on imputed negligence for the purpose of presentation to the legislatures of the various states for their consideration. The act follows:

"1. In any action for personal injuries or wrongful death resulting from collision or other accident to a vehicle, and sustained by a person who at the time of said collision or other accident was riding in such vehicle, the plaintiff shall not recover damages from any person from whom the driver of said vehicle or the operator or owner thereof could not recover any damages sustained by said driver, owner or operator of said vehicle as a result of said collision or accident because of the contributory negligence of such driver, owner or operator. Provided, that this section shall not apply to any action against the person driving said vehicle or owning or operating the same. Provided, further, that this section shall not apply to any action for personal injuries to or for the wrongful death of a person who at the time of such collision or other accident was a passenger in a vehicle of a carrier for hire. Provided, further, that this section shall not apply to any action brought for personal injuries to or the wrongful death of any minor under the age of sixteen years at the time of said collision or accident."

The committee collected information and opinions from a number of members of this association that proved exceedingly helpful and reported that it was gratified with the intense and universal interest in the matter now under consideration. Regarding the constitutionality of the act, the committee reports that it is now awaiting the opinion of counsel.

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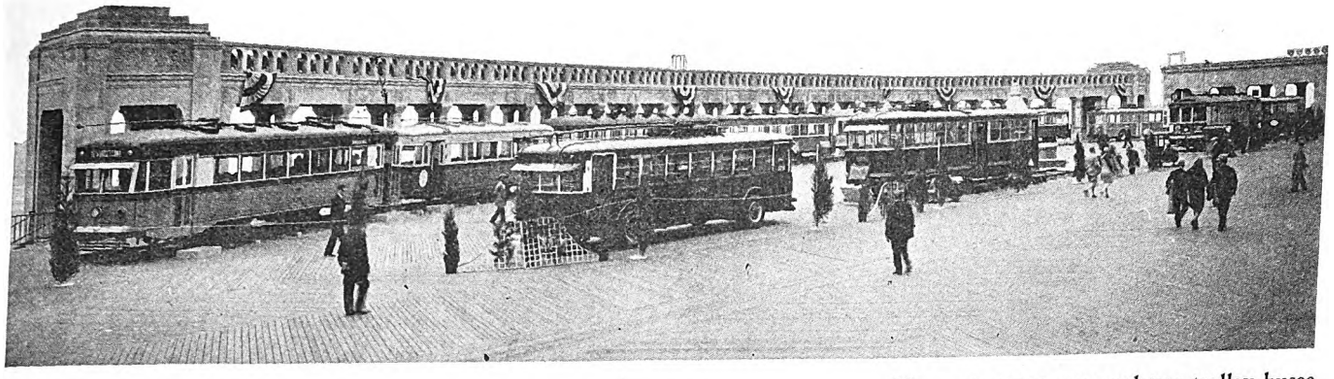

Nine new street cars and two trolley buses were shown on the Boardwalk at Atlantic City

Many Innovations in EQUIPMENT and APPARATUS Shown in Most Attractive Exhibit

New Car Designs Recognize Demand for Higher Speed—Larger Capacity a Feature of Latest Type Buses—Track Construction Machinery Improved—Betterments Made in Overhead Line Material

SURPASSING all previous exhibits in attractiveness of arrangement, this year's show in the magnificent Atlantic City Auditorium set a record of accomplishment for the annual convention of the American Electric Railway Association. In size the exhibit was almost exactly the same as those of the past two years at Cleveland. A total of nearly 105,000 sq.ft. of floor space was used for the display. Of this amount approximately one-third was utilized by the bus exhibit. Nine of the latest type street cars and two trolley-buses were shown on the Boardwalk in front of the Auditorium.

New Cars Designed for Higher Speeds

Foot control, center exit doors and reduction in unsprung weight are interesting features of the cars shown in this year's exhibit. Cabinet inclosure of control apparatus, increased attention to operators' comfort, improved seating arrangement and growing use of composition flooring are other outstanding elements in the latest designs.

The most radical departure from conventional design was the lightweight, double-truck car built by the Twin Coach Corporation for the Brooklyn & Queens Transit Corporation. This car, with a length of 45 ft. and seats for 52 passengers, weighs only approximately 30,000 lb. The four motors are full spring suspended, being directly attached to the car underframe and connected to the axles through propellor shafts with universal joints. Entrance is at the front where a Perey turnstile is located. Exit is through a treadle-operated folding door located just back of the center of the body. The car is arranged for double-end operation. Special attention has been paid to the insulation of sound-producing parts.

Another interesting front-entrance, center-exit, double-end car was that built by the Cincinnati Car Corporation for the United Traction Company of Albany. This car has an overall length of 42 ft. 8⅜ in. and seats 44 passengers. Aluminum sectional construction, single panel windows and elimination of the letter board are features of the design. The trucks are equipped with Hyatt roller bearings and magnetic track brakes. The electrical equipment consists of four 30 hp. motors with foot control. This car weighs 32,450 lbs. complete. Door-operating devices as well as electric heaters are Consolidated Car-Heating Company design.

Other center exit designs included a car built by the Department of Street Railways, Detroit, mounted on Timken 52-A trucks and a car built by Brill for the Chicago Surface Lines with four 50-hp. motors mounted on 76-E-2 trucks. The Peter Smith mechanical ventilating

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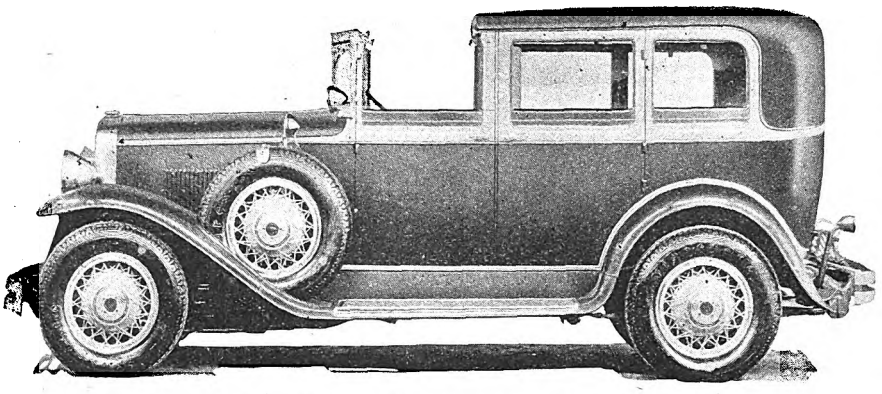

New model taxicab shown by General Motors Truck Company

system is an interesting feature of the Detroit car.

The Osgood Bradley Car Company exhibited a medium size, double-end, double-truck car similar in general design to the cars developed by this company for the street railways in Worcester and Springfield. The standard double-truck, one-man, two-man city type car used in Milwaukee was shown by the St. Louis Car Company.

Both the four-wheel and the eight-wheel type of Brill master unit cars were shown. The eight-wheel type is mounted on 177-E-1-X trucks with four 35-hp. motors. This car was built for the Lynchburg Traction Company. The four-wheel car is mounted on a truck frame of special design with a long wheelbase arranged with sufficient axle play to permit easy passage of sharp curves. It is equipped with two 50-hp. motors with foot control.

The light-weight, high-speed car built by Osgood Bradley Company for the Pittsburgh Railway equipped with the new 52-A Timken trucks was also exhibited on the outdoor track. The seats are of the individual bucket type placed at an angle of 45 deg. along the sides of the car. Each truck has two motors with armature shaft brakes and automatic acceleration.

A trackless trolley with aluminum body was shown by the Cincinnati Car Corporation. This is similar in general to the vehicles built by the same company for the Utah Light & Traction Company. Another interesting trolley bus in the outdoor exhibit was that built by the Twin Coach Corporation for the New Orleans Public Service, Inc.

In the Auditorium exhibit, the J. G. Brill Company displayed a new low-level truck, model 188-E, with swivel supported journal boxes. The Timken Detroit Axle Company exhibited its recently designed 52-A truck with armature shaft disk brakes. A graduated spring suspension truck was shown in the indoor exhibit of the St. Louis Car Company.

Trend Toward Larger Capacity in Buses

In the bus exhibit the general trend appeared to be toward vehicles having seating capacities ranging from 35 to 41 although a few buses were exhibited providing seats for 21 passengers. Front entrance and rear exit arrangement was characteristic of many of the larger types.

The General Motors Truck Company exhibited five Yellow Coaches and three chassis, one of which was of the gas-electric type. A city service bus with all-metal body having unusual aisle width and headroom was an interesting feature of this exhibit. The apparent ease of maintenance and the lightness of construction of this design created a favorable impression. A novel feature of the General Motors exhibit was a new model taxicab.

The Saf-T-Cab Corporation also showed a four-passenger cab of the sedan type with a compartment for the driver separated from the tonneau.

Six buses, ranging in seating capacity from 12 to 41 passengers, and a stripped chassis were exhibited by the White Company. A model 54 chassis was shown with two body types. The "Parlor Pullman," which normally seats 25 passengers, has auxiliary seats giving a maximum carrying capacity of 31 passengers. A combination passenger-baggage-express bus accommodates fifteen passengers but this number can be increased to 21 if no baggage is carried. The model 54-A, which has the same general specifications as the model 54, has a wheelbase of 250 in. instead of 240 in., thus making it possible to carry a larger pay load.

A 21-passenger bus was shown with double seats on one side and a row of single seats on the opposite side with an exceptionally wide aisle, thus allowing ample room for standees.

The International Motor Company exhibited three models of Mack buses, including the four-cylinder model AB, the six-cylinder model BK, which replaced the former model AL, and a new model BC. The latter which develops 100 hp. is mounted on the so-called Mack straight frame. This type of bus is built with either a 202- or a 231-in. wheelbase. A noteworthy feature of the various Mack types is the degree of standardization of body parts.

Studebaker exhibited a new 220-in. bus chassis with an eight-cylinder, 125-hp. motor. The frame has eight cross-members, three of which are of the tubular type. This is said to decrease frame distortion to a marked degree. A 25-passenger parlor coach mounted on the 220-in. chassis was shown also and a 21-passenger street car city type bus in addition to a de luxe model of the same type.

The Twin Coach Company exhibited for the first time its new 21-passenger urban coach with center entrance. The feature of this type of bus is that at peak hours it has space available to carry double the number of passengers who can be seated. The wheelbase is 140 in., enabling the coach to turn within a 25-ft. radius. Its parts are interchangeable with the larger models. Various larger Twin Coach models were shown also.

The Dodge Brothers Corporation exhibited one bus of the 16-passenger parlor type and one of the 21-passenger city type. The engine develops 78 hp. and the transmission has four speeds. Four wheel brakes of the internal expanding hydraulic type are provided. A new combination of generator and motor which can be installed in any conventional type of bus was displayed by the Fraser Electric Transmission Company. The Fraser unit consists of a d.c. generator, which is directly connected to and driven by the bus engine, and an electric motor which takes current from the generator and drives the propeller shaft, all in a single housing.

A Pickwick "Nite Coach" showed much ingenuity in its design. Accommodations are provided for 26 passengers in thirteen compartments equipped with hot and cold running water. Kitchen and toilet facilities also are provided.

Recent models shown by the Lang

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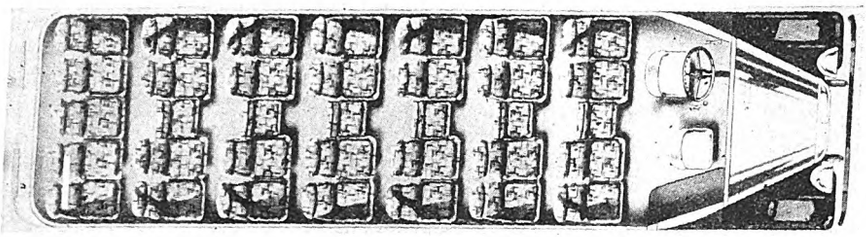

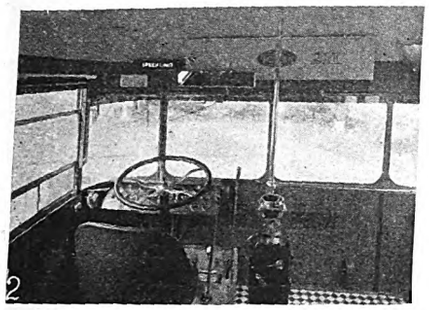

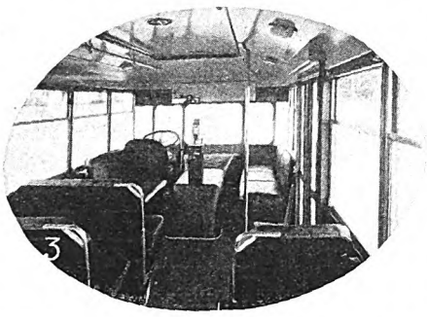

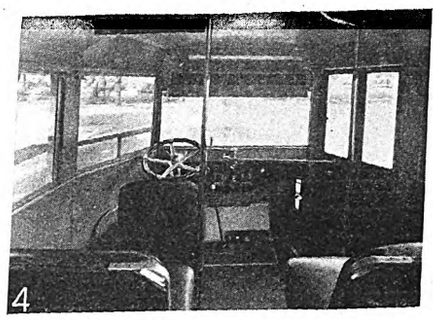

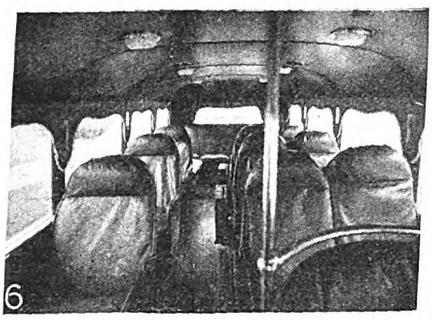

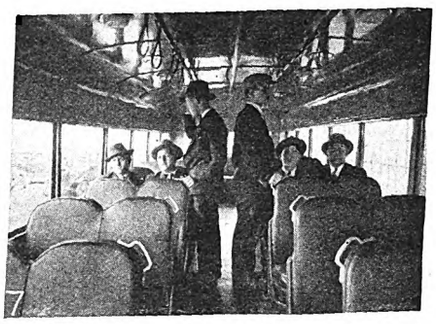

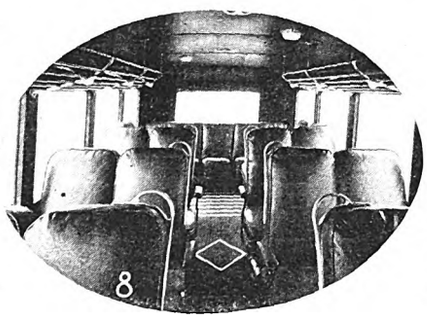

Some of the Features in the Bus Exhibits

1. This new model Yellow Coach has six tilting seats between the regular seats.
2. Device showing when predetermined speed limit has been reached is located above driver in the Twin Coaches.
3. Seating arrangement at front of new baby Twin Coach.
4. Commodious entrance of new Mack city type bus.
5. Interior view of new 39-passenger Yellow Coach with Lang body for city service.
6. Folding aisle seats increase capacity in this model shown by Bender Body Company.
7. Wide aisle and ample headroom feature White model 54-A bus.
8. Interior of Studebaker de luxe 21-passenger street car type bus.

Body Company include a body accommodating 39 to 41 passengers made for the Cleveland Railway, an all-metal, de luxe parlor car built for the Greyhound Lines and a body of semi-metal construction which was exhibited for the first time.

The Bender Body Company exhibited three different models—the fifteen- to eighteen-passenger parlor chair coach, the standard city type bus and a parlor-pullman coach. The first of these was mounted on a White six-cylinder chassis, model 61, with a wheelbase of 170 in. The standard city type bus affords seats to 21 passengers while the aisle width of 23 in. permits the carrying of a considerable number of standees. The parlor pullman coach seats 33 passengers while nine more can seated on folding or tilting seats, making a total of 42. Both the first and last mentioned designs have ample space for carrying baggage on the roof or inside on a wide overhead rack.

Four and six-cylinder motors for bus service were shown by the Hercules Motors Corporation. A feature is the integral casting of the crankcase with the cylinders.

The Waukesha Motor Company displayed various types of engines, including the latest rail six-cylinder motor, which develops from 200 to 400 hp. at a speed of approximately 1,000 r.p.m.

A Viking large model six-cylinder rail car engine was the feature of the Sterling Engine Company's exhibit. This motor has a cylinder 8 x 9 in., developing 465 hp. at 1,200 r.p.m.

A de luxe model 10 observation parlor coach mounted on a Reo GB bus chassis was shown by the Fremont Metal Body Company. A feature is that the body is provided with a rub rail composed of three runners of $3\frac{1}{2}$-in. molded hard rubber reinforced with steel, thus affording protection against denting of the lower panel. The Büssing Motors Company of America exhibited an imported chassis of German make. Its motor with a bore and stroke of $5 \times 6\frac{1}{2}$ in. develops 110 hp. at 1,000 r.p.m. The radiator is of the sectional type while the six-cylinder engine is cast in three blocks of two cylinders each and is mounted with transmission in a subframe suspended in rubber blocks. The Brooks Steam Motor, Inc., exhibited its first bus, preparatory to its start on a production basis. The Farnham Nelson Company, manufacturer of bus bodies, exhibited a parlor observation coach and a 39-passenger bus of the street car type with rear exit.

A 25-passenger bus built by the Anderson Body Company, with inside and outside baggage facilities having an all-metal body and roof of the monitor type, had also an all-metal interior, equipped with de luxe head-roll chairs. All seats face forward.

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The American Car & Foundry Motors Company exhibit featured recent models for intercity service. In these designs special attention has been given to the outside and interior finish, producing an extremely pleasing effect.

Innovations in Electrical Equipment

Visitors to the exhibit of the Westinghouse Electric & Manufacturing Company's exhibit were greatly interested in the demonstration of the VA variable automatic control. In this apparatus the control is actuated by two pedals placed in front of a comfortable seat for the operator. By means of a series of lights traveling around the frame the speed of the car is indicated corresponding to each action of the controller. The mechanism itself is placed in front of the operator, so that he can see at once the result of each movement of his feet on the pedals.

Other features of the exhibit included a complete truck for a double-truck street car, equipped with two 516-D railway motors and WN drive. One of the No. 1426BT, 50 hp. motors for use with the Timken drive also was shown. A large model of the Deion indoor circuit breaker was on display. There was also an automatic switching equipment, a Rectox polarity insuring equipment for railway converters and automatic d.c. feeder equipment.

Trolley bases and trolley harps and wheels for trackless trolleys were a feature, as were automotive air brakes. A demonstration of the voice-actuated control unit was given, attracting great attention. An entire section of the exhibit was given over to parts for modernization of equipment. Renewal parts of the latest design were shown, covering many lines of railway equipment.

Features of the General Electric display included the wide range of products made by this company. There was a working demonstration of the new PCM pedal-operated motor control with dynamic braking feature. A chart drawn with colored neon lights gave a graphic comparison of the smoothness of acceleration obtained with the PCM control with its eighteen points as compared with the K-75 control with eight points.

Other equipment displayed included a model of the synchronous selector supervisory for the centralized supervision of the Cincinnati Street Railway system, an atomic hydrogen arc welder, railway motors and controllers, gears and pinions and overhead line equipment.

A scene depicting a modern city with its skyscrapers, with a street car, a bus and an airplane in the foreground, gave an excellent opportunity for showing the possible uses of the products of the Aluminum Company of America. Underneath this picture was a display of many of the products of this company, ranging from large beams and casings to screws and nails. Windows and doors for cars and buses as well as for general building purposes were shown. There was an exhibit of castings and moldings used in the Blackhall car. Another display showed roofing and corrugated sheathing, while seamless tubing in various sizes was featured. One collection included screw machine parts such as bolts, nuts and machine and wood screws.

Track Exhibit Impressive

Among the several newly developed and improved devices and materials for track construction and maintenance which were shown at the exhibit were a uniform tension bolting machine, a new type of shallow tie, a new compression drop testing machine, improved rail grinders, tapered wood ties, a new design of rail welding preheater, bars and plates with bends for rail joints, a combination cover and tool box for a welding outfit and a concrete mixer heater. In all the groups of equipment—ties, rail joints, special work, rail bonds and track machinery there were many interesting and valuable exhibits.

Twice daily demonstrations of the "mortar flow" principle to give a uniform concrete bond between ties, rail and concrete, featured the exhibit of the International Steel Tie Company. The company also had on display a compression tamping machine, a uniform tension bolting machine to be operated by one man, a D.S.R. tie layer, a mortar flow pulsator, a modernized type of twin tie and a new precision type rolled steel rail clip. The company also showed samples of hand-tamped and pulsated concrete and steel bonds, a section of Detroit track that had been in service for eight years, the stone ballast and grout method for finishing track in three days and a type of tie construction for renewal on an old concrete base.

A number of models showing the Dayton method of track construction were included in the exhibit of the Dayton Mechanical Tie Company. The company also showed three types of shallow ties, booster joints, steel ties for special work and tilted rails.

A short section of track consisting of standard rails and Carnegie steel cross ties, along with several types of steel sheet piling, was shown by the Carnegie Steel Company. A pair of wrought steel wheels mounted on a heat treated axle completed the exhibit.

The W. S. Godwin Company demonstrated the use of its keystone tapered wood tie, wide on top and narrower on the bottom, which allows further spacing of the ties with additional strength. A small model with both tapered ties and regular square ties embedded in concrete, with the required spacing of each, was shown. The company also displayed its steel paving guards for increasing the edge bearing strength of pavement.

Samples of ZMA poles, cross arms and ties, preserved against decay and termite attack with zinc-meta-arsenite, were displayed by the Curtin-Howe Corporation. The samples demonstrated adequately the cleanliness of the timber after treatment and the ability of the treated wood to receive paint.

A newly developed compression drop testing machine and a large display of silico-manganese steel trackwork featured the exhibit of the Bethlehem Steel Company. This trackwork included a crossing, a tongue switch and mate and two diamond frogs. The company also displayed a track section of steel ties, samples of Keystone fin tail, open center and straight end steel ties, adjustable switches, bolts, a car wheel and an axle upon which were mounted a gear and two car wheels.

Special trackwork, including switches and crossing parts, as well as wood models showing construction of various special trackwork parts was included in the Lorain Steel Company exhibit. A flange bearing rail section also was shown.

Two solid manganese steel tongue switches, one a new flexible wall type and the other the proposed A.E.R.A standard type, were shown by William Wharton, Jr. & Company. This company also displayed a manganese steel half crossing of a scientifically designed type, a double point complete with stock rail and adjustable guard and a manganese steel tongue point complete with stock rail and heel casting.

The Metal & Thermit Corporation featured a new design of rail welding preheater in its exhibit. The

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company also displayed materials and equipment for Thermit rail welding, a welding tool wagon completely equipped, two new designs of rail clamps and specimens of Thermit welds made by various methods.

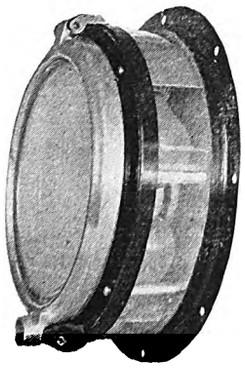
Una arc welders of the latest type for track welding, bonding and shop welding, Una arc welders of a.c.-d.c. types for shop use, samples of welds and high tensile rods were

Reclining chair exhibited for either car or bus by Heywood-Wakefield Company

shown by the Una Welding & Bonding Company. The company gave interesting demonstrations of its Goodspeed automatic welder.

The exhibit of the Railway Trackwork Company included the improved Atlas rail grinder equipped with a Bakelite wheel, the Vulcan rail joint grinder, an Ajax electric arc welding outfit, the Eureka rotary grinder, several grinding wheels and bricks and a track curve oiler.

A number of applications of Elastite, including rail filler, rail cushion,



Headlight exhibited by Electric Service Supplies Company illuminates the dash of street cars

asphalt plank, expansion joint, third rail covering, cable trunking and foot blocking, were displayed by Philip Carey & Company.

Several types of continuous joints and special angle bars adapted to the latest practice of welding were exhibited by the Rail Joint Company.

Samples of special trackwork, including a tongue switch, mate, frog, crossing and various types of spring boxes, were exhibited by the Buda Company. Photographs of assembled special trackwork layouts completed the company's display.

Steel plates and bars of various sizes for rail joints, shaped with a U-bend in the center to allow for expansion and contraction and designed for welding on the base and web of the rails, were shown by the Moisselle Welded Rail Joint Company.

All types of rail bonds, including steel arc weld, gas weld, copper arc weld, brazed and signal bonds, were displayed by the Electric Railway Improvement Company. The company also showed two electric arc furnaces, welding rods and rheostats and a wheel-mounted welder which also is portable. The cover for this welder was fitted with wheels allowing its conversion to a tool box when not used as a cover.

The American Steel & Wire Company also showed several types of rail bonds, signal bonds and rail bonding appliances, as well as welding wire, wire rope, wires and cables for all purposes.

A complete line of compressed air equipment for track construction and maintenance, including a compressor outfit, portable air compressors, tie tampers, paving breakers, drills, back fill tampers and other pneumatic equipment was displayed by the Ingersoll-Rand Company. This exhibit also included a safety saw and an air hoist.

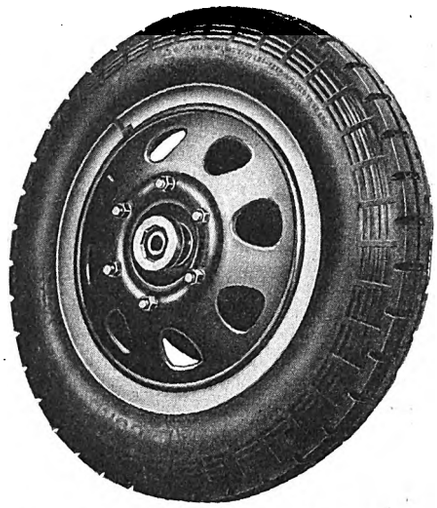
The Duff-Norton Manufacturing Company displayed a complete line of jacks for railway use, including track, automatic lowering, car repair, journal, self-lowering ball-bearing screw and air motor operated screw jacks. The company also showed pinion pullers and tie spacers.

Templeton, Kenly & Company, Ltd., also displayed several types of jacks for car, track and motor bus service. Among the jacks exhibited were some for pushing pipe under streets and tracks, pulling together rails and expanding rails.

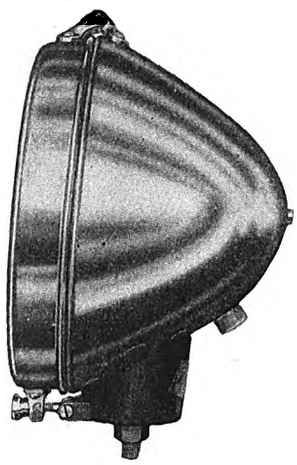
Several tools for railway use, including ballast and tamping forks, rail forks and rakes for gravel, cinders, etc., were exhibited by the American Fork & Hoe Company. The company also showed its True Temper products—tapered rail joint shims—and its rail anchors.

An oil burning tar kettle on wheels, a concrete mixer heater, a kerosene torch for general purposes mounted on wheels, a portable kerosene torch and a track sander comprised the exhibit of track equipment of the White Manufacturing Company.

Many improvements were shown in overhead line construction material. The Anaconda Wire & Cable Company and the American Brass Company jointly exhibited high-tension control wire risers used in catenary systems. A feature was the "Hi-tenso BB" wire, for which an 82 per cent conductance is claimed. Other products shown included copper composite cable, Anaconda hollow conductor, Everdur copper bus bars and tools, and commutator bars. The Malleable Iron Company's exhibit included adjustable mounts and overhead clamps for "H" columns, railroad electrification catenary clamps and cables, and insulator hangers.



Spoksteel single front wheel exhibited by the Motor Wheel Corporation, Lansing, Michigan



Golden glow chromium plated bus headlight has a diameter of 9 in.

The Cheatham Electric Switching Device Company showed an automatic electric switch point throwing device

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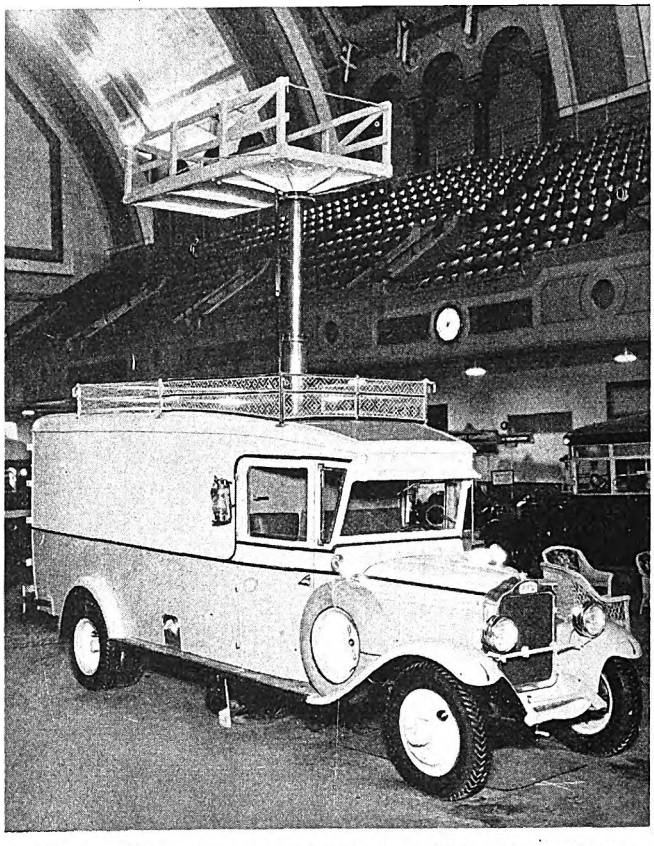
which is operated by the motorman through the controller on the car. The Westinghouse Electric & Manufacturing Company had a complete line of overhead construction material, such as splicers, frogs, section insulators, turnbuckles, etc.

A particularly interesting feature of the overhead line equipment exhibit was a tower wagon mounted on a 51-A White chassis. This is built in three sections and is hydraulically operated. The raising of the platform up to its highest position takes place in fourteen seconds. A maximum elevation of 25 ft. is obtainable.

An extensive line of overhead construction material was shown by the General Electric Company.

Catenary construction material was shown in the exhibit of the American Cable Company, which also had on display an interesting flexible belt and dead head sling.



New model tower wagon mounted on White 51-A chassis

Recent developments in overhead line material were shown in the exhibit of the Ohio Brass Company. Among the features were samples of the various parts used in the overhead system of the Cleveland Union Terminal. A newly-designed crossover for use in overhead systems for trackless trolleys operates automatically, thus preventing jumping of the trolley wheel which is more likely to happen with trackless trolley operation than in ordinary street railway operation. A section insulator has been designed for use in connection with this crossover. A splicer for high-speed operation was exhibited. This is especially recommended for pantograph operation and is made from a bronze aluminum alloy. A duplex removable pan of the frog facilitates its removal without disturbing the trolley wire or guy wire installations. A removable section-insulator design facilitates its replacement if necessary without disturbing the other parts of the overhead system. A spring lock hanger takes up the shocks applied to the trolley wire when a trolley wheel passes an ear. A special trackless trolley harp has been especially designed for application on the trolley bus to reduce the tendency for the trolley wheel to jump the wire. A cushion silencer which consists of a rubber insert into the trolley pole holding the trolley harp reduces the noise materially; it was shown for the first time. A removable trolley shoe attached to the harp by one bolt was shown also.

Flooring of various types was exhibited by the Johns-Manville Corporation, including Masticoke, truss plate steel flooring and other materials suitable for street cars and buses.

New 1-gal. pressure type fire extinguisher made by the Pyrene Manufacturing Company

The Irving Iron Works Company exhibited Safkar steps and Irving open-steel flooring.

The Alan Wood Steel Company showed the "AW" diamondette steel floor plates for use in the transportation industry.

Chanarch aluminium and steel car doors were featured by the Morton Manufacturing Company.

Porcelain enamel stanchions, hand rails and door hangers were included in the exhibit of the Ellcon Company.

Fyr-Freez exhibited portable fire extinguishers.

Meters to register energy consumption of electrical equipment and gasoline consumption on buses were featured by the Economy Electric Devices Company. At the same booth was shown a new type reverse-flow ventilating system.

De Walt Products Corporation had on display direct-driven power saws for ripping, crosscutting and other operations in coach work.

Highway crossing signals were this year's feature of the Nachod & U. S. Signal Company. The maximum traffic control device was installed in addition to the existing traffic signal installations. A turn-right signal to prevent sideswiping of cars with automobiles also was shown.

The Okonite Company and the Okonite-Callender Cable Company exhibited samples of rubber-covered and cambric insulated cables and various types of tape and ignition wire.

Motion picture apparatus with a portable sound collecting device was shown by Electrical Research Products, a subsidiary of the Western Electric Company.

Among the unusual displays was that of the Public Service Co-ordinated Transport. At the back of its booth were transparencies illustrating various phases of its extensive services. A large wall map of the territory served by the company's transportation lines, bus and electric, was the central feature of the exhibit, supplemented by time tables and descriptive literature.

Timken products were shown in two allied exhibits. The Timken Roller Bearing Company showed the use

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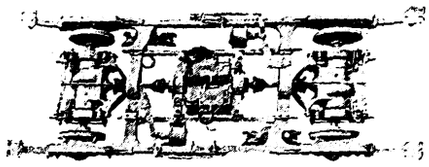
Cabinets inclose all control apparatus at front of car exhibited by Cincinnati Car Corporation

of its products in the form of railway journals and in the car of the Cleveland Railway. The Timken-Detroit Axle Company exhibited various types of bus axles and the new model 52 worm-drive street car truck.

The Clark Equipment Company showed a new bus axle designed for use with the Clark spoke type dual pneumatic wheel.

Single front and dual rear pneumatic wheels for trucks and buses were exhibited by the Erie Malleable Iron Company. The construction of these wheels permits free circulation of air around the brake drums which



New Brill 283-A truck for four-wheel cars

helps to keep the drums and tires at a normal temperature.

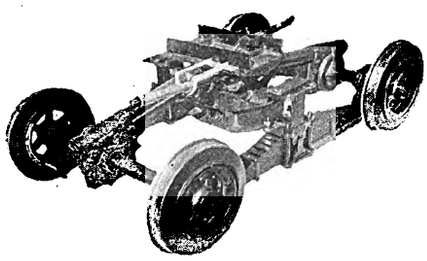
The National Malleable & Steel Castings Company exhibited a new wheel made of spun steel.

Ball and roller bearings of the latest types were shown by the Norma-Hoffmann Bearings Corporation, as well as bus generators and magnetos.

Bearings for axles and armatures were featured in a great variety in the exhibit of the National Bearing Metals Corporation.

The Spicer Manufacturing Corporation and its affiliated companies, the Brown-Lipe Gear Company and the Parish Crushed Steel Company, exhibited a line of propeller shafts and universal joints both of metallic and fabric type. Other products displayed were the latest bus transmission units and bus springs, side rails and other metal stampings.

A new ticket printing register was the feature of the Ohmer Fare Register Company's exhibit. This register is electrically operated. Instead of using a push button, a short

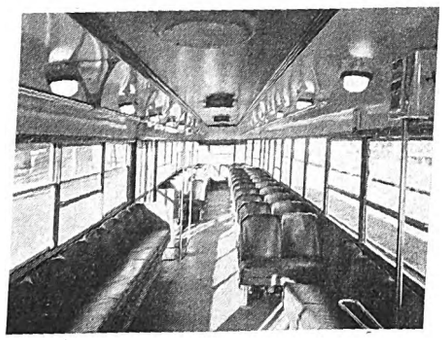


Twin Coach car has motor suspended from car body

hand lever is used which receives pressure from the palm of the hand. An indicator shows the amount of fare paid in large figures at the top of the register. Other exhibits were the standard ticket-printing register, toll bridge register and other types of cash and ticket registers.

Various types of fare registers for railway station and bus or car use were shown by the National Cash Register Company. The bus registers shown, print tickets which are issued to the passengers on payment of fare.

The Cleveland Fare Box Company



Interior view of new Twin Coach street car

exhibited its latest portable and stationary registers, coin-counting machines and tokens. Ticket and transfer-issuing machines were shown by the Macdonald Manufacturing Company.

The Perey Manufacturing Company had a display of passimeters and coin recorders.

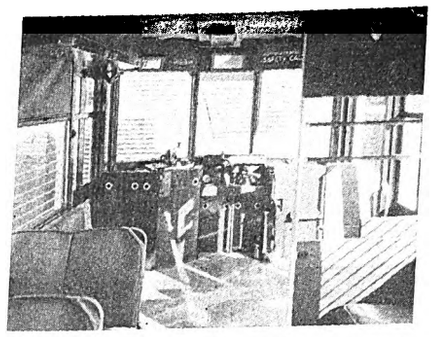
A number of types of coin-counting, coin-sorting and coin-wrapping machines were exhibited by the Sattley Company.

The Hyman Register Corporation showed devices for the mechanical issuing of transfers.

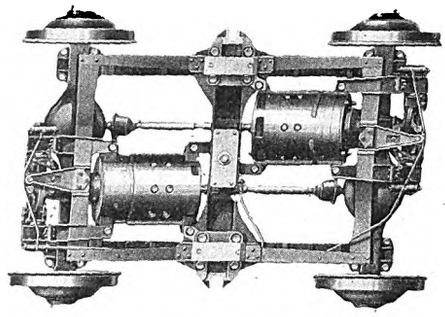
The Globe Ticket Company had a large display of transfers and railway tickets.

The Rochester Printing Company exhibited various types of railway transfers and tickets.

Electric car heaters of various types were shown by the Consolidated Car Heating Company. Motor resistor heaters which utilize the heat ordinarily wasted in resistance grids were also shown, as well as various other pieces of electrical equipment for cars, including relays, thermostatic control equipment and similar devices.



New arrangement of control apparatus in St. Louis car



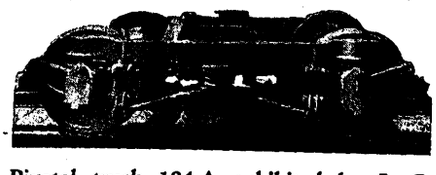
Timken model 52 worm drive truck with armature shaft disk brakes

The Gold Car Heating & Lighting Company exhibited various types of car-heating equipment and in addition switches, ventilators and miscellaneous sundries.

Two new models of the "2000 type" bus heater were featured by the Nichols-Lintern Company, along with a dual roof ventilator and a coach fan.

The Motor-Car Ventilator Company exhibited various types of

Cincinnati Car Company truck with track magnetic brakes



Pivotal truck 184-A exhibited by J. G. Brill Company

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ventilating systems, known as the "Vac-Vent," for buses. It is stated that these are especially adapted for the removal of carbon monoxide gas fumes and complete motor and body ventilation.

Upholstery leathers in the latest shades and in several grades formed the exhibit of the Radel Leather Manufacturing Company.

The Cleveland Tanning Company showed high-class upholstery leathers of all kinds.

The Eagle-Ottawa Leather Company showed various kinds of leather suitable for the upholstery of electric cars and buses.

Chase Velmo upholstery for interurban electric railway and bus equipment was shown by L. C. Chase & Company.

Blanchard Brothers & Lane had an attractive exhibit of leather upholstery for cars, buses and household and office furniture.

Reclining chairs for cross-country buses and rotating chairs, both double and single, for cars and buses were included in the display of the Hale & Kilburn Company. Other seats for transportation service were shown.

Specimens of Rol-Man products made of rolled and forged manganese steel were exhibited by the Manganese Steel Forge Corporation. The exhibit consisted principally of parts for use on cars and trucks, such as journal boxes, pedestal liners, bolsters and transom chafing plates.

Sound proofing of gear cases to reduce car noises was demonstrated by the Chillingworth Manufacturing Company.

Electric railway and bus equipment of many kinds was exhibited by the National Railway Appliance Company. Among the products were brake-testing machines, electrical test benches, drum screw lathes and similar machinery used in repair of cars and buses. The Fraser gas-electric drive and the Walter snow plow also were shown.

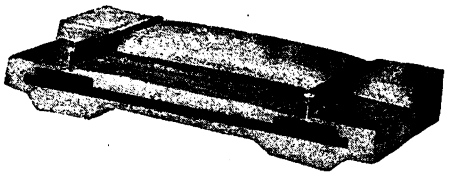
One of the latest developments shown by the Griffin Wheel Company was a chilled tread wheel with a chilled back flange and a chilled rim.

The American Brake Materials Corporation exhibited various types of brake shoes, brake bands and brake lining material.

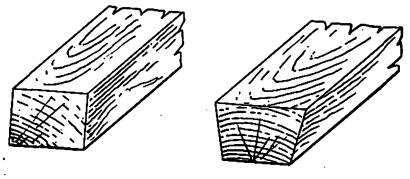
Brakeshoe linings for buses and trucks were displayed by the Russell Manufacturing Company.

Several types of wheel truing brake shoes were shown by the Wheel Truing Brake Shoe Company.

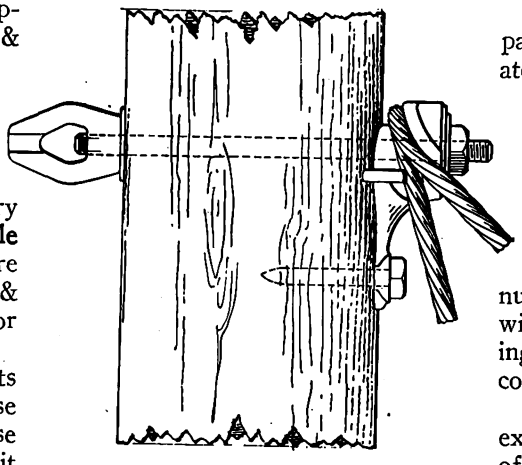
A working exhibit of the Anderson Brake Adjuster Company demonstrated the improved types of non-vibrating slack adjusters made by it. The adjuster is designed to prevent wear caused by vibration.



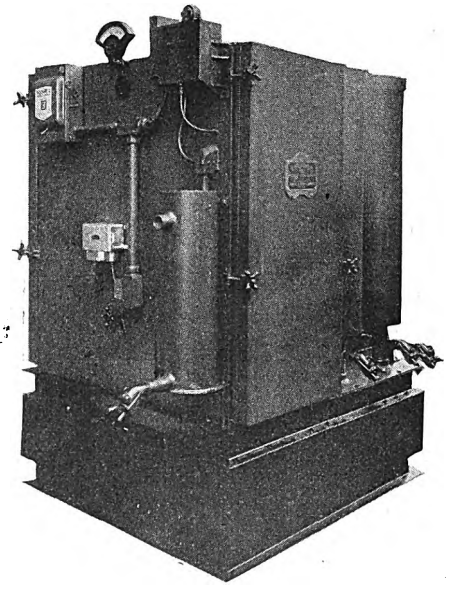
Cross-section of Dayton tie in track showing how it reinforces concrete beam



Keywood ties which are tapered for prolonging the life of track, shown by W. S. Godwin Company, Inc.



Guy hook and eye nut assembly manufactured by the Malleable Iron Fittings Company



The "Refineroil" oil reclaiming machine operates continuously 24 hours a day on 110 or 220 volts, a.c. or d.c.

In addition to the standard Peacock brake the National Brake Company exhibited new models of brakes, including an eccentric cam type and also a sheave type, both for vertical operation.

The Hunt-Spiller Manufacturing Corporation showed a new brake drum of air furnace gun iron for buses and trucks.

Electric Service Supplies Company was featuring a new type of headlight which illuminates the dash. The edges of the case are of glass, permitting the light to flood from the dash. Another headlight of parabolic shape for use on buses also was shown.

The Robert Bosch Magneto Company displayed magnetos, generators and other automotive equipment.

A complete line of electric starting, lighting, voltage regulation and other electric equipment was shown by the Leece-Neville Company.

Steering gears for buses and trucks were shown by the Hannum Manufacturing Company, along with a cut-away steering gear showing the variable ratio and large thread contact.

The National Pneumatic Company exhibited full-sized working models of door engines, treadles and similar equipment. The light-weight differential engine, the vacuum door engine for buses, a new treadle reversing machine and a treadle switch were other features.

The North East Electric Company featured a line of heavy duty electrical equipment for bus service, including starting motors, ignition units, magnetic horns, voltage regulators and junction boxes.

A new type of anti-friction bearing for railway journals was the feature of the display of SKF industries. It also was shown installed in a street railway motor.

Quick removable metal sash for street cars and buses was shown by the O. M. Edwards Company, along with samples of the Edward's metal filing cabinets.

Working models showing mechanical window lifting devices were installed in car sections in the exhibit of the Briggs & Stratton Corporation. Another display of this company was the Basco four-cycle gasoline engine.

The National Carbon Company showed a complete line of carbon graphite and metal graphite brushes for motors, generators and other electric railway equipment.

The Safety Car Devices Company

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had a complete display of safety car equipment, including foot-actuated brake valves, "E" relay valves and other detail parts. Wabco gaskets and packing cups also were shown.

The Saf-T-Cab Corporation displayed a four-passenger cab of the sedan type with a compartment for the driver separated from the tonneau.

The Hilliard Corporation, which makes the "Refineroil" oil reclaiming machine for the General Electric Company was showing its latest machine of 50 gal. per day capacity.

Aqua Oil Service displayed gasoline and oil storage equipment together with meter service as provided with Aqua nozzle control.

Samples of lubricating oils were shown by the Texas Company, displayed with working models of car axles, journal boxes and bearings.

The Crew Levick Company had a display of motor oil, differential oil, lubricating oils and greases, and a new grease gun developed for reaching the several bearings.

Cleaning material for bus and railway use was featured by Oakite Products and a model tank equipment in actual operation demonstrated how tenacious grease and dust can be removed from car trucks and buses.

The Arco Company showed its various types and shades of paint and lacquer finishes.

Haskelite Manufacturing Corporation showed samples of Haskelite plywood and Plymetl for use in cars and buses and for paneling and interior trim in building construction.

The De Vilbiss Company showed a model spray painting outfit together with exhaust equipment for spray painting and lacquering. Another display was a portable air compressor used in the spray painting of bridges and other outside structures.

Cut-away models of transmissions and clutches for buses and trucks electrically driven to show transfer of power through the various reductions were shown in the booth of Fuller & Sons Manufacturing Company.

Gruss air springs in various models for use on buses, taxis and trucks were displayed by the Cleveland Pneumatic Tool Company. The exhibit also included a working model of the "Cleco" multi-power automobile brake.

The Bragg-Kliesrath Corporation exhibited its B-K vacuum power brakes for all types of gasoline-driven motor vehicles.

The uses of Pantasote for car-seating and curtain material, of "Thermasote" insulating board and of "Homasote" floor-insulating material were featured at the booth of the Pantasote Company. Models also showed the correct and incorrect manner of applying "Agasote" for headlining and paneling.

Budd Wheel Company had a display featuring the double capnut mounting which separately locks each of the rear wheels of the bus or truck.

Seating equipment, including adjustable back reclining seats for long-distance bus operation, as well as seating equipment for street cars, was included in the display of the Kelton-Aurand Manufacturing Company.

The Heywood-Wakefield Company exhibited a complete line of seats for use on city or interurban cars. The exhibit also featured a three-position reclining seat for use in long-distance bus operation.

Malleable iron hardware for bus body work, including door controls, bus seat frames, folding steps, corner irons and windshield hinges, was shown in the booth of the Eberhard Manufacturing Company.

Houde Engineering Corporation displayed its full line of hydraulic double-acting shock absorbers for controlling spring action. The company's standard bumpers also had a place in the exhibit.

A full-sized as well as a miniature model of the "Handy Sandy" distributor, for spreading sand, cinders or salt on icy pavements, was displayed by Highway Service, Inc. The device can be easily attached to any truck.

Ypsilanti Reed Furniture Company had a showing of some of its latest car and bus seating equipment, including a reclining chair for long-distance operation.

Zenith-Detroit Corporation was represented by its line of carburetors and fuel filters.

"Tool Steel" gears and pinions for electric railway service and the "Tool Steel" single reduction gear unit for high-speed motors formed the exhibit of the Tool Steel Gear & Pinion Company.

Skinner Automotive Device Company showed in operation its standard oil reclaimers for reconditioning crankcase drainage.

Oxalite Corporation had a display with Oxalite rail welding materials, with alloy steel clamps, molds and crucibles in place. There were also shown oxalite rail welds on various types of joints, together with the apparatus used in performing the work.

Stevens-Walden Company exhibited its line of wrenches of various types, including special sets for electricians, millwrights, and automotive mechanics, as well as other shop equipment in its line.

Standard Steel Works Company showed a special rolled steel wheel and a tempered steel axle, both supplied to well-known railway operators.

Deluxe Products Corporation exhibited its light-weight cast-iron piston, which is especially adapted for heavy-duty bus and truck service.

Goroco Mechanical Spreader Company showed a miniature working model of its device for spreading and distributing sand, cinders or gravel. It is said to be easily attachable to any truck and can be operated with one or with two men.

Hyatt Roller Bearing Company exhibited its latest standard journal box designed for standard A.E.R.A. pedestals.

Overhead trolley line material for direct suspension work, including trolley frogs, hangers, crossovers and ears, was exhibited by the Electric Railway Equipment Company. This company also had on display sample sections of tubular steel poles and pole fittings.

C. I. Earll showed working models of trolley catchers and receivers in operation.

A new type of integrating gasoline meter, designed especially for buses, and a new type of air rectifier for preventing frozen equipment on railway cars were in the exhibit of the Illinois Motive Equipment Company.

International Register Company showed a complete line of single and double fare registers, for electrical foot or manual operation. The exhibit also included a saw for cutting plywood.

Upholstery leathers, both in full hides and on bus and car seats, featured the display of the General Leather Company. Products of this company were also used in upholstery work by a number of the other manufacturers of standard seating materials as exhibited at the convention.

Aligning and boring fixtures for main bearings and connecting rods, a main bearing thrust facing and radius tool, a connecting and trimming tool, a brake drum gage and a drum lathe were exhibited by the Waddell Engineering Company.

The Tuco Products Corporation showed its "Tucolith" composition

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flooring for cars and buses, with working models showing the proper application at door entrance and at trapdoors. The exhibit also included samples of the Tuco waterproof roofing canvas and Tuco window screens.

H. H. Robertson Company displayed a model substation ventilated by means of stationary roof ventilators and illuminated through Robertson side wall sash.

Railway Utility Company exhibited a full line of heaters, heat regulators and ventilators, fitted with its Chromalox heating units.

Wood Conversion Company had in its booth samples of balsa wood insulation for passenger and refrigerating cars and for buses. The uses of this material and of its "Nu-wood" insulating board were shown by means of an automatic motion-picture apparatus.

Motor Wheel Corporation showed samples of its "Spoksteel" drop-forged wheels for buses and trucks.

The exhibit of the Ohio Varnish Company consisted of a display of the raw materials entering into the manufacture of that company's paints and lacquers.

Ahlberg Bearing Company was represented by a line of its CJB master ball bearings and ground bearings.

Continental Motors Corporation had a display of its complete line of bus and truck motors mounted on revolving standards. Some of the models were cut away to show the action of the pistons while in motion. Included in the display was the new 150-hp. bus motor.

Dayton Steel Foundry exhibited its single and dual pneumatic steel bus and truck wheels.

Bonded asbestos brake lining, which is said to possess special qualities of resistance for high-speed service, was exhibited by Ferodo & Asbestos, Inc.

Johnson Fare Box Company displayed its line of stationary automatic registers and electric fare collection systems. Change-makers were also displayed.

New Departure Manufacturing Company had in its booth two heavy-duty bus axles cut away to show the installation and operation of "New Departure" bearings in gears, differential and pinion shaft. A four-speed heavy-duty bus transmission was cut away to show the application of the bearings to all shafts.

Winchester Repeating Arms Company had a display of its cartridge core radiators for buses and heavy-duty trucks.

Apparatus shown by the Miller Oil Purifier Company restores used lubricating oil to its original quality. It is automatically controlled by an electric thermostat and the used oil is pumped into the treating chamber with a mechanical compound and heated to flash temperature, after which it is filtered.

The Wadell Engineering Company exhibited main bearing and connecting rod boring apparatus and other fixtures used in the finishing of gasoline motors.

Ross Gear & Tool Company in its exhibit featured its recently developed "roller mounted" cam and lever steering gear, which is said to permit of greater ease in steering.

At the Bridgeport Brass Company booth were samples of the overhead line materials made by this manufacturer.

Charts and Statistics in A.E.R.A. Exhibit

One of the most interesting exhibits at the A.E.R.A. booth was a series of 26 wall charts and graphs depicting recent trends in electric railway and motor bus operations. These covered such subjects as distribution of revenues, passenger traffic, relation of passenger automobile registration and of material employment to passenger traffic, wages, fares, distribution of operating expenses, increase in bus operations, bus depreciation rates in use, relief from paving burdens, percentage of gross earnings paid for accidents, etc.

All of the available bulletins and reports prepared by the statistical department were on display. These covered nearly the whole range of subjects that are of vital interest to electric railways and motor bus operators. Other publications of the association also were displayed.

Interior of Atlantic City Auditorium during 48th annual A.E.R.A. convention, showing bus exhibit in foreground

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Latest Monthly Reports

MONTHLY reports of electric railway companies for the latest available periods are shown below. The trends toward stabilization of revenue and expenditures that have been available for some time continue. Many companies are showing a considerable improvement in net income.

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Key System Transit Co., Oakland, Cal.					
July, 1929	568,353	522,667	.....	45,686	*76,706*
July, 1928	586,392	545,641	.....	40,751	*82,521*
7 mo. end. July, 1929	4,077,923	3,952,284	.....	125,639	*750,294*
7 mo. end. July, 1928	4,143,486	3,678,303	.....	465,182	*392,251*
Market Street Railway, San Francisco, Cal.					
August, 1929	825,433	680,391*a*	.....	145,042	87,384*f*
August, 1928	829,968	702,646*a*	.....	127,322	66,552*f*
12 mo. end. Aug., 1929	9,578,190	8,156,738*a*	.....	1,421,452	697,813*f*
12 mo. end. Aug., 1928	9,854,150	8,336,957*a*	.....	1,517,193	758,466*f*
Jacksonville Traction Co., Jacksonville, Fla.					
July, 1929	88,555	78,690	8,995	495	.....
July, 1928	92,461	80,090	8,928	3,073	.....
12 mo. end. July, 1929	1,166,990	946,664	106,622	107,446	*52,192*
12 mo. end. July, 1928	1,244,653	1,008,763	107,086	121,787	*48,736*
Honolulu Rapid Transit Co., Honolulu, Hawaii					
August, 1929	87,963	51,367	7,976	29,608	16,339
August, 1928	91,051	52,701	13,128	26,163	15,197
8 mo. end. Aug., 1929	703,775	403,167	74,236	235,045	129,214
8 mo. end. Aug., 1928	716,767	420,791	94,838	209,338	145,810
Chicago Surface Lines, Chicago, Ill.					
August, 1929	5,113,909	4,129,476*a*	.....	984,433	851,651*d*
August, 1928	5,072,241	4,085,147*a*	.....	987,094	850,475*d*
Indianapolis Street Railway, Indianapolis, Ind.					
July, 1929	384,445	302,415	.....	82,030	5,250
July, 1928	389,580	306,944	.....	72,636	638
United Railways & Electric Co., Baltimore, Md.					
August, 1929	1,307,143	903,403	115,130	302,455	21,410
August, 1928	1,254,367	845,359	115,892	304,619	20,453
8 mo. end. Aug., 1929	11,025,673	7,572,608	1,060,129	2,509,875	252,861
8 mo. end. Aug., 1928	10,765,664	7,279,286	1,029,107	2,553,851	284,634
Boston Elevated Railway, Boston, Mass.					
August, 1929	2,473,665	2,021,243	125,252	332,263	*361,650*
August, 1928	2,477,150	2,073,618	133,059	276,237	*398,356*
July, 1929	2,496,387	1,969,935	125,342	412,871	*285,903*
July 1928	2,525,089	2,048,956	145,236	345,000	*331,329*
Eastern Massachusetts Street Railway, Boston, Mass.					
August, 1929	689,273	465,546	30,270	213,293	59,177
August, 1928	720,276	522,025	27,102	195,690	49,733
8 mo. end. Aug., 1929	5,813,685	3,633,666	259,132	2,069,587	641,750
8 mo. end. Aug., 1928	6,075,376	3,945,609	233,483	2,051,585	648,005
Boston, Worcester & New York Street Ry., Framingham, Mass.					
June, 1929	66,457	56,598	1,625	8,393	6,923
June, 1928	56,360	47,543	1,614	7,391	5,921
6 mo. end. June, 1929	66,457	305,789	9,750	44,654	35,834
6 mo. end. June, 1928	56,360	340,655	9,689	33,451	24,482
Department of Street Railways, Detroit, Mich.					
August, 1929	2,136,238	1,650,272	62,178	432,368	287,182
August, 1928	1,997,417	1,553,846	63,435	400,241	240,416
12 mo. end. Aug., 1929	26,641,025	21,101,478	752,076	4,950,693	3,240,691
12 mo. end. Aug., 1928	23,787,435	18,535,903	784,498	4,702,540	2,805,361
Kansas City Public Service Co., Kansas City, Mo.					
August, 1929	717,306	556,639	41,675	118,991	42,123*c*
August, 1928	717,402	.....	.....	.....	57,716*c*
8 mo. end. Aug., 1929	5,949,988	4,493,970	333,400	1,122,617	496,479*c*
8 mo. end. Aug., 1928	6,035,483	.....	.....	.....	485,493*c*
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
June, 1929	85,895	80,169	7,840	52,807	17,774
June, 1928	77,118	58,448	7,840	23,427	*11,201*
6 mo. end. June, 1929	516,531	388,780	47,040	148,338	*46,488*
6 mo. end. June, 1928	546,801	383,551	47,040	152,516	*40,185*
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
July, 1929	77,124	62,708	7,840	18,851	*11,520*
July, 1928	72,135	58,808	7,840	17,440	*13,717*
7 mo. end. July, 1929	593,655	451,488	54,880	167,189	*58,008*
7 mo. end. July, 1928	618,937	442,360	54,880	169,957	*53,903*
Brooklyn-Manhattan Transit System, New York, N. Y.					
August, 1929	4,944,666	3,513,358	298,381	1,210,220	404,645
August, 1928	4,824,580	3,483,735	315,510	1,126,349	400,104
2 mo. end. Aug., 1929	10,095,553	7,020,597	632,143	2,583,965	1,012,158
2 mo. end. Aug., 1928	9,811,047	6,967,227	658,841	2,396,232	962,061
Hudson & Manhattan Railroad, New York, N. Y.					
August, 1929	990,161	520,501*a*	.....	469,660	134,241
August, 1928	967,369	541,172*a*	.....	426,197	90,706
8 mo. end. Aug., 1929	8,262,107	4,193,138*a*	.....	4,068,969	1,381,273
8 mo. end. Aug., 1928	8,200,304	4,265,679*a*	.....	3,934,625	1,250,599
Interborough Rapid Transit Co., New York, N. Y.					
August, 1929	5,432,697	3,726,407	196,713	1,509,576	*280,146*
August, 1928	5,052,627	3,482,656	197,300	1,372,671	*429,846*
2 mo. end. Aug., 1929	10,899,103	7,502,218	399,021	2,997,863	*580,523*
2 mo. end. Aug., 1928	10,145,869	6,834,057	394,804	2,917,008	*687,628*
Long Island Railroad, New York, N. Y.					
July, 1929	4,250,440	2,290,236	476,658	1,483,499	1,329,088
July, 1928	4,108,724	2,351,987	420,534	1,335,716	1,129,029
7 mo. end. July, 1929	23,582,131	15,863,513	1,530,804	6,173,945	5,089,705
7 mo. end. July, 1928	22,884,958	16,569,866	1,356,249	4,952,990	3,872,671
New York, Westchester & Boston Ry., New York, N. Y.					
August, 1929	219,537	152,805*a*	.....	66,732	*151,071*
August, 1928	204,874	166,745*a*	.....	38,129	*167,347*
8 mo. end. Aug., 1929	1,671,155	1,194,988*a*	.....	476,167	*1,237,382*
8 mo. end. Aug., 1928	1,561,916	1,197,648*a*	.....	364,268	*1,233,883*
Third Avenue Railway System, New York, N. Y.					
August, 1929	1,239,476	970,932	88,484	199,711	*64,945*
August, 1928	1,258,110	995,477	94,389	185,924	*71,945*
2 mo. end. Aug., 1929	2,536,787	1,972,336	179,337	424,336	*97,421*
2 mo. end. Aug., 1928	2,563,786	1,994,974	188,962	414,291	*88,219*
Cincinnati Street Railway, Cincinnati, Ohio					
August, 1929	722,505	506,327	61,714	156,432	*23,754e*
Philadelphia & Western Railway, Norristown, Pa.					
August, 1929	60,556	36,696	.....	.....	8,693
August, 1928	64,319	39,466	.....	.....	9,681
Galveston-Houston Electric Railway, Houston, Texas					
July, 1929	51,752	27,753	2,563	21,434	.....
July, 1928	55,640	31,283	2,511	21,844	.....
12 mo. end. July, 1929	605,423	337,771	31,769	235,882	*34,970*
12 mo. end. July, 1928	682,684	398,302	30,465	253,915	*14,741*
Houston Electric Company, Houston, Texas					
July, 1929	277,144	175,103	25,440	76,600	.....
July, 1928	276,188	169,876	24,753	81,557	.....
12 mo. end. July, 1929	3,374,467	2,092,403	287,104	996,925	591,525
12 mo. end. July, 1928	3,287,429	2,000,118	295,525	991,785	591,361
Pacific Northwest Traction Co., Seattle, Wash.					
July, 1929	92,304	68,603	5,834	17,865	.....
July, 1928	88,183	66,344	4,981	16,796	.....
12 mo. end. July, 1929	899,050	750,770	54,094	94,183	*23,413*
12 mo. end. July, 1928	883,867	710,455	49,556	123,854	*56,458*
Spokane United Railways, Spokane, Wash.					
July, 1929	93,921	87,919	5,525	.....	*28,661*
July, 1928	98,524	.....	5,145	.....	.....
Calgary Municipal Railway, Calgary, Alta.					
July, 1929	95,234	55,468	.....	39,766	8,899
July, 1928	88,013	55,281	.....	32,732	6,950
7 mo. end. July, 1929	609,938	349,080	.....	260,858	48,193
7 mo. end. July, 1928	546,671	334,144	.....	212,527	36,214
Edmonton Radial Railway, Edmonton, Alta.					
July, 1929	67,629	46,568	.....	21,061	712
July, 1928	67,638	44,472	.....	23,166	2,423
7 mo. end. July, 1929	501,392	314,109	.....	187,283	14,846
7 mo. end. July, 1928	474,479	310,718	.....	163,761	3,558
Lethbridge Municipal Railway, Lethbridge, Alta.					
June, 1929	4,803	3,929	.....	874	*1,711*
June, 1928	4,888	5,250	.....	*362*	*2,947*
6 mo. end. June, 1929	30,338	24,098	.....	6,240	*9,272*
6 mo. end. June, 1928	29,657	28,003	.....	1,654	*13,855*
British Columbia Electric Railway, Vancouver, B. C.					
June, 1929	1,133,016	791,929	.....	341,087	.....
June, 1928	1,051,883	730,576	.....	321,307	.....
12 mo. end. June, 1929	14,046,630	9,446,459	.....	4,600,171	.....
12 mo. end. June, 1928	13,175,223	9,091,733	.....	4,083,490	.....
London & Port Stanley Railway, London, Ont.					
June, 1929	61,337	54,725	.....	6,612	.....
June, 1928	52,293	47,725	.....	4,568	.....
Hydro-Electric Railways, Essex District, Toronto, Ont.					
June, 1929	107,301	77,949	400	19,002	*11,320*
8 mo. end. June, 1929	853,650	624,779	3,146	225,725	*10,424*
8 mo. end. June, 1928	.....	.....	.....	.....	*23,057*
Regina Municipal Railway, Regina, Sask.					
July, 1929	31,299	20,526	.....	10,773	*1,139*
July, 1928	26,655	19,281	.....	7,374	*3,158*
7 mo. end. July, 1929	249,789	152,186	.....	97,603	14,212
7 mo. end. July, 1928	209,661	140,900	.....	68,761	*1,678*
Saskatoon Municipal Railway, Saskatoon, Sask.					
July, 1929	31,073	21,638	1,227	8,208	*589*
July, 1928	29,623	19,769	1,185	8,669	1,407
7 mo. end. July, 1929	224,648	140,965	9,252	93,683	14,162
7 mo. end. July, 1928	202,881	134,001	8,115	68,880	10,302

a Includes taxes. *b* Net operating revenue. *c* Before depreciation. *d* Balance for return on investment. *e* Deficiency after return on capital. *f* Before depreciation and federal taxes.

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News *of the* Industry

Market Street Railway's Position Favorable

In a review of the affairs of the Market Street Railway, San Francisco, Cal., Hubert J. Soher, writing in the *Chronicle*, says:

"Market Street Railway earnings this year are showing a slight improvement over the previous year in spite of the fact that quotations on its bonds and prior preferred stock are at the lowest point in history. The bonds are quoted at $89 and the stock at $23 with junior stock issues selling at less than $10 per share.

"It is quite apparent that the improvement has been reflected in recent months rather than during the year and the improvement in earnings in the last few months over the corresponding period of last year is the best criterion by which to judge the company.

"While earnings have declined, the drop has been due largely to conservative bookkeeping methods invoked by the corporation, although gross has declined to a slight extent and operating expenses have increased substantially in the same period.

"The company holds $330,000 in its treasury and $2,309,000 in its sinking fund. The company reduces its outstanding funded debt at the rate of $500,000 each year from 1925 to 1932, inclusive, and at the rate of $300,000 per annum thereafter.

"The sinking fund has been rather stringent and will continue so for another two and a half years, but with payments cut down by $200,000 the company will be in a much better position up to maturity in 1940.

"The Market Street Railway people, at least, are in the interesting position of having their first franchise expire in November and the city in the somewhat embarrassing position of having no solution to offer the citizens or the company as a result of the impending expiration.

"The company will probably continue to operate under a temporary charter extension, but the matter will necessarily have to come to a head before long. Under the circumstances, the bonds paying $7 are yielding nearly 8 per cent at the present time. The company is apparently able to continue to pay its funded debt without difficulty and to meet its sinking fund requirements promptly."

Duquesne Wants Contract Similar to Pittsburgh

Public Service Commissioner Shelby conducted a hearing recently at which the city of Duquesne and the Pittsburgh Railways sought the commission's approval of a contract entered into a month ago by the city and the company, providing for creation of a traction conference board to assist in the management of the company.

The contract is similar to those entered into with many other municipalities in Allegheny County, being in effect a duplicate of the contract the company entered into with the city of Pittsburgh in 1921. It provides for an annual payment to the municipality in lieu of paving charges.

No opposition to approval of the contract developed.

City Renews Its Plea for Relief from Purchase Obligation

Mayor Edwards of Seattle, Wash., has asked A. W. Leonard, president of the Puget Sound Power & Light Company, to present a request to the officers of the company in the East for a two-year moratorium on payments of principal under the terms of the contract by which the city is purchasing the company's railway lines. In the event the railway deal is not promptly refinanced, the Mayor asks that the moratorium be granted so the lines can be rehabilitated, new, light cars purchased, better service afforded, expenses reduced and a general breathing spell afforded to the city. Interest payments, it is definitely understood, would be met promptly.

The city executive makes it clear that the moratorium is asked only in the event the negotiations for refinancing the debt, to be taken up when President Leonard returns about three weeks later, are delayed for any reason.

Getting After the Boston Taxis

Police Commissioner Herbert A. Wilson, testifying before the special commission investigating the taxicab situation at the State House, said that prior to 1927 he had had no difficulty regulating the public and private stands but that after that time infractions had piled up and he began to prosecute the offending drivers. He said that attorneys for the taxicab companies had adopted the attitude, "Let Wilson prosecute. We'll have it nol-prossed upstairs."

Commissioner Wilson upheld his original position that, unless he is allowed a continuation of his present authority to regulate the situation, it will become impossible to control.

In response to questioning, he said he was opposed to establishment of a separate body for control of taxis, if the matter of street regulation were still to remain as a police function. He was inclined to think, he said, that even in cities where such a body exists, taxi control ultimately remains with the police.

Twin City Company Against School Fare

Owing to the request that the Twin City Rapid Transit Company, Minneapolis, Minn., put into effect a 5-cent fare for school children similar to that granted recently in Duluth, T. Julian McGill, vice-president at Minneapolis, has found it necessary to review anew the conditions under which the Duluth-Superior Traction Company granted this concession. Mr. McGill pointed out that the 5-cent fare for Duluth school children was granted only after the Duluth Council had agreed to the following concessions:

To revoke present council orders for street railway extensions.

Not to order any additional extension for two years..

To agree to the removal of certain bus lines that were not paying.

Not to appeal to the United States Supreme Court the State Railroad and Warehouse Commission's fare decision.

Mr. McGill is understood to feel that the principle of a school children's fare is unsound economically, and that there is no accurate basis for applying this fare only to the needy.

He also pointed out that in Duluth 10-ride coupon books, sold for 50 cents, must be used within 15 days. Coupons unused after that period are void.

$31,109,174 for Cars and Subway Equipment in New York

Requisitions aggregating $31,109,174 covering seventeen different items affecting rapid transit construction facilities came before the Board of Estimate of New York for approval at its first fall meeting Sept. 26. All but $98,970 of this sum is for the city's new subway system. The main items in the list for the city system follow:

300 steel cars	$9,145,000
600 motors and controls	2,659,100
Signal equipment	5,598,750
Power substations	2,743,174
Schermerhorn Street contract	4,934,000
Queens Boulevard contract	5,250,000
Duct line in Fifty-third Street	286,500
Completion of Central Park West	51,000
Real estate fund requirements	100,000

In the Interest of Brooklyn's Civic Beauty

Co-operating with the Brooklyn Downtown Association and the merchants on lower Fulton Street in their efforts to improve the appearance of Brooklyn's principal downtown shopping street, the Brooklyn-Manhattan Transit Corporation has begun the work of repainting the "L" structures in Fulton Street from Hudson Avenue to Myrtle Avenue and in Flatbush Avenue from Livingston Street to the north side of Fulton Street. For these sections of the "L" a color scheme has been adopted which is expected to make the structure more pleasing in appearance. Included in the color combinations are light buff, light green and dark green. The B.-M.T. is also planning to remove any unnecessary signs and wires from the structure, and has arranged to move the feeder wires now attached to the side of the structure between Boerum Place and Flatbush Avenue to a less conspicuous place under or on the structure.

Bellingham, Wash.—Paving between tracks of the Pacific Northwest Traction Company on South State Street, will be started at once. The work will cost $25,000.

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Late News Briefs

Indianapolis, Ind.—Public hearings on the proposed $70,000,000 Indiana utility merger affecting gas, interurban and power companies of the state, will be opened Dec. 2 by the Indiana Public Service Commission. When all audits, appraisals and exhibits have been submitted, a recess will be declared to permit the evidence to be studied by all parties. No statement has been made for some time relative to progress of the forces at work in the field studying the properties, but it is understood that practically all work has been completed and exhibits now are being prepared.

Palo Alto, Cal.—The Peninsular Railway has been authorized by the Railroad Commission to abandon operation of its interurban line between Mayfield Junction and the Southern Pacific Company's station at University Avenue in Palo Alto. Service will also be abandoned on the Stanford University line from the Southern Pacific station at University Avenue to the campus. The company has, however, been authorized to operate a new service between Mayfield Junction and the Mayfield station of the Southern Pacific.

Boise, Idaho.—A miniature traffic war has been peremptorily ended, with the department of law enforcement ordering an invader of the territory of the Boise Traction Company off the streets. The invading transit company had a permit to operate between Boise and Idaho City but during the past several days has been moving just ahead of the regular bus, hauling passengers free of charge.

Indianapolis, Ind.—Final hearing on four suits seeking a permanent injunction against consummation of the Insull deal for the Union Traction Company of Indiana will be held before Judge Harry O. Chamberlin in the Circuit Court in Indianapolis on Oct. 29. Counsel for the protesting bondholders have agreed that a temporary restraining order issued by the court a fortnight ago should continue without hearing on the application for a temporary injunction and that the issues in the cases should be heard all at the same time unless action should be taken before Oct. 29 by the defendants to have the restraining order dissolved.

Atlanta, Ga.—A conference has been called between bus operators and members of the Georgia Public Service Commission relative to placing of bus lines under the commission in accordance with an act of the recent legislature.

Columbus, Ohio—In commenting on the report of Harry Allensworth, expert for the city in its investigation of the railway department of the Columbus Railway & Light Company, the Columbus *Citizen*, a Scripps-Howard paper, says: "When a new street car rate is put up to the voters of Columbus they have a very practical business problem to decide. They must decide whether or not they want street cars and, if so, at what rate they may be assured of having them."

Baltimore, Md.—Within a year the United Railways plans to relocate the entire stretch of rails on York Road between Towson and the city line, moving the rails to the center of the street.

New York, N. Y.—The Manhattan Railway stockholders' protective committee has announced through its chairman, Nathan L. Amster, that it has filed a formal request with Chairman Delaney, of the Board of Transportation, and also with William G. Fullen, chairman of the New York State Transit Commission, to be joined, as party of primary interest, in any of the conferences, hearings and negotiations between those parties and the Interborough Rapid Transit Company.

Washington, D. C.—Preparations for the resumption of hearings on the application of the Capital Traction Company for an increase in fare have been started by the Public Utilities Commission with indications that a final and determined effort will be made to mold a new plan of merger that will be acceptable to both the public and the companies. The hearings were recessed Sept. 10 to permit the commission to dispose of a mass of accumulated routine matters. They are now about to be resumed.

Toronto, Ont.—While many of the members of the Council have expressed themselves as being in favor of the investigation of the affairs of the Toronto Transportation Commission, it is felt by others that there has not been sufficient evidence produced to warrant the city to involve itself in an investigation that has been estimated to cost $240,000. In the official communication forwarded to the Council, the Board of Control recommended that a judicial probe be instituted "with respect to each and every allegation, statement and insinuation contained in the letter of Acting Chairman E. J. Lennox, and that, in conjunction with the judicial investigation recommended, an independent audit of the books and accounts of the T.T.C. should be ordered."

Providece, R. I.—Use of the one-man system on Broad Street, by the United Electric Railways which also operates in Pawtucket and Central Falls leaves Providence proper with only one electric line continuing to operate on the former basis of two operators.

Montreal, Que.—The wants of the South Shore in matters of transportation were explained to the transport interests at a conference held recently, attended by delegates of the South Shore Transportation Commission, the Montreal Tramways, the Canadian National Railways and the Provincial Transport Company. Those demands were held confidential, since within a few weeks there will be another meeting at which first lines of a definite transportation plan may be drawn. The South Shore Commission intends to communicate that plan first to each municipality across the St. Lawrence.

Lynchburg, Va.—When the one-man car is placed in operation by the Lynchburg Traction & Light Company in this month, the one man who will operate it will be called the "operator." The operator will be clothed with a new style uniform. It will comprise khaki trousers and coat, military style. The shoes will be high black, and black puttees will be used. The cap will be visor style, with insignia above visor. The badge will be worn on left coat breast. The shirt to be worn by the operator will be khaki, soft collar, low roll, and worn with a black tie.

Springfield, Mass.—One of the exhibits at the Eastern States Exposition here is the first electric freight locomotive ever constructed. For comparative purposes, the New Haven Railroad, the owner of the old locomotive, has on display one of its most modern electric freight engines in use between New Haven and New York. The first electric freight locomotive was built by the Pullman Car Company for the Ansonia, Derby & Birmingham line, now a part of the Connecticut Company, a New Haven road subsidiary. It was delivered in 1888.

Seattle, Wash.—The new cross-town bus and railway service for the north end has been started by rerouting of the Green Lake and Third Avenue Northwest buses of the Seattle Municipal Railway system. Terminals of both bus lines will be changed to effect connections with street cars on the Green Lake, Wallingford, Montlake, University, Eastlake, Broadway and Fifteenth Avenue Northwest lines. Rerouting of the lines will give a new loop service to a large area not heretofore served.

Kansas City, Mo. — The crosstown street-car line of the Kansas City Public Service Company in Independence did not stop at midnight on Sept. 11 as scheduled, but will continue for thirty days. The railway some months ago applied to the Public Service Commission to discontinue the line because it was losing money. The request was granted, but the discontinuance has been put over several times.

Atlanta, Ga.—The fortieth anniversary of the advent of the trolley car in Atlanta was celebrated by *Two Bells*, publication of the Georgia Power Company, with a special edition. The first car appeared on Aug. 23, 1889. Joel Hurt, president of the East Atlanta Land Company, was master of ceremonies. Coincident with this event ex-President Cleveland was fishing. John L. Sullivan and Jake Kilrain were in trouble for fighting in Mississippi, natural gas had just been discovered at Dalton, Ga., and the Prince of Wales was wearing a sash with his summer costumes.

Newark, N. J.—Public Service Coordinated Transport is said to have no intentions of using any special equipment on the railway in the canal subway. The present plans provide for sending trolleys through the canal subway. It was asserted that the canal bed is not available for rapid transit in the same sense that the New York subways are.

St. Louis, Mo.—The Public Ownership League on Sept. 21 decided to circulate initiative petitions providing for an election on the question of the acquisition and operation of a municipal transportation system. The proposal will first be presented to the Aldermen. If the board fails to pass the bill the league will go direct to the voters. To refer the question to the voters at the next election signatures of 5 per cent of the registered vote at the last mayoralty election must be obtained. This is approximately 18,000 signatures.

East St. Louis, Ill.—The East St. Louis & Suburban Railway has been appointed an official ticket agent for the Universal Aviation Corporation to sell airline tickets in East St. Louis, Alton, Highland, Greenville, Vandalia, Collinsville, Belleville, Lebanon and O'Fallon.

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Personal Items

Dr. A. A. Mitten Heads Mitten Management

Dr. Arthur Allen Mitten was elected president of Mitten Management, Inc., at a special meeting of the board of directors on Oct. 3. He succeeds his father, the late Thomas E. Mitten.

Dr. Mitten has long been identified with the Mitten enterprises. In 1927 he succeeded to the chairmanship of the executive committee of the Philadelphia Rapid Transit Company. For a long time before that he was the silent influence and power in the company's co-operative welfare and public relations work.

His activity with the company began on May 1, 1919, when he became secretary of the Co-operative Welfare Association. Ever since that time he has taken an active part in the co-operative activities of the company and is personally known

A. A. Mitten

and highly regarded by thousands of the company's employees. At the same time Dr. Mitten became secretary of the employees' Co-operative Association he also assumed the duties of supervisor of welfare and employment.

T. E. Mitten's only son was educated as a physician and surgeon. He entered the electric railway industry in 1915 as industrial surgeon with the railway in Milwaukee. When the United States entered the World War Dr. Mitten went to France as captain of an ambulance company, was twice severely gassed, was wounded and then captured in August, 1918. He was imprisoned at Villingen until after the armistice was signed.

On May 15, 1922, Dr. Mitten was elected a director of the company and he has served in that capacity without interruption since that time. Until his election as chairman of the executive committee he acted as secretary of the board of directors. Dr. Mitten also served for several years as vice-president of Mitten Management, Inc., which operates both the Philadelphia Rapid Transit Company and the International Railway, Buffalo, N. Y.

George E. Tracey, general superintendent of the Southern New York Railway, Mohawk, N. Y., has been appointed to the post of general manager of the Schuylkill Valley Traction Company, Norristown, Pa. He had been with the Southern New York Railway since 1918. Richard M. Roberts will succeed him at Mohawk.

Charles H. Forsgard Manager at Toledo

Charles H. Forsgard, superintendent of the Community Traction Company, Toledo, Ohio, has been made general manager. He succeeds J. Frank Johnson, whose resignation as vice-president and general manager has been accepted. Election of Mr. Forsgard as a vice-president is expected to follow at the regular meeting of the board.

In 1915 he joined the organization of the Houston Light & Power Company, Houston, Texas, and later had charge of the operations of ice and light plants of the Boston Operating Company. In 1918 he became associated with Westinghouse-Church-Kerr & Company. In 1921 he joined Henry L. Doherty & Company, who operate the Toledo property. He went to Toledo from Durham, N. C., two years ago to accept the position of superintendent of the Community Traction Company.

A marked increase in revenue has been effected and public relations have been vastly improved at Toledo since the original Milner service-at-cost franchise was revised. In all of the rehabilitation work at Toledo Mr. Forsgard has played a very prominent part.

Henry L. Sanders Retires from Cincinnati Car Corporation

Henry L. Sanders, president of the Cincinnati Car Corporation, whose resignation was effective Oct. 1, terminated at that time a career of 25 years activity in the Cincinnati street railway service. A desire to take a long rest on his plantation in South Carolina dictated the move on Mr. Sanders' part.

For a quarter of a century Mr. Sanders has been an important executive identified with what in former years were known as the Schoepf interests. He succeeded the late W. Kesley Schoepf as president of the Cincinnati Car Company, predecessor of the corporation of similar name, at the latter's death in May, 1927.

During his incumbency as head of the company the acquisition of the Versare Corporation was made, and the many details of working out this amalgamation and merging the activities of the two concerns fell largely on his shoulders. Now that the combined company is fully organized, Mr. Sanders felt that it was an opportune time to relinquish his duties.

Mr. Sanders' first postion in Cincinnati was as assistant purchasing agent for the Cincinnati Traction Company, the Ohio Electric Railway and the Cincinnati Car Company. He served successively as auditor, treasurer and vice-president of those companies, finally being made president of the Cincinnati Car Company after it had taken over the remainder of the Schoepf interests following the return of the street railway system to the Cincinnati Street Railway.

As noted previously in the Electric Railway Journal News, Mr. Sanders will be succeeded as head of the Cincinnati Car Corporation by C. E. Morgan, formerly vice-president and general manager of the Brooklyn City Railroad.

Guy C. Hecker, the Association's New Secretary

Guy C. Hecker, elected general secretary of the American Electric Railway Association to succeed James W. Welsh, has been special engineer of the association since 1922. His connection with the electric railway industry dates from 1903, when he started with the Citizens Traction Company of Oil City, Pa. After spending five years with that company as wireman, substation operator and power station operator, he entered the Carnegie Institute of Technology in the electrical engineering course, working evenings as load dispatcher for the Pittsburgh Railways. Two years later he became load dispatcher on the regular force.

In 1912 Mr. Hecker was made chief electrician and in 1918 was promoted to the position of electrical engineer. In 1920 he went with the Westinghouse Electric & Manufacturing Company as a general engineer. During the next two years he spent a great deal of time in the analysis of the economies of automatic substations on many electric railway properties. It was from this position that he resigned in 1922 to become special engineer of the association.

The selection of Mr. Hecker to fill the post vacated by Mr. Welsh when he accepted the position at Cleveland was a natural one. Schooled under Mr. Welsh, Mr. Hecker is thoroughly familiar with the routine of the work of the secretary, and, moreover, in the post of special engineer to the association, he has the knowledge of the men in the industry so helpful to the incumbent of the position of secretary. He is affable without being fulsome, and is both a capable engineer and executive. Very important, he enjoys the confidence of the entire personnel of the association staff.

H. A. Metz Re-elected to Interborough Board

Herman A. Metz has been re-elected a public director of the Interborough Rapid Transit Company, New York, without the recommendation of the State Transit Commission. He now is in the position of representing the state commission on the Interboro directorate without any official credentials from that body as contemplated when the provision for public representation on the board was made. With no definite recommendation from the commission—which holds the power of nomination under the stock trust agreement—the trustees of the voting trust, Frank Hedley and Frank L. Polk, re-elected him for a full three-year term.

The voting trustees also filled six other vacancies. They elected, on nomination of the Manhattan Elevated, Finley J. Shephard to succeed Bertram J. Cutler, resigned, and William Roberts, to succeed himself. On nomination of the bondholders, John E. Zimmerman was re-elected a director, and the three regular stockholder directors, Edward J. Berwind, chairman of the board,

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Mortimer N. Buckner and Charles E. Dunlap, whose terms expired, also were re-elected. All were chosen for three-year terms with the exception of Mr. Shephard who fills an unexpired term of two years.

R. W. Woodruff Heads White Company

Robert W. Woodruff has been elected president of the White company, Cleveland, succeeding the late Walter C. White. Mr. Woodruff has been on the board and executive committee of White Motor for several years and has been connected with the company for seventeen years. He is also president of the Coca Cola Company.

In commenting on current conditions Mr. Woodruff states:

"The situation as the White Company enters the final quarter is pre-eminently satisfactory. Our production and sales for the first nine months considerably exceeded the same period of 1928. Inventories both of new and used care are the lowest in our history. Orders on hand are larger than a year ago and prospects for the remainder of the year are bright."

New Indianapolis Department Organizes

Henry L. Dithmer, Indianapolis, has been elected president of the board of directors of the Indianapolis Utilities Department, created by act of the last session of the Legislature to manage any utility properties that may be taken over by the city under municipal ownership. John J. Madden has been named vice-president. Other officers chosen are Guy A. Wainwright, secretary, and Almus G. Ruddell, treasurer. Brodhurst Elsey, Edward A. Kahn and Eli Lilly, the other members of the board, have been named as a committee to write the by-laws and rules. The board expects to meet monthly.

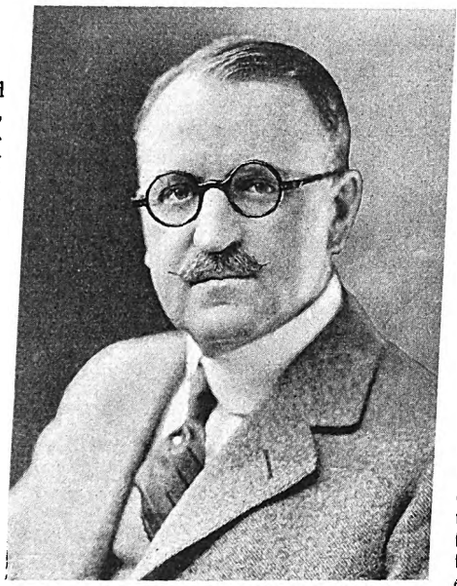
Labor Man Named Boston "L" Trustee

Ernest A. Johnson, secretary of the Boston Building Trades Council, has been nominated by Governor Allen for appointment as a member of the board of public trustees of the Boston Elevated Railway, Boston, Mass. Mr. Johnson succeeds Stanley R. Miller.

C. Peter Clark has been elected president of the Old Colony Railroad, Boston, Mass., to fill the vacancy caused by the death of Fayette S. Curtis. Mr. Clark was born in Jamaica Plain, Mass., on Sept. 12, 1858, and was the son of Charles P. Clark, for many years president of the New Haven Railroad. Charles Peter, Jr., entered the service of the old New York & New England Railroad at the age of eighteen and worked his way up the ladder until in 1896 he was appointed general manager. He later became general manager and second vice-president of the Buffalo & Susquehanna Railroad. In 1913 he entered the employ of the State of Massachusetts in the Public Utilities Department. On Sept. 12, 1928, Mr. Clark's seventieth birthday, he was retired from State Service, in accordance with the Massachusetts laws.

T. E. Mitten

Rehabilitator of Properties in Buffalo, Chicago and Philadelphia Drowned in Accident on His Pocono Estate



Thomas E. Mitten

IN THE death by accidental drowning on Oct. 1 of Thomas E. Mitten this industry loses one of its outstanding characters. One does not have to subscribe to all that Mr. Mitten did to accord him the measure of recognition that properly was his. As the rehabilitator of railway properties first in Buffalo, then in Chicago and lastly in Philadelphia the work that he did was prodigious and the results likewise were beneficial and lasting. He pioneered in many directions. He worked largely alone. Under him men came and men went, but certainly in Philadelphia he rounded out a system which was a credit to the city and a source of admiration generally.

If, in some of the things he did, Mr. Mitten departed from accepted standards he may be forgiven. Of late he had become a storm center because of the interlocking of P.R.T., Mitten Management, Mitten Bank and Mitten Bank Securities Corporation, but any feelings that may have been engendered by the zealousness of Mr. Mitten in guarding the undertaking he had so large a hand in fashioning are forgotten by the public and the press in their appreciation of the work of the man.

That everything he touched reflected the glow of Mr. Mitten's imagination and the warmth of his enthusiasm certainly is true. Just as true is it of him, as Owen D. Young, chairman of the board of the General Electric Company said, that he was an heroic figure. He certainly was. So replete is the career of the man with outstanding achievement that it would be utterly impossible to encompass his record within the bounds of a biography confined to present space limitations.

He had very definite ideas of what a transportation system should be and certainly he achieved them in Philadelphia. He had very definite ideas of relations between management and men and these also he achieved. If his attitude on labor was paternalistic, as has been charged, the result still stands that in Philadelphia he quickly brought order out of chaos and made of his men self-respecting citizens with a share in the ownership of the property for which they worked.

As the *Public Ledger* so aptly said, this is not the moment to discuss the issues involved in the transit litigation nor the controversies that characterized the recent political contest in Philadelphia. Whatever may be the outcome of these differences of opinion and purpose, Mr. Mitten must be judged by what he did in Philadelphia and by his remarkable achievement in carrying out his theories of what should be the proper relations between labor and capital, between employers and employed.

Coming in 1911 to Philadelphia as technical adviser and head of the Rapid Transit Company, then on the verge of bankruptcy with its personnel in the throes of violent internal dissension, Mr. Mitten was able to bring order out of chaos. He built up an efficient transit system on the wreck of the old and gained the support and confidence of his employees. The system was virtually made over. Instead of going on through recurring strikes and disorders, the transportation service has been carried on efficiently and without interruption during the entire period. And he built up an organization among the men of the P.R.T. which for loyalty to the company and for efficiency of service to the public has probably no peer in the transit industry.

Mr. Mitten's first experience in the field of electrically propelled transportation came about 1890, when, as general superintendent of the Denver, Lakewood & Golden Railroad, he changed the line from a steam road to one electrically equipped.

His opportunity to enter the electric railway industry came in 1896, when he was made assistant superintendent and later general superintendent of the electric lines of Milwaukee, Wis. He left this post in 1901 to become general superintendent of the International Railway, Buffalo. So successful was Mr. Mitten in solving the complex engineering and transit problems presented to Buffalo by the Pan-American Exposition in 1901 that at the close of the exposition he was made general manager.

In 1905 Mr. Mitten went to Chicago and became president of the Chicago City Railway, which system he rehabilitated. He resigned this position to go to Philadelphia. Mr. Mitten at once became the outstanding figure of the Philadelphia Rapid Transit Company upon his arrival early in 1911, fresh from his triumphs in the management of the Chicago City Railway. In June of the same year he was elected chairman of the executive committee of the P.R.T., and on the death of Charles O. Kruger, president of the company, Mr. Mitten was elected to succeed him. He held the post until February, 1923, when he resigned, retaining, however, the chairmanship of the board of directors and of the executive committee, his influence in shaping and carrying forward the policies of the P.R.T. being unimpaired.

Mr. Mitten took up his work in Philadelphia in 1911 at a time when the affairs of the Philadelphia Rapid Transit Company were at a low ebb. E. T. Stotesbury, who had undertaken the financing of the corporation to relieve it from its many embarrassments, was largely instrumental in inducing Mr. Mitten to relinquish his Chicago connection, admitting that in planning to lift P.R.T. from

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its difficulties he had been guided by his faith in "one of the best street railway men in the country."

Mr. Mitten's passing throws great responsibility on the organizations in Philadelphia and Buffalo. They will be subjected to a severe test. But Mr. Mitten has constantly contended that he builded with the idea of succession in mind so that the work he started could be carried on uninterrupted.

D. L. Huntington

David Lynde Huntington, president of the Washington Water Power Company, Spokane, since 1910, president of the Spokane United Railways and prominently identified with the electrical development of the Northwest, died at his home in that city Sept. 27. He had been confined to his home for the past two years, but he was able to devote some attention to company affairs.

Mr. Huntington was an important factor in the growth of Spokane utilities and it was largely through his vision and guidance, in association with the late Henry M. Richards, the preceding president, that the company has reached its present position. The last big undertaking of Mr. Huntington as active head of the Washington Water Power Company was the building of the Chelan hydro-electric plant, in connection with which project he personally supervised the details of the purchase of the site, the award of contracts and the financial program formulated to see the enterprise through.

George W. Palmer, Jr.

George W. Palmer, Jr., long-time electrical engineer of the properties now the Eastern Massachusetts Street Railway, Boston, Mass., died at Larchmont, N. Y., on Sept. 26.

One of the oldest members in point of service of the Engineering Association, for many years he was an outstanding figure in the old power distribution committee, of which for several years he was chairman, while as a member of the executive committee he did much to advance the standing of the association.

He was compelled by illness to relinquish all offices before he had held the presidency. When it was realized he would be unable to return to active work, he was elected, as a well earned recognition of his services, the only honorary member of the Engineering Association.

His death removes another of the older men who were outstanding figures in the engineering field, and although he had long been ill his death is a great shock to those who knew him.

Willard E. Winner

Willard E. Winner, pioneer in the security business in Kansas City, Mo., and promoter of important subdivisions of Kansas City, died on Sept. 3. He was 41 years old when the land boom in Kansas City collapsed. The eight preceding years had seen his rise from a clerkship to the control of many millions, much of the money his own, and his loss of all of it. Beginning in the '80s with about $9,000, he organized the Winner Investment Company. Within a few years he headed nineteen corporations. He opened one homesite addition after another. When an addition did not move quickly because of lack of transportation he built an electric railway to it or through it.

Walter C. White

Walter C. White, president and executive head of the White Company, bus and truck manufacturers, of Cleveland, Ohio, died on Sept. 29 as a result of injuries received in an automobile accident the previous day. Mr. White was driving in from his estate, the Circle Farm, 7 miles outside of Cleveland, when his auto collided with a smaller car which backed out of a farmyard adjoining the highway. Mr. White's car turned over several times following the collision and landed across his body. He was extricated with difficulty. Owing to the remoteness of the place where the accident occurred it was nearly two hours before medical attention was possible.

The White Motor Company, of which he was president, dates back to the earliest days of the industry. During the early part of the current century, the White company was the leading producer of steam automobiles in this country. It controlled many valuable patents and was an outstanding leader in the competition which developed between steam cars and gasoline cars for a leading place in the motor industry. When it was apparent that the gasoline motor was gaining supremacy, the

Walter C. White

White company changed its policy and began production of a gasoline passenger vehicle which met with success. Later the company discontinued production of passenger cars and concentrated on the production of trucks and buses and it was with this phase of the company's activities that Mr. White was identified.

During the World War he was chairman of the commission sent to France by the United States government to assist in organizing repair and maintenance of motor vehicles in military transportation. For his war work, Mr. White received the decoration of Chevalier of the Legion of Honor of France. In the early days Mr. White made many demonstrations of White motors in races and hill-climbing tests throughout the country. He became vice-president of the White Motor Company in 1906 and its president in 1921. He was also president of the White Motor Securities Corporation, the White Motor Realty Company and other Cleveland companies.

Mr. White was born in Cleveland on Sept. 8, 1876, the son of Thomas H. and Elmira Greenleaf White. He was graduated from Cornell University in 1898 and took his bachelor of law degree from the New York Law School the following year.

James R. Henry, railroad builder and superintendent of construction of the Chicago-New York Air Line, an electric road built in Laporte, Porter and Lake Counties, Indiana, in 1910, is dead at Valparaiso, Ind. He was born in Rochester, N. Y., 79 years ago, and when a young man entered the service of the Michigan Central Railroad. He later undertook railroad contracting work and assisted in building the Chicago & Erie, Michigan & Ohio and Rock Island extension in Kansas.

Henry Fisher

Henry Fisher, who financed the construction of the first three-phase hydro-electric plant in the United States for long-distance transmission, died on Sept. 6 at Santa Barbara, Cal. His age was 86. His career included organization of the Redlands Street Railway and the San Bernardino Valley Traction Company. He organized the Fisher Oil Company in the early years of the petroleum industry in Pennsylvania and was one of the originators of the pipe line method of oil transportation. He served as a director of the Pittsburgh Petroleum Exchange and as first president of the Washington Oil Company, later controlled by Standard Oil.

After taking up his residence at Redlands in 1893, Mr. Fisher became president of the Redlands Electric Light & Power Company, the parent company of the Southern California Edison Company. He was a director in the latter until eight years ago, when his son, John H. Fisher, president of the Equitable Investment Corporation of Los Angeles, took his place. Mr. Fisher, Sr., also was a director of the First National Bank of Los Angeles and the First National Bank of Redlands.

F. R. Henry

Franklin Redman Henry, president of the Majestic Manufacturing Company, makers of stoves and ranges, died on Aug. 21 in St. Louis, Mo. He had been an officer of various railways in St. Louis for 26 years before he resigned in 1908 to become connected with the Majestic Manufacturing Company, of which he was elected president in 1923. Mr. Henry began his business career in 1884 as a clerk for the Missouri Railway, now part of the St. Louis Public Service Company. He was general auditor for the United Railways Company when he resigned in 1908. Mr. Henry was born in St. Louis 62 years ago.

John L. Mier, manager of concessions at the Creve Coeur Lake Amusement Park of the St. Louis Public Service Company, St. Louis, Mo., died on Sept. 7 at Overland, Mo. Mr. Mier retired as a division superintendent for the Olive Street lines of the old United Railways thirteen years ago after having been with the railways in St. Louis for thirty-seven years. He was 67 years old.

Albert E. Smith, comptroller and assistant secretary of the Electric Bond & Share Company, New York, N. Y., died recently. Mr. Smith was one of the original members of the company when it was formed in 1905. He had held the offices of assistant treasurer, assistant secretary and treasurer, and since 1918 he had been comptroller and assistant secretary. He was 53 years old.

Charles J. Moore, retired automobile manufacturer and since 1927 vice-president of the National Safety Council, is dead.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 73 New York, November, 1929 *Number 21*

Crystallized Opinion on Car Design Needed

DEVELOPMENTS which have been made in car design during the past few years show real progress. But this progress has been slow compared with the needs of the situation. While it is almost universally admitted that cars should be improved, there is no general agreement as to how it should be done. On the one hand the railways are not sure what kind of cars they want, and on the other hand the manufacturers are hesitant to offer new designs.

Railway men are firmly convinced that transportation by street car will continue to have a real place. They realize that modern cars have undoubted advantages, but opinion has not crystallized as to what a modern car should be. Although a number of new designs have been brought out, purchases have been largely confined to cars of conventional type. Apparently this has not been due to any particular dissatisfaction with the new designs but rather to lack of definite conviction that they are a practical answer to the operators' problems.

Good cars are available today for the railways which are urgently in need of new rolling stock. Radical improvements have been made in essential features. Bodies, doors, trucks, motors, control and other parts are now available that far surpass the best of a few years ago. Nevertheless, it appears that nothing yet offered has sufficient appeal to tempt operators who are on the fence.

Purchases will lag as long as this situation continues. Widespread modernization of rolling stock is the industry's great need, but it cannot be looked for until opinion has been crystallized with regard to the essentials.

An Unusual Piece of Financing

VARIOUS devices to make fixed income securities more attractive to investors have been adopted during the last few years, in fields other than that of local transportation. In Baltimore, however, a particularly interesting plan of this kind has been undertaken recently in connection with the maturing obligations of the United Railways & Electric Company. Due to uncertainty and to early maturities the interest bearing securities of this company have been selling at a substantial discount and the stock, paying nothing, has been quoted around $10 a share. But the company has improved its financial position and has now announced a program which, at a single stroke, will meet a large volume of maturing obligations, decrease its funded debt and effect a substantial reduction in annual interest charges. The company will offer stockholders $2,500,000, par value, of bonds now in the treasury and will use the proceeds together with accumulated cash reserves, to retire a total of $4,000,000 of bonds and notes. Since the interest requirements on the new securities will amount to only $125,000 a year as against $225,000 on the outstanding issues, the direct reduction in fixed payments is $100,000.

These bonds will be offered to stockholders at present market prices, but with special stock rights attached. That is the unusual feature. The bonds to be offered are $1,500,000 of first consolidated United Railways & Electric 4's at 58 and accrued interest, and $1,000,000 of Maryland Electric Railways first and refunding 6½'s at 80 and interest. Accompanying the former will be option warrants for seventeen shares of common stock while the latter will have similar warrants for 24 shares of stock. Holders will have two years in which to exercise the warrants at $15 a share. If this is done the company will receive $750,000 additional funds without increasing its funded debt.

Both parties should benefit by this arrangement. United Railways & Electric consolidated 4's mature in 1949, and Maryland Electric Railways 6½'s in 1957. Thus at present prices the yield to the purchaser is a little more than 8 per cent. On the other hand, $1,500,000 of obligations are being permanently retired and the company's annual interest reduction of $100,000 will amortize the entire discount in about eight years.

Short Riding—A Neglected Opportunity

WITH all the attention that has been devoted in recent years by the local transportation lines to the development of new business, comparatively little consideration has been given to that one-time mainstay of the street car, the short rider. Twenty-five years ago there were relatively few long lines, and the persons who rode for distances of less than a mile constituted the bulk of the traveling public. As the routes have been extended farther and farther, more and more attention has been paid to the suburbanites who live near the outer ends. Demands have been made for extensions of even the longest routes, so that patrons could settle still farther away from the business districts.

With all the attention paid to these commuters—for they really are in much the same class as the suburbanites living along the steam railroads—less care has been devoted to the provision of service specially suited to hold the short-distance rider. Modern schedules use the cars efficiently on the long lines, and they are made to fit in on the trunks as best they can. Then, too, the large cars that have been in use for a number of years make short headways less necessary than did the smaller cars that were common in the past. So the frequency of service, even on the heaviest trunks, often is less today than it was a generation ago. Traffic congestion has made it more difficult to give an attractive short ride.

Rapid transit is no answer to the demand for this class of service. People will not climb up and down

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stairs when they wish to ride only a few blocks, particularly when they do not know if a train will be available for some minutes after the platform is reached. Where surface lines have been taken off and rapid transit lines substituted, a source of revenue has been lost irretrievably.

That there still is a demand for this class of service is seen in the enormous growth of the taxicab business in recent years. By far the greater portion of taxicab rides are for short distances. Even though this business is limited by the fares that must be charged, its total volume is amazing. The taxi, however, cannot take the place of the street cars or bus lines, if proper attention is given to the demand of the public.

What is needed to make short distance riding more popular is, first of all, frequency of service. This is even more important than speed, as the total time of the trip is short. The best results can be obtained with "car-in-sight" service, for then the patron knows at once that his wait will be only a matter of seconds. That idea was widely accepted during the vogue of the Birney car, but appears to have been forgotten now. Safety zones for the street cars and well-marked stopping places for the buses are essential. The vehicles themselves must be carefully marked to eliminate any possibility that the passenger may go wrong. The cars or buses should be easy of access and reasonably comfortable. Fares should be as simple as possible. The old-time nickel had a certain advantage from the standpoint of simplicity and ease of collection. Car and bus operators, it goes without saying, must be courteous and helpful to appeal to the non-necessity rider.

No reason exists for believing that it is impossible to get back the short riders. In some places they have come back, and in considerable numbers. Sidewalks today are more congested than ever, and the business of the aggressive transportation man is, above all things, to get the people off the sidewalks.

Better, If Not Bigger

NOW that the 48th annual A.E.R.A. convention has passed into history the time has come for an appraisal of what it really meant to the electric railway industry. Although attendance and exhibit space fell somewhat short of the figures of the three previous gatherings at Cleveland, this fact has little bearing on the success of the convention. Compared with the 1925 convention, the last held at Atlantic City, the attendance was almost exactly the same, while the exhibit space exceeded the amount taken on that occasion. In diversity, attractiveness of arrangement and interest this year's display surpassed any of its predecessors. Undoubtedly, it was a show that made a deep impression and will long be remembered.

The exhibitors themselves express entire satisfaction with the results. They say that the operators were more seriously intent upon getting the most out of the assembled exhibits than at any convention in recent years. "Well repaid for our trouble and expense," "attention and interest good; better than heretofore," "the most productive form of advertising in which we engage," "more than usual amount of interest displayed," are but a few representative comments.

Operators, too, have expressed themselves as well pleased with the convention. In the wide range of subjects considered this year's program exceeded anything that preceded it. Informative discussion took place on topics of immediate interest to the delegates as well as on general topics of interest to the entire industry. Undoubtedly everyone attending this year's convention felt well repaid for the time and effort so expended.

Chicago's New Start Toward Unification

CHICAGO still has a long way to go to effect unification of its transportation facilities, but the progress made since the passage of the necessary enabling bills and their signature by the Governor represent two important steps forward. True, there has been a disposition toward criticism on the part of those who had hoped that the program might go before the voters this fall, but considering the magnitude of the problem that was a little too much to expect. The new legislation simply opens the way for the City Council to negotiate a franchise which will include provisions deemed necessary to permit the various companies to be brought together in combination with subways still to be constructed. The resulting franchise, whatever its terms, must then be approved by a public referendum. There still remains, therefore, a long road to travel before the much needed consolidation, co-ordination and expansion of transportation facilities in Chicago can be carried out.

Despite the obstacles that are still ahead a renewed start toward settlement of the franchise problem has been made under auspices more propitious than those which have existed for many years. In the first place, the public itself seems to realize that the purpose sought is sound. Secondly, the sponsorship of the measures recently passed by the state Legislature was such that no motives other than those of the public good and provision for sound city development can be attached to them. The matter was first threshed out before the citizens' traction settlement committee, headed by James Simpson, an organization adequately representative of various shades of opinion.

Finally, and perhaps most important of all as a favorable influence in the present situation, is the growing public confidence in the present management of the Chicago transportation properties. The people of the city are gradually coming to understand that in the midst of political scandal and turmoil, and despite franchise and consequent financial difficulties, transportation service in the city has been steadily improved. They are gradually becoming conscious of the fact—generally recognized throughout the electric railway industry—that despite all the trying conditions imposed by the unsettled franchise situation, the transportation properties in Chicago are among the best managed and most efficiently operated systems in the world. Certainly the latest proposal, calling for the expenditure of $300,000,000 for subways and for extensions, augurs well for the future.

It now remains to be seen whether, under these favorable circumstances, a franchise settlement can be worked out which shall be conceived from the public's point of view not to drive the hardest possible bargain with present investors in the property, but with terms under which the city may be assured the best possible transportation service for the future as well as the present. It is to be hoped that the emphasis will be laid on public convenience and comfort rather than minimum fare; that every precaution will be taken to insure maximum efficiency of operation, rather than minimum possible return to investors—in short, that the negotiators for the city will

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adopt the modern business concept of insuring full value for the car riders' fare in return for a fair profit to the company; a concept which offers the only known method of insuring financial backing and management competent to give that kind of service. That these necessary factors are being taken into account to the extent they deserve is indicated by the statement of one of the members of the general financial committee entrusted with the work of planning for the $200,000,000 of new capital to be raised within the next four years to the effect that the committee will advocate a balanced division of securities, adequate earnings and a level of fares adequate to meet the charges on the new money. On no other basis can the plan be made a success.

Canadian Railway Prosperity Continues

FOR some years the results of operation of the Canadian electric railway systems have been showing a healthy and steady improvement. Whereas revenues have scarcely held stationary in the United States they have increased year after year in Canada. At the same time operating expenses have been held down so that there has been a gain in net each year since 1924.

Results for 1928 not only confirm the general trend; they strengthen the position of the Canadian roads appreciably. Revenues reached a new high for all time at $55,632,761. This was 3.8 per cent above the figure for 1927. At the same time operating expenses were $38,782,719, or only 3.1 per cent higher than in 1927. The net operating revenue accordingly went up to $16,850,042 or 5.8 per cent more than in the preceding year. The improvement came from an increase of 3.3 per cent in passengers and 16 per cent in freight.

Gains such as these are the more noteworthy when it is considered that while 59 properties are listed in the Dominion, almost exactly half of the revenue comes from two of them—Montreal and Toronto. Of the other properties only one, the British Columbia Electric Railway, has a gross revenue in excess of $2,000,000. At the other extreme are sixteen properties with revenues of less than $100,000 and fifteen between that figure and $200,000. Such companies are frequently considered hopeless. Yet 21 out of 31 in this classification did better than cover operating expenses and sixteen of them covered fixed charges and showed a surplus for the year.

Reasons for the good results obtained by the Canadian roads would be instructive if they could be definitely determined. Passenger and freight revenues are not shown separately, but even crediting all the revenue to the passenger business, the receipts are at the rate of only 6.9 cents per pasenger. This is considerably below the current rate in the United States, so that higher fares scarcely can be the cause of the increase in gross. Of course, automobile registration is below that for the United States, and the climate is such that there are comparatively long periods during the winter when automobiles are little used. Still it seems doubtful if this is sufficient explanation for the favorable results. Canada is a growing country, and the trend of population toward the cities is just beginning to be felt. This may be an important factor, although the steady gain in riding for each year since 1925 would tend to discount it. In any event, a study of the results in Canada indicates that there is something to be learned from the experience of these small roads that have been able to show such excellent results.

New Application of "Skip Stop" Plan

HIGHER speed is unquestionably an extremely important feature in improving street railway service, and one of the most effective means of attaining this result is the limited or "skip stop" plan. During the World War many electric railways were compelled to eliminate stops to save fuel. However, with the passing of this temporary requirement most of them returned to their original stop spacing. A feeling has existed that the average passenger would prefer to take a longer time for his ride and be subject to a more frequent stopping of his vehicle rather than to be compelled to walk a somewhat greater distance to reach the boarding point. Objections voiced by business interests have also been an important factor in dissuading the railways from the use of "skip stops." Generally speaking, the popularity of the plan ceased at the end of the war.

Now appears a reviving interest in this idea. Following the victory of the "skip stop" plan in Cleveland, where it was adopted only after exhaustive discussion, came the approval of the Public Service Commission of Maryland for the installation of a similar system in Baltimore. The most recent revival is in Kansas City, where the plan has lately been adopted on three important lines. The excellent results obtained are told in an article appearing elsewhere in this issue. Exclusive of the business district where no stops were eliminated, the total number of stopping points was reduced from 321 to 187, or about 42 per cent. Scheduled speed has been increased from 9.2 to 11.5 m.p.h., making actual savings ranging from five to eleven minutes for a single trip.

Higher car speed is, of course, the biggest advantage of the limited stop plan. There are several others, however, that are worthy of mention. These are reduced operating cost, greater comfort resulting from the less frequent starting and stopping, increased good will on the part of the patrons, and a possible gain in revenue. Although the system has not been in operation long enough in Kansas City to make possible any definite conclusions as to its effect on revenue, it is expected that the three lines on which the experiment is being made will show substantial increases in riding when the public realizes the advantages of the improved service.

One-Man Cars Adopted at Des Moines

EMPLOYEES of the Des Moines Railway have at last consented to revise their long-term labor contract and to accept the one-man car as a fact. This is most encouraging. That they remained adamant on the issue so long is unfortunate, both to them and the company. Even if it isn't easy to reduce a course of this kind to terms of dollars and cents, the fact remains that both the men and the company were the losers. Des Moines needs the one-man car if service there is not to be reduced to the mere skeleton of lines that might be expected to support two-man service. Just how far the company will go in its operation of the one-man car is still a matter of conjecture, but it is reasonable to suppose that it will be applied advantageously and that the service will be so strengthened as to frequency that it will be made much more attractive than it could be under two-man operation, and that the employees will gain at the same time the railway stands to profit.

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Survey Shows TRANSIT

Changes in Riding and Service in the Period 1918-1927 Are Included for Leading American Communities. Demand for Public Transportation Service Has Continued Despite Enormous Increase in Automobile Registration in Every City Studied. Gross Revenues and Per Capita Earnings Have Increased Generally

MUCH progress has been made in city transportation since the end of the World War. Many of the properties in cities large and small are earning more, both in the aggregate and on a per capita basis, than they were in 1918. Almost without exception they are giving more service and on most of the properties the bus has been introduced to good effect in supplementing the street car. The story is told effectively in the comparative figures included in the main table published with this article, which brings together operating results for 23 important cities in the United States and Canada. The figures were collected and analyzed by the Beeler Organization, New York, and have been arranged for publication in a single tabulation. With one exception, Lexington, Ky., the cities included are of more than 100,000 population, and five of them had more than 1,000,000 inhabitants in 1927 in the territory served by the transportation systems. Population statistics were obtained from various sources, usually the local authorities, and represent the closest available estimates for the respective dates.

Although every one of the cities included in the survey has had a gain in population, there have been wide differences in amount. Houston shows the largest proportional increase, having 70 per cent more inhabitants in 1927 than in 1918. Other cities in which the growth has been large are Lexington, Ky., with a 46.2 per cent increase in the same period; Atlanta, 39.6 per cent; Cleveland, 35.1 per cent, and Portland, Ore., 37.3 per cent. Detroit has grown 30.43 per cent in five years. The growth has been slow in some of the cities, Cincinnati showing an increase of only 5.6 per cent and Omaha 9.6 per cent. The remaining cities in the group studied show gains ranging between 10 per cent and 26 per cent.

Street car and bus riding has varied over a wide range in these 23 cities in the period under consideration. Oddly enough, the maximum gains in riding have occurred in the cities at the two extremes of population —Lexington and New York. In Lexington the number of revenue passengers has gone up 58 per cent, while in New York the corresponding increase was 56.7 per cent.

COMPARISON OF PER CAPITA RIDING AND AUTOMOBILE OWNERSHIP, 1927

City	Population Served	Rides per Capita	Automobiles per 1,000 Population
New York	6,217,260	485	74.7
San Francisco	576,000	461	198
Chicago	3,102,800	376	128.9
Toronto	585,628	331	137.2
St. Louis	832,000	324	170
Boston	1,220,434	301	125
Baltimore	855,000	265	185.8
Cincinnati	459,500	244	185.8
Milwaukee	589,000	241	227.6
Detroit	1,565,100	240	246.1
Kansas City	500,000	239	231.8
Cleveland	1,111,317	236	187.6
Atlanta	317,100	235	169.3
Richmond	191,890	221	78.1
Pittsburgh	1,290,000	205	138.9
Memphis	205,700	201	219.1
Winnipeg	305,000	197	80.8
Des Moines	148,900	192	217
Omaha	219,200	189	203.2
Portland, Ore	354,608	168	223
Denver	327,175	162	216.5
Houston	259,000	159	200
Lexington, Ky	60,312	105	177.1

In each of these instances the gain was at a materially greater rate than the increase in population. Other cities where there has been a gain in riding on the public transportation systems in excess of the rate of increase in population are San Francisco, with a 34.4 per cent increase in revenue riders; Chicago, 31.5 per cent; St. Louis, 16.4 per cent, and Pittsburgh, 13.55 per cent. Several cities included in the survey have shown an actual decrease in riding. These are Denver, Des Moines, Baltimore, Kansas City, Omaha, Cincinnati, Cleveland and Portland, Ore.

General Increases Made in Service

Service rendered by the transportation systems, as measured in vehicle-miles operated, has been increased very generally. The only cities included in the survey where less vehicle-miles were operated in 1927 than in 1918 are Denver, Omaha and Portland. Toronto had less car-mileage in 1927 than in 1922, but this period represents the transition from the service given with cars which were in use immediately after the Toronto Transportation Commission took over the property of the Toronto Railways to the modern service now given, with larger cars and improved routing.

Buses were an inconsiderable factor in providing service in 1918. Only three cities, New York, Chicago and Baltimore, show bus passengers in that year. There were some independent bus lines, principally of the jitney class, which existed in several of the cities, but which had almost entirely disappeared by 1927. By that year, however, the bus had become an important factor in the permanent local transportation scheme in all of the cities included except Denver and Memphis. In certain of the cities the use of the bus made possible a reduction in the number of car-miles operated in 1927 as compared with 1918. Those cities showing such a decrease in car-miles are Boston, Detroit, St. Louis, Omaha, Cincinnati, Cleveland, Portland, Toronto and Winnipeg.

Fare Increases Are General

Fares, as measured by the receipts per revenue passenger, have gone up to some extent in every one of the 23 cities except San Francisco, where they have remained almost stationary. In Toronto the figures for 1928 show virtually the same rate as for 1922, the slight increase being due to a different distribution of cash and ticket riders. Cities where the average fare has increased

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TRANSIT TRENDS *in 23 Cities*

more than 50 per cent are Atlanta, Des Moines, Boston, Cincinnati, Cleveland and Richmond.

The revenue rides per capita, likewise, show a great range. The highest riding habit was in New York, with 485 rides per capita in 1927. It was followed closely by San Francisco, with 461. Chicago, with 376 rides per capita, was third. As might be inferred, the revenue vehicle-miles per capita were highest in the same three cities, being 69.42 in New York, 66.88 in Chicago and 62.97 in San Francisco. The revenue rides per vehicle-mile of service rendered are highest in San Francisco, being 7.32. This figure is approached closely in New York, with 6.99 rides per vehicle-mile, and Cleveland, with 6.73 rides.

Widespread Use Made of Buses

Widespread growth in the use of buses for urban service is indicated clearly in the columns in the table giving the relative percentages of street car and bus passengers and vehicle-miles. From practically nothing in 1918 the bus has increased its usefulness in nearly all of the cities. In Lexington the buses are used to give 41.85 per cent of the vehicle-miles of service and carry 29.7 per cent of the revenue passengers; in Cincinnati they are giving 29.7 per cent of the service and are carrying 16 per cent of the riders, and in Richmond they are giving 29.6 per cent of the service and carrying 20.6 per cent of the passengers. In no city studied were buses carrying more than 1 per cent of the passengers in 1918.

Among the cities included in the tables, New York, Boston and Chicago are the only ones which give service with rapid transit trains run in subways or on elevated structures. There is only one other American city in the same class. In Boston the entire transportation system is under one management, and services with rapid transit trains, surface cars and buses are closely coordinated. In Chicago the rapid transit lines, which are all elevated, the surface cars and a portion of the buses are run by independent companies. To some extent these services overlap and are in competition. New York is served by two distinct rapid transit systems and a large number of surface car companies independent of one another. Most of these surface lines have no connection with the rapid transit systems. Bus service is given by one principal company, which from an operating standpoint is independent of any of the other transportation systems. In addition to it there are several bus systems of minor character, also independent.

Of the cities without rapid transit, San Francisco has two separate and competing street car systems. Both of them run buses. In Detroit all of the street cars and most of the buses are under one management, although one important bus line is competing. In St. Louis the street railway runs a portion of the buses, although the larger portion of them are under an independent management. The principal services in each of the other cities are supplied by a single management.

The rapid transit situation is of such importance, particularly at the present time, with many cities investigating propositions for construction of subways, that a supplementary analysis is given for New York and Chicago to show separately the two classes of transportation. In New York, it will be noted, 60 per cent of the total passengers ride on the rapid transit lines, which furnish 70 per cent of the total vehicle-miles. Even so, there was a gain of 16.6 per cent in surface car riding during the period, although there was a reduction in service given with the street cars.

In Chicago, on the contrary, the rapid transit lines are not nearly of such great importance as they are in New York. In 1927 they carried only 19 per cent of the riders and furnished 28 per cent of the service offered to the public. The riding on the surface cars is increasing at a greater rate than the population, while the riding on the rapid transit lines is not quite keeping up with it.

Figures on Boston, segregating the several forms of

COMPARISON OF RAPID TRANSIT AND SURFACE LINES, NEW YORK AND CHICAGO

	New York City			Chicago		
	1918	1927	Per Cent Increase	1918	1927	Per Cent Increeas
Revenue passengers						
Rapid transit lines	1,029,165,648	1,830,189,949	77.9	197,500,107	226,212,172	14.5
Street cars	869,997,143	1,014,339,389	16.6	685,300,718	881,958,647	28.7
Buses	26,360,801	172,030,954	....	4,575,000	58,583,572	....
Total, all transit	1,925,523,592	3,016,560,292	56.7	887,375,825	1,166,754,391	31.5
Service in vehicle-miles operated						
Rapid transit lines	194,677,252	301,962,385	55.1	53,012,263	58,102,242	9.6
Street cars	126,452,878	101,784,869	*19.5*	112,984,183	135,491,794	19.9
Buses	7,885,591	27,853,400	....	1,411,789	13,904,069	....
Total, all transit	329,015,721	431,600,654	31.2	167,408,235	207,498,105	23.9
Revenue rides per capita						
Rapid transit lines	189	294	55.6	75	73	*2.7*
Street cars	160	163	1.9	261	284	8.8
Buses	5	28	....	2	19	....
Total, all transit	354	485	37.0	338	376	10.1
Revenue vehicle-miles per capita						
Rapid transit lines	35.77	48.57	35.8	20.21	18.73	*7.38*
Street cars	23.24	16.37	*29.6*	43.08	43.67	1.37
Buses	1.45	4.48	....	0.54	4.48	....
Total, all transit	60.46	69.42	14.8	63.83	66.88	4.56
Revenue rides per mile						
Rapid transit lines	5.28	6.06	14.8	3.73	3.89	4.3
Street cars	6.88	9.97	44.9	6.07	6.51	7.2
Buses	3.34	6.18	....	3.24	4.21	....
Total, all transit	5.85	6.99	19.5	5.30	5.62	6.0
Per cent of revenue passengers						
Rapid transit lines	54.00	60.00	....	22.00	19.00	....
Street cars	45.00	34.00	....	77.00	76.00	....
Buses	1.00	6.00	....	1.00	5.00	....
Per cent of revenue vehicle-miles						
Rapid transit lines	60.00	70.00	....	32.00	28.00	....
Street cars	38.00	23.60	....	67.00	65.00	....
Buses	2.00	6.40	....	1.00	7.00	....

Note—Figures for New York do not include the Hudson & Manhattan Railroad or electrified steam railroads doing a suburban business. The number of revenue rides is based on the number of revenue fares collected. *Italic figures* indicate decreases.

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Transportation Development in Representative

	Population Served	Revenue Passengers			Service in Vehicle-Miles Operated			Average Fare per Revenue Passenger, Cents	Revenue per Capita, Dollars	Revenue Rides per Capita			Revenue Miles per Capita		
		Street Car	Bus	Total	Street Car	Bus	Total			Street Car	Bus	Total	Street Car	Bus	Total
San Francisco, Cal.															
1918	488,700	197,398,636	(a)	197,398,636	31,675,691	(a)	31,675,691	4.97	20.08	404	(a)	404	64.82	(a)	64.82
1927	576,000	263,840,415	1,535,957	265,376,372	35,695,461	577,310	36,272,771	4.95	22.81	458	3	461	61.97	1.0	62.97
Per cent increase	17.9	33.7	.....	34.4	12.7	.....	14.5	*0.40*	13.6	13.4	.....	14.1	*4.40*	.....	*2.85*
Denver, Colo.															
1918	268,000	62,549,114	.....	62,549,114	11,451,230	.....	11,451,230	5.17	12.07	233	.....	233	42.73	.....	42.73
1927	327,175	53,138,325	.....	53,138,325	11,046,168	.....	11,046,168	7.48	12.14	162	.....	162	33.76	.....	33.76
Per cent increase	22.08	*15.0*	.....	*15.0*	*3.5*	.....	*3.5*	44.68	0.58	*30.47*	.....	*30.47*	*20.99*	.....	*20.99*
Atlanta, Ga.															
1918	227,000	70,575,593	.....	70,575,593	12,610,025	.....	12,610,025	4.55	14.15	310	.....	310	55.55	.....	55.55
1927	317,100	73,711,924	881,816	74,593,740	13,447,471	528,086	13,975,557	6.83	15.87	232	3	235	42.48	1.66	44.14
Per cent increase	39.6	4.46	.....	5.69	6.64	.....	9.83	50.10	12.16	*25.16*	.....	*24.19*	*23.53*	.....	*20.54*
Chicago, Ill.															
1918	2,622,754	882,800,825	4,575,000	887,375,825	168,996,446	1,411,789	167,408,235	5.10	17.26	336	2	338	63.29	0.54	63.83
1927	3,102,800	1,108,170,819	58,583,572	1,166,754,391	193,594,036	13,094,069	207,498,105	7.33	27.56	357	19	376	62.40	4.48	66.88
Per cent increase	18.3	25.53	1,180.52	31.5	14.56	884.85	23.9	43.7	59.7	6.25	850	10.1	1.41	729.62	4.56
Des Moines, Iowa															
1918	118,448	33,147,775	.....	33,147,775	5,403,926	.....	5,403,926	4.74	13.28	280	.....	280	45.64	.....	45.64
1927	148,900	28,158,788	423,465	28,582,253	5,422,487	266,769	5,689,256	7.48	14.36	189	3	192	36.69	1.52	38.21
Per cent increase	25.7	*1.51*	.....	*13.8*	0.35	.....	5.28	57.8	8.12	*32.5*	.....	*31.4*	*19.63*	.....	*16.29*
Lexington, Ky.															
1918	41,247	3,992,270	.....	3,992,270	756,151	.....	756,151	5.80	5.61	97	.....	97	18.33	.....	18.33
1927	60,312	4,441,149	1,869,922	6,311,071	1,058,247	761,406	1,819,653	6.55	6.88	74	31	105	17.54	12.62	30.16
Per cent increase	46.2	11.2	.....	58.0	39.9	.....	140.6	12.9	22.6	*23.7*	.....	8.2	*4.3*	.....	*64.5*
Baltimore, Md.															
1918	767,000	226,834,528	1,950,795	228,785,323	32,569,906	350,816	32,920,722	5.13	15.29	296		2298	42.46	0.46	42.92
1927	855,000	218,714,410	7,819,778	226,534,188	33,979,657	1,810,840	35,790,497	7.34	19.44	256		9265	39.74	2.12	41.86
Per cent increase	11.5	*3.6*	.....	*1.0*	4.3	.....	8.7	43.08	27.14	*13.5*	.....	*11.1*	*6.4*	.....	*9.47*
Boston, Mass.															
1918	1,098,692	348,664,700	.....	348,664,700	53,021,816	.....	53,021,816	5.84	18.52	317	.....	317	48.26	.....	48.26
1927	1,220,434	343,490,089	23,448,819	366,938,908	51,271,263	5,562,766	56,834,029	9.27	27.86	281	20	301	42.01	4.56	46.57
Per cent increase	11.1	*1.5*	.....	5.2	*3.3*	.....	7.2	58.75	50.43	*11.4*	.....	*5.1*	*13.0*	.....	*3.5*
Detroit, Mich.															
1923	1,200,000	371,001,139	.....	371,001,139	51,226,716	.....	51,226,716	5.57	17.22	309	.....	309	42.69	.....	42.69
1928	1,565,100	337,081,660	39,956,700	376,678,360	48,266,729	13,167,724	61,434,453	6.54	15.76	215	25	240	30.84	8.41	39.25
Per cent increase	30.43	*9.14*	.....	1.53	*5.86*	.....	19.63	17.41	*8.48*	30.42	.....	*22.33*	*27.76*	.....	*8.06*
Kansas City, Mo.															
1918	430,000	122,114,076	.....	122,114,076	22,456,333	.....	22,456,333	5.36	15.21	284	.....	284	52.22	.....	52.22
1927	500,000	113,542,693	5,911,093	119,453,786	24,269,406	2,619,674	26,889,080	7.59	18.12	227	12	239	48.54	5.24	53.78
Per cent increase	16.28	*7.02*	.....	*2.18*	8.07	.....	19.74	41.60	19.13	*20.1*	.....	*15.8*	*7.06*	.....	*2.99*
St. Louis, Mo.															
1918	784,000	245,876,910	.....	245,876,910	42,380,108	.....	42,380,108	5.50	17.25	314	.....	314	54.06	.....	54.06
1927	832,000	258,810,976	27,296,000	286,106,976	42,071,360	8,514,100	50,585,460	7.45	24.17	293	31	324	47.70	9.65	57.35
Per cent increase	12.5	5.3	.....	16.4	*0.7*	.....	19.4	35.49	40.11	*6.8*	.....	3.1	*11.9*	.....	*6.0*
Omaha, Neb.															
1918	200,000	52,726,355	.....	52,726,355	8,859,692	.....	8,859,692	4.92	12.95	263	.....	263	44.30	.....	44.30
1927	219,200	40,973,245	525,367	41,498,612	8,177,796	295,381	8,473,177	6.93	12.98	187	2	189	37.31	1.35	38.66
Per cent increase	9.6	*22.3*	.....	*21.3*	7.6	.....	*4.4*	40.85	0.23	*28.4*	.....	*28.1*	*15.78*	.....	*12.79*
New York City															
1918	5,441,730	1,899,162,791	26,360,801	1,925,523,592	321,130,130	7,885,591	329,015,721	4.94	17.59	349	5	354	59.01	1.45	60.46
1927	6,217,260	2,844,529,338	172,030,954	3,016,560,292	403,747,254	27,853,400	431,600,654	5.38	24.99	457	28	485	64.94	4.48	69.42
Per cent increase	14.3	49.78	552.6	56.7	25.73	253.21	31.2	8.9	42.1	30.95	460	37.0	10.05	209.0	14.8
Cincinnati, Ohio															
1918	435,200	112,400,000	.....	112,400,000	19,500,000	.....	19,500,000	4.99	12.89	258	.....	258	44.81	.....	44.81
1927	459,500	94,006,310	18,000,000	112,006,310	18,000,000	7,630,000	25,630,000	8.70	21.20	205	39	244	39.17	16.60	55.77
Per cent increase	5.6	*16.4*	.....	*0.35*	*7.7*	.....	31.4	74.35	64.47	*20.5*	.....	*5.4*	*12.59*	.....	*24.40*
Cleveland, Ohio															
1918	822,474	273,239,716	.....	273,239,716	36,875,603	.....	36,875,603	4.44	14.74	332	.....	332	44.83	.....	44.83
1927	1,111,317	251,018,905	11,296,027	262,314,932	35,451,274	3,523,666	38,974,940	7.01	16.54	226	10	236	31.90	3.17	35.07
Per cent increase	35.1	*8.1*	.....	*4.0*	*3.9*	.....	5.7	57.88	11.3	*31.9*	.....	*28.9*	*28.6*	.....	*21.7*
Portland, Ore.															
1918	258,288	68,628,602	.....	68,268,602	15,919,450	.....	15,919,450	6.14	16.31	265	.....	265	61.63	.....	61.63
1927	354,608	56,949,726	2,652,265	59,601,991	13,989,019	1,313,428	15,302,447	7.77	13.06	160	8	168	39.45	3.70	43.15
Per cent increase	37.3	*17.0*	.....	*13.1*	*12.1*	.....	*3.9*	26.55	*19.02*	*39.62*	.....	*36.6*	*36.0*	.....	*30.0*
Pittsburgh, Pa.															
1918	1,152,000	232,823,184	.....	232,823,184	33,442,211	.....	33,442,211	5.86	11.83	202	.....	202	29.03	.....	29.03
1927	1,290,000	262,061,272	1,834,752	263,896,024	41,370,874	1,256,026	42,626,900	8.09	16.55	203	2	205	32.07	0.97	33.04
Per cent increase	11.98	12.56	.....	13.35	23.71	.....	27.46	38.05	39.90	0.5	.....	1.49	10.47	.....	13.81
Memphis, Tenn.															
1918	176,500	40,346,427	.....	40,346,427	6,461,204	.....	6,461,204	4.99	11.40	229	.....	229	36.61	.....	36.61
1927	205,700	41,235,426	.....	41,235,426	8,021,062	.....	8,021,062	7.0	14.05	201	.....	201	38.99	.....	38.99
Per cent increase	16.5	2.2	.....	2.2	24.1	.....	24.1	40.3	23.2	*12.2*	.....	*12.2*	6.5	.....	*6.5*
Houston, Texas															
1918	152,000	31,098,759	.....	31,098,759	5,457,237	.....	5,457,237	4.88	9.98	202	.....	202	35.9	.....	35.9
1927	259,000	37,012,895	4,251,328	41,264,223	7,791,863	1,463,769	9,255,632	7.28	11.59	143	16	159	30.0	5.7	35.7
Per cent increase	70.4	19.0	.....	32.7	42.7	.....	69.9	49.3	16.1	*39.2*	.....	*21.3*	*16.4*	.....	*0.6*
Richmond, Va.															
1918	162,860	41,204,406	.....	41,204,406	6,718,928	.....	6,718,928	4.35	11.02	253	.....	253	41.26	.....	41.26
1927	191,890	33,649,451	8,717,469	42,366,920	7,984,877	3,359,409	11,344,286	7.12	15.73	175	46	221	41.61	17.51	59.12
Per cent increase	17.8	*18.3*	.....	2.8	18.8	.....	68.8	63.68	42.7	*30.8*	.....	*12.6*	0.8	.....	*43.3*
Milwaukee, Wis.															
1918	500,000	123,488,090	.....	123,488,090	17,436,274	.....	17,436,274	4.45	11.0	247	.....	247	34.87	.....	34.87
1927	589,000	133,582,587	8,188,199	141,770,786	21,626,268	2,345,133	23,971,401	6.38	15.35	227	14	241	36.72	3.98	40.70
Per cent increase	17.8	8.2	.....	14.8	24.0	.....	37.5	43.4	39.5	*8.1*	.....	*2.4*	*5.3*	.....	*16.7*
Toronto, Canada															
1922	529,083	186,747,308	2,126,652	188,873,960	26,497,167	393,910	26,891,077	6.16	21.60	353	4	357	50.08	0.74	50.82
1928	585,628	189,064,065	4,578,862	193,642,927	25,197,725	1,255,955	26,453,680	6.18	20.42	322.8	7.8	330.6	43.03	2.14	45.17
Per cent increase	10.69	1.24	115.31	2.52	*4.91*	218.84	*1.63*	0.28	*5.46*	*8.55*	93.3	*7.4*	*14.08*	189.18	*11.18*
Winnipeg, Can.															
1918	262,000	.....	.....	56,348,716	10,222,684	77,250	10,299,934	4.03	8.67	.....	.....	215	39.0	0.3	39.3
1927	305,000	.....	.....	60,045,833	9,841,980	897,850	10,739,830	5.86	11.58	.....	.....	197	32.3	2.9	35.2
Per cent increase	16.4	.....	.....	6.6	*3.7*	.....	4.3	45.4	33.6	.....	.....	*8.4*	*17.2*	.....	*10.4*

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...ities, 1918 to 1927

Revenue Rides per Mile			Per Cent of Revenue Passengers		Per Cent of Revenue Vehicle Miles		Motor Vehicle Registration		
Street Car	Bus	Total	Street Car	Bus	Street Car	Bus	Number Registered	Per 1000 Popul.	Persons Per Auto
6.23	(a)	6.23	100.0	(a)	100.0	(a)	36,000	74	13.6
7.39	2.66	7.32	99.42	0.58	98.41	1.59	114,122	198	5.0
3.62	.....	17.50	.....	.....	.....	.....	217.01	167.56	.....
5.46	.....	5.46	100.0	.....	100.0	.....	20,000	74.6	13.4
4.81	.....	4.81	100.0	.....	100.0	.....	70,840	216.5	46.0
1.90	.....	*11.90*	.....	.....	.....	.....	254.2	190.2	.....
5.59	.....	5.59	100.0	.....	100.0	.....	17,200	75.8	13.2
5.48	1.67	5.34	98.80	1.20	96.15	3.85	53,670	169.3	5.9
1.97	.....	*4.47*	.....	.....	.....	.....	212.0	123.4	.....
5.22	3.24	5.30	99.0	1.0	99.0	1.0	100,000	38.1	26.2
5.72	4.21	5.62	95.0	5.0	93.0	7.0	400,000	128.9	7.8
3.58	29.94	6.0	.....	.....	.....	.....	300.0	238.3	.....
6.16	.....	6.16	100.0	.....	100.0	.....	12,848	109	9.21
5.20	1.59	5.03	98.52	1.48	95.31	4.69	32,256	217	4.6
5.58	.....	*18.34*	.....	.....	.....	.....	151.06	99.1	.....
5.27	.....	5.27	100.0	.....	100.0	.....	3,800	92.1	10.8
4.19	2.46	3.47	70.37	29.63	58.15	41.85	10,687	177.1	5.6
7.4	.....	*34.1*	.....	.....	.....	.....	181.2	92.2	.....
5.96	5.56	6.95	99.0	1.0	99.0	1.0	43,600	56.8	17.6
6.44	4.32	6.33	97.0	3.0	95.0	5.0	157,900	185.8	5.4
7.5	.....	*8.9*	.....	.....	.....	.....	262.0	225.0	.....
6.58	.....	6.58	100.0	.....	100.0	.....	42,500	38.7	25.9
6.70	4.22	6.46	93.6	6.4	90.2	9.8	152,554	125.0	8.0
1.2	.....	*1.8*	.....	.....	.....	.....	259.0	223.0	.....
7.24	.....	7.24	100.0	.....	100.0	.....	204,357	170.45	5.9
6.98	3.01	6.13	89.49	10.51	78.57	21.43	385,141	246.08	4.53
9.59	.....	*15.33*	.....	.....	.....	.....	88.3	44.37	.....
5.44	.....	5.44	100.0	.....	100.0	.....	27,760	64.6	15.5
4.68	2.26	4.44	95.05	4.95	90.26	9.74	115,922	231.8	4.3
1.40	.....	*18.38*	.....	.....	.....	.....	317.6	258.8	.....
5.80	.....	5.80	100.0	.....	100.0	.....	30,000	38.3	26.1
6.15	3.21	5.66	90.5	9.5	83.2	16.8	150,000	170.0	5.9
6.1	.....	*2.4*	.....	.....	.....	.....	400.0	343.9	.....
5.95	.....	5.95	100.0	.....	100.0	.....	15,000	75.0	13.3
5.01	1.78	4.90	98.73	1.27	97.01	2.99	44,500	203.2	4.9
5.8	.....	*17.6*	.....	.....	.....	.....	196.7	170.9	.....
2.16	3.34	5.85	99.0	1.0	98.0	2.0	108,000	19.9	50.4
6.03	6.18	6.99	94.0	6.0	93.6	6.4	464,225	74.7	13.4
1.83	85.02	19.5	.....	.....	.....	.....	329.8	275.4	.....
5.76	.....	5.76	100.0	.....	100.0	.....	22,400	51.5	19.4
5.22	2.36	4.37	84.0	16.0	70.3	29.7	85,400	185.8	5.4
9.4	.....	*24.1*	.....	.....	.....	.....	281.3	260.8	.....
7.41	.....	7.41	100.0	.....	100.0	.....	54,600	66.4	.....
7.08	3.21	6.73	95.7	4.3	91.0	9.0	208,400	187.6	.....
4.5	.....	*9.2*	.....	.....	.....	.....	281.0	183.0	.....
4.30	.....	4.30	100.0	.....	100.0	.....	18,997	73.2	13.5
3.90	2.0	3.89	95.6	4.4	91.5	8.5	78,940	223.0	4.4
9.3	.....	*9.58*	.....	.....	.....	.....	315.5	204.6	.....
6.96	.....	6.96	100.0	.....	100.0	.....	53,600	46.53	21.51
6.33	1.46	6.19	99.3	0.7	97.05	2.95	179,192	138.91	7.20
9.05	.....	*11.06*	.....	.....	.....	.....	234.31	198.54	.....
6.24	.....	6.24	100.0	.....	100.0	.....	10,023	56.8	17.6
5.14	.....	5.14	100.0	.....	100.0	.....	45,074	219.1	4.6
7.6	.....	*17.6*	.....	.....	.....	.....	349.7	285.7	.....
5.70	.....	5.70	100.0	.....	100.0	.....	12,943	85.0	11.7
4.75	2.90	4.46	89.7	10.3	84.2	15.8	51,824	200.0	5.0
6.7	.....	*21.8*	.....	.....	.....	.....	301.0	135.0	.....
6.13	.....	6.13	100.0	.....	100.0	.....	3,210	19.7	50.7
4.21	2.59	3.73	79.4	20.6	70.4	29.6	14,990	78.1	12.8
11.3	.....	*39.2*	.....	.....	.....	.....	367.0	296.0	.....
7.08	.....	7.08	100.0	.....	100.0	.....	26,000	52.0	19.2
6.18	3.49	5.91	94.22	5.78	90.22	9.78	134,029	227.6	4.4
8.7	.....	*16.5*	.....	.....	.....	.....	415.5	337.7	.....
7.05	5.40	7.02	98.9	1.13	98.5	1.46	37,204	70.5	14.20
7.50	3.65	7.32	97.64	2.36	95.2	4.75	80,347	137.2	7.29
6.38	*32.41*	4.27	.....	.....	.....	.....	115.96	94.61	*48.67*
.....	.....	5.47	.....	.....	99.3	0.7	7,495	28.6	35.0
.....	.....	5.59	.....	.....	91.6	8.4	24,665	80.8	12.4
.....	.....	2.2	.....	.....	.....	.....	229.0	182.5	*64.6*

transit, are not available, as the methods of fare collection and transferring from one type of vehicle to another preclude the obtaining of the necessary data.

Perhaps the most striking comparison that may be seen in the entire table of statistics is the growth of motor vehicle registration. In no city shown did the increase in registrations of motor vehicles between 1918 and 1927 amount to less than 100 per cent. In Detroit, renowned as the motor city, the increase was 88.3 per cent in five years. However, the registration in Detroit for 1923 was far and away above any other city, being 170.45 motor vehicles per 1,000 of population. Incidentally, Detroit still remained at the head of the list in 1927. Des Moines just failed of doubling the ratio of vehicles to population during the period. From 109 per 1,000 of population in 1918 it went up to 217 in 1927. The total number of vehicles in the city, however, increased 151 per cent.

As it stands today, there is an average of about 200 automobiles per 1,000 of population in the cities included in the survey, or five persons per automobile. Those with less than 4.5 persons per automobile registered are Kansas City, Portland, Ore., and Milwaukee. At the other end of the scale are Pittsburgh, with 7.2 persons per automobile; Chicago, 7.8; Boston, 8; Richmond, 12.8, and New York, 13.4. The two Canadian cities also show relatively few automobiles, Toronto having 7.3 persons for each one registered and Winnipeg 12.4.

A comparison of the per capita riding and automobile registration was made to see if there is more riding of public conveyances in those communities where the automobile registration is small. Results are shown in the table on page 1032. The cities are arranged in order of rides per capita. The population and the number of automobiles per 1,000 of population also are given. New York, with the largest population and the smallest proportional number of automobiles, heads the list. Richmond and Winnipeg, which have, next to New York, the smallest relative automobile registration, are far below it in riding habit, having respectively 221 and 197 rides per inhabitant. Apparently mere size is by no means the only determining factor in inducing riding, since there are several cities of moderate size that exceed some of the communities with 1,000,000 or more as regards riding habit.

Per Capita Revenue Increasing Greatly

Revenue per capita has continued to grow very generally despite the enormous increase in automobile registration. The only city included where there has been a recession is Portland, Ore., and there the total gross increased. In Detroit the revenue per capita has gone down 8.48 per cent since 1923, and in Toronto it has gone down 5.46 since 1922. In both of those cities the situation was peculiar in that the municipality had recently taken over the transportation system and that the riding was abnormal in the earlier year. Comparable figures for 1918 are, of course, not available.

Included in the list of cities with revenue per capita of more than $20 is Toronto, with $20.42 in 1928, as against $21.60 in 1922. The other cities, in all of which the comparison is between 1918 and 1927, include Cincinnati, which has gone up from $12.89 to $21.20, or 64.47 per cent; San Francisco, from $20.08 to $22.81, or 13.6 per cent; St. Louis, from $17.25 to $24.17, or 40.11 per cent; New York, from $17.59 to $24.99, or 42.1 per cent; Chicago, from $17.26 to $27.56, or 59.7 per cent; and Boston, which heads the list, having gone up from $18.52 to $27.86, or 50.43 per cent.

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Rochester Traffic Study Proves Importance of Street Cars

Increasing use of buses and taxicabs is also indicated by comparative figures for the years 1927, 1928 and 1929

FOR three consecutive years the traffic committee of the Rochester Engineering Society has conducted traffic surveys in the city of Rochester. Each time these surveys were made with the assistance of about 1,000 Boy Scouts. The counts were made at the same time of the year, on the same day of the week, during the same hours of the day, covering the same streets, so that the figures were in every way comparable. These surveys showed clearly the value and importance of street cars as a means of transportation. Compared with other vehicles they carry many times the number of people per unit of street space occupied. They are responsible for a very small portion of the traffic accidents and are used to a greater extent by shoppers than any other means of transportation.

A cordon traffic count around the business district was made at exactly the same locations for three consecutive years. For the three years the count of the passenger automobiles entering and leaving the district during a twelve-hour day was as follows:

	Automobiles	Passengers	Passengers per Automobile
1927	120,969	192,308	1.58
1928	126,523	198,861	1.57
1929	138,092	214,910	1.56

This shows an increase of nearly 5 per cent for 1928 over 1927 and a 9 per cent increase for 1929 over 1928. Another trend shown is a small but constant decrease in the number of passengers per automobile. Trends in other classes of traffic are shown in the following table:

Year	Miscellaneous	Commercial	Street Cars	Taxis	Buses
1927	4,596	39,545	5,246	1,582	122
1928	4,137	29,021	6,215	1,386	119
1929	4,090	30,028	6,563	2,519	256

Miscellaneous vehicles, which are mostly horse-drawn, show a decrease each year, as might be expected. Commercial vehicles showed an increase in 1929, although there was a falling off the previous year.

Street cars show a constant increase, 1929 being 25 per cent greater than 1927, the increase in passenger automobiles over the same period being only 14 per cent. Taxicabs, while showing a decrease in 1928, showed a large increase in 1929 due to a taxi war in which rates have been cut to a point where a minimum number of four people riding together can be transported at a rate which is often less than the street car fare would be. The increase in bus operation in Rochester is reflected in the traffic count of buses, which increased over 100 per cent in 1929.

At the point of maximum traffic where the greatest number of vehicles and passengers pass, an analysis or street efficiency chart was made. At this point it was found that street cars constituted 5 per cent of the vehicles using the street but carried 60 per cent of the passengers. On the other hand, passenger automobiles constituted 75 per cent of the traffic but carried only 40 per cent of the passengers. At another location near the center of the business district a check taken the following year during the rush hour showed that automobiles averaging 1.67 passengers each constituted 81 per cent of the total vehicles, while street cars averaging 48 passengers comprised only 10 per cent of the vehicles but carried 79 per cent of the traffic.

The surveys show that while the number of parked automobiles in the downtown district has increased from 2,847 in 1927 to 4,137 in 1929, the percentage of violations of the parking restrictions is less. In 1927 it was found that 58 per cent of all the automobiles parked

Main Street, Rochester, N. Y., where surveys show that street cars comprising 5 per cent of the total number of vehicles carry 60 per cent of the total passengers

in the downtown district between 10 and 11 a.m. were parked in violation of some regulation. In 1928 this had decreased to 48 per cent and in 1929 to 36 per cent. The major portion of the violations were due to overstaying the time limit, but some violations of every parking rule were encountered.

In addition to a count of the number of automobiles parked in the streets, the 1929 traffic survey included all the private parking stations in the downtown district. The check was made at 10:30 a.m. when 3,005 automobiles were found parked in the 88 stations. These stations had a maximum capacity of 8,591 cars.

The 1929 survey included a pedestrian count made on sidewalks at important points in the business district, a demand for such counts coming from many stores, real estate concerns and advertising companies. A maximum of 85,000 people was found to pass one point on Main Street during a twelve-hour period, 50,000 of these being on one side of the street. The maximum pedestrian peak occurred during the noon hour.

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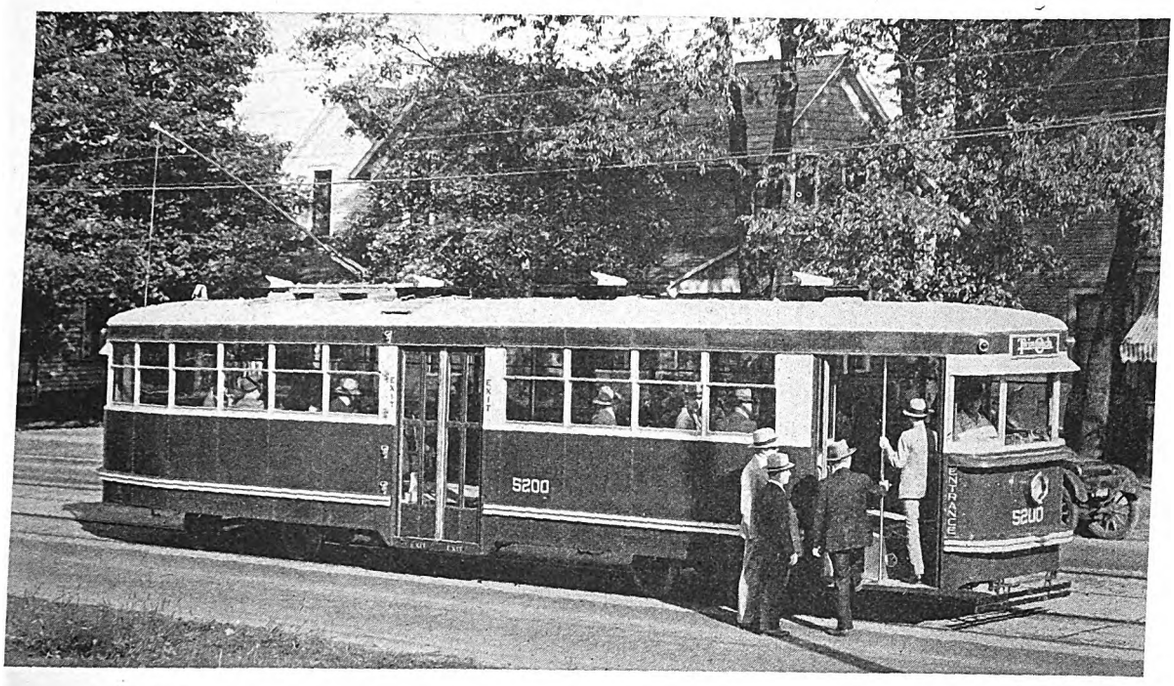


A Twin Coach street car with motors full spring-suspended is an outstanding recent development

Lightness and Speed

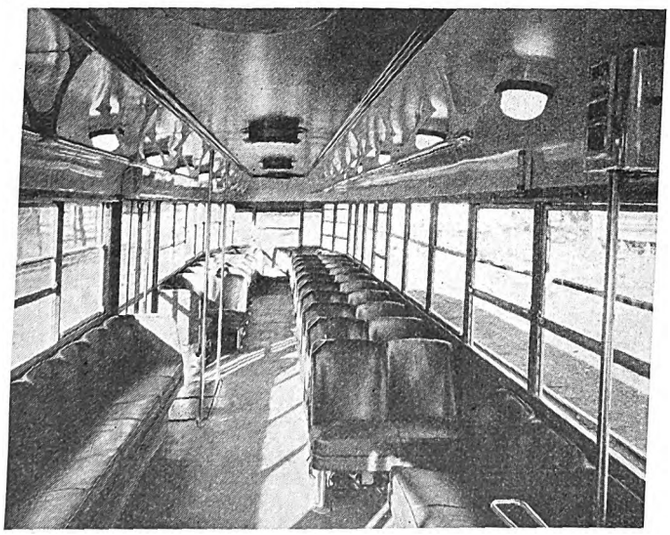
Mark New Car Designs

Many innovations in vehicles exhibited at A.E.R.A. Convention. Extensive use made of aluminum in body construction. Unsprung weight reduced. Higher rates of acceleration and braking attained

MAJOR improvements in the design of electric railway cars were an outstanding feature of this year's convention of the American Electric Railway Association. Not since the first appearance of the so-called "automotive type" street car several years ago has there been so marked a departure from established practice. Among the interesting developments are: more extensive application of aluminum in body construction, wider use of light-weight high-speed electric motors mounted on worm drive trucks, introduction of foot control, innovations in door arrangement, and improvements in seats not only for passengers but also for the car operator.

A radical departure from previous designs was seen in the new Twin Coach double-truck street car. The motors are mounted on the under side of the car body and connected to the axles through propeller shafts with universal joints. By this means the weight of the truck has been reduced to 3,500 lb., giving an extremely small total unsprung weight. The truck has a wheelbase of 72 in. and is arranged for either 24-in. or 26-in. wheels, which are keyed and press-fitted to the ends of 4-in. solid chromium nickel heat-treated axles. The axle is driven by a worm, with a $7\frac{2}{3}$ to 1 gear ratio. The elliptical springs are rubber-insulated. Side-sway oscillators are center-pivoted under substantial cross-supports anchored to the body framing, thus permitting free movement of the trucks on turns. In order to reduce noise the wheels are rubber-cushioned.

The four 35-hp. motors are mounted on body cross-members through rubber insulation. Remote control is foot-operated. The foot control consists of a dynamic and air brake pedal



Seats and ventilators of novel designs are features of the new Twin Coach car

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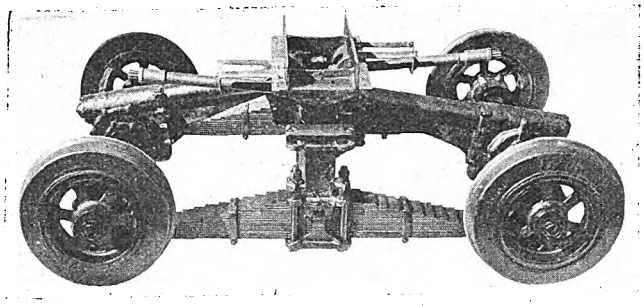
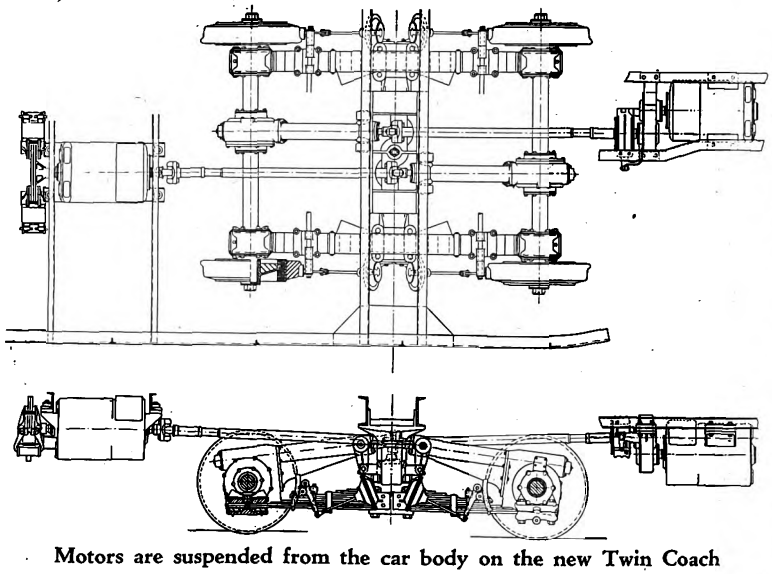


Lightness of construction is the outstanding feature of the Twin Coach car truck

operated by the left foot. The power accelerator pedal is operated by the right foot.

General dimensions of the car are shown in the accompanying table. The body is of semi-flexible construction and is supported by main frame cross-members, trussed and diagonally braced directly above the truck bolsters. The car is designed for single-end operation with front entrance and center exit. The double-leaf doors open inwardly, giving a passageway 4 ft. 4 in. wide. They are actuated by means of National Pneumatic controls with step treadles for the center exits. A combination turnstile and fare register that is located just behind the operator's seat facilitates one-man operation.



Motors are suspended from the car body on the new Twin Coach automotive type car

There are 52 seats of the semi-bucket type, and there is an extra wide aisle space, leaving ample room for standees. A longitudinal seat extends from the front door to the center exit on the right-hand side, while a three-passenger longitudinal seat is located at the left-hand side near the front. Behind this are ten transverse double seats, while along the rear half of the right side five transverse double seats are available. A built-in seat is placed against and around the rear end of the car.

Aluminum Extensively Used in Albany Car

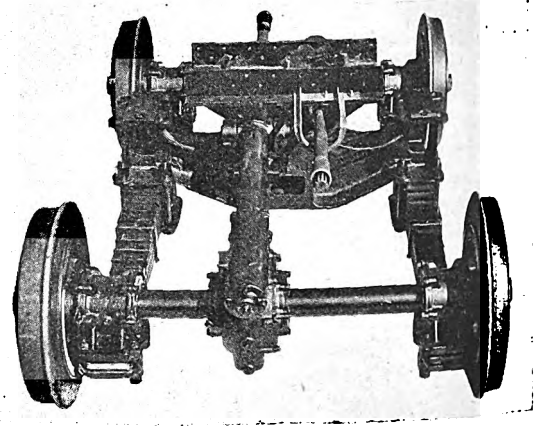
Another striking design was the new double-end, front-entrance, center-exit, double-truck car built by the Cincinnati Car Corporation for the United Traction Company of Albany, N. Y., according to the design of Edward Murphy, general manager. This car deviates from the conventional body design in many details and also differs in truck construction. Aluminum is used more widely than heretofore, the underframe being made entirely of this material. The side sills also are made of aluminum, an angle extending in one continuous piece from the front body corner-post to the center-exit door and from the center exit to the rear vestibule corner on both sides of the car. Another feature of this car body is in the framing, which has sufficient strength to permit elimination of bulkheads. In the roof, the carlins are braced by individual cast aluminum purlin separators, located in pairs and arranged to accommodate lighting fixtures. Braces are bolted to the carlins and form a continuous tie from one end of the roof to the other.

The cars are equipped with two four-wheel arch-bar trucks with spring-pedestal cantilever type journal boxes, combination rubber cushions and semi-elliptical spring-bolster suspension. This truck is designed to negotiate curves of 30-ft. radius. The wheelbase is 5 ft. 4 in. The axles are of the journal-bearing type and the wheels have a diameter of 26 in. The brake equipment is of the foot-operated type with full safety features for one-man operation. Besides wheel brakes the trucks are designed and constructed to carry magnetic rail brakes if desired.

The electrical equipment consists of four 35-hp. motors with PCM foot control. The gong, sander and doors are operated by hand through small levers on the dash mounted in front of the motorman. The front-entrance doors are operated by the motorman also and are of the double two-leaf folding type. The center-exit doors are of the same type but are treadle-operated.

Seats are provided for 44 persons on twenty double seats, each 35 in. long and 18 in. wide, and on two double seats placed longitudinally beside the end doors. The aisle width is 22 in., thus giving adequate space for standees during the peak hours and enabling the passengers to circulate easily through the car.

A new one-man, double-truck, double-end car was built for the Milwaukee Electric Railway & Light Company by the St. Louis Car Company. At the right of the operator are double doors, one for entrance and the other for exit. The door at the rear end is equipped



The Twin Coach truck is worm-driven and connected to the motor by a propeller shaft provided with universal joints

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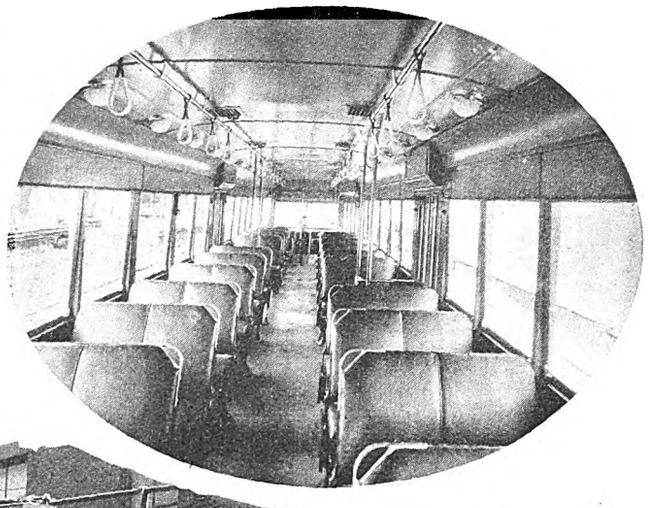
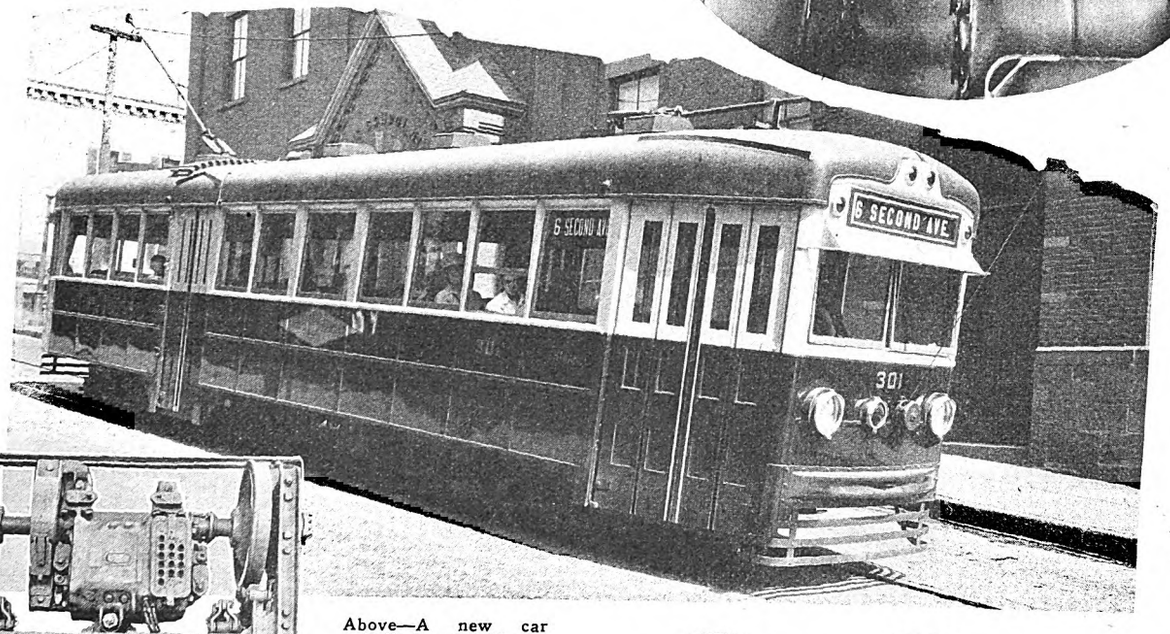
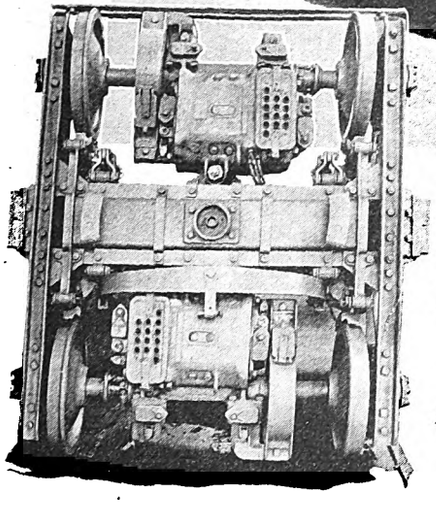
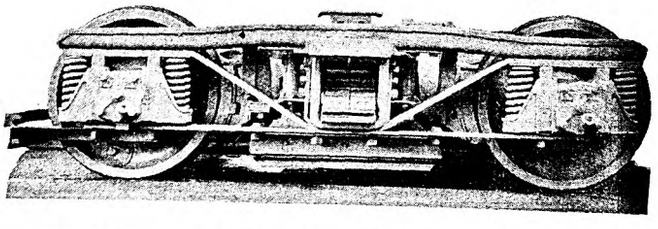
with an automatic step treadle. Much attention was given to the interior appointments. Six dome lighting fixtures provide the necessary illumination. Steel panels conceal the air piping and electrical apparatus at each end. Seats are available for 48 passengers and there is ample room for standees.

The trucks are of the St. Louis Car Company type E.I.B.-58, with cast-steel equalizers having a special feature in the mounting of the detachable journal boxes. The side frames are of cast steel with gussets and brackets for transoms, with which the brake and bolster suspensions are cast integrally. The transoms are of rolled steel bulb beams. There are only four joints in the entire









Above—A new car built by the Cincinnati Car Corporation for the United Traction Company of Albany
In Oval—Interior of new Albany car
At Right—Roller bearings and a special spring suspension add to the riding comfort of the Cincinnati trucks under the Albany cars
At Left—The new Cincinnati trucks are extremely light and simple in construction

of the truck frame. All wearing surfaces are fitted with easily renewable heat-treated high-carbon steel wear plates and bushings. The truck is equipped with a fully graduated system of springs, consisting of a combination of full elliptic and helical springs. The brake gear is inside hung and fitted with anti-rattle devices, and the motors are inside hung. Each truck has two 25 hp. motors.

Rapid Acceleration and Braking Feature Detroit Car

Light weight, rapid acceleration and high free-running speed are features of an experimental car built by the Department of Street Railways, Detroit. Factors which have contributed to keeping down the weight are: light-weight motors and trucks, reduced amount of steel framing in the car body, absence of heavy brake rigging, use of aluminum as the material for the trolley pole, bumpers, door engines, air compressor and piping. In general, the car follows the Peter Witt design now standard on this system. Four Westinghouse 300-volt 60-hp. motors are mounted on Timken model 52 trucks. General Electric sixteen-point automatic control is used.

The braking system is straight air, but has the novel feature of using a foot-operated brake valve of the G.E. VB-2 type. This is a balanced air-pressure valve and gives an operation akin to that of braking an ordinary automobile. The pedal is spring-controlled and may be locked in the application position.

Forced ventilation is used, following a design developed by the Peter Smith Heater Company. With this system air is admitted to the car through intake ventilators on the roof and exhausted through four grilles inserted in the floor. The exhaust is accomplished by means of a motor-driven exhaust fan suspended under the car floor and connected to the floor grilles by flexible metal tubing.

Several noise reduction features have been incorporated in the design, including worm gear drive, rubber spring supports, rubber motor supports, rubber mounting of air compressor and trolley base, and sound insulating of the floor with felt. Details of the construction were given in an article appearing in the August issue of this paper.

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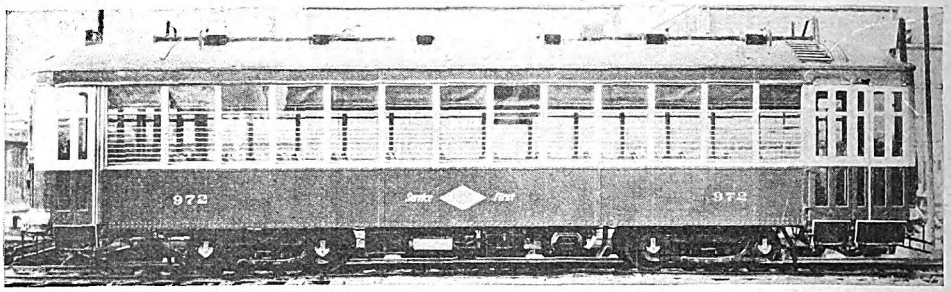
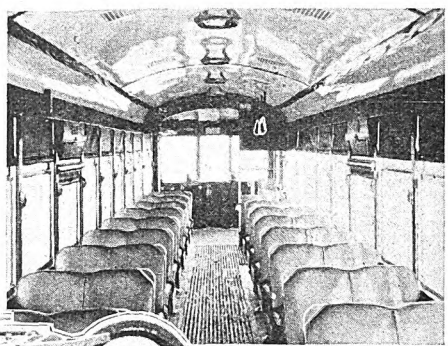
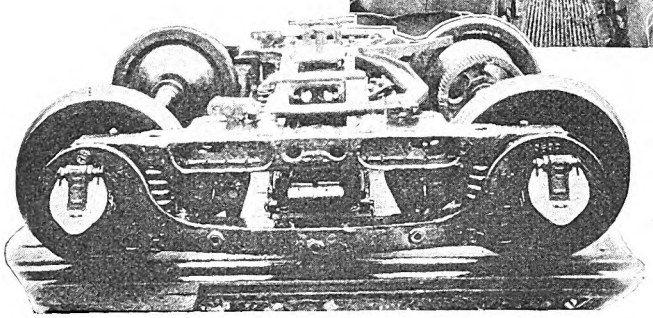




Above—Double-end car built by the St. Louis Car Company for the Milwaukee Electric Railway & Light Company

At right—Control apparatus on the Milwaukee car is entirely inclosed

Below—Truck used under the new Milwaukee cars



Extreme lightness of weight and electro-pneumatic control with pedal-operated accelerator and dynamic brakes are features of an experimental car of the Pittsburgh Railways, built by the Osgood-Bradley Car Company. The car was built with the lightest possible car-body framing construction consistent with the necessary strength and regard for manufacturing considerations. Metallic parts of the body construction and the various items of equipment have been made of aluminum wherever possible. Special aluminum alloy was used throughout the structure where special strength requirements are important, while commercial aluminum was used for the various items of interior finish.

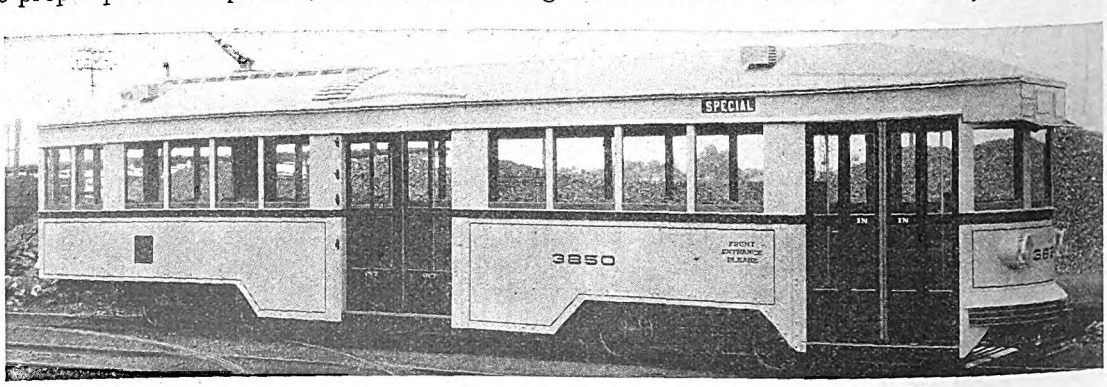
The master controls, both for acceleration and braking, are foot-actuated through two pedals. They have been designed to resemble the controls of an automobile. Variable rates of acceleration and braking may be obtained, and are approximately proportional to the distance the proper pedal is depressed, the maximum being obtained with full depression. A full description of this car was published in the July issue of ELECTRIC RAILWAY JOURNAL.

Larger seating capacity at lower cost per seat is an outstanding feature in the single-end car built for the Chicago Surface Lines. The weight has been brought down from 820 lb. per seat to 740 lb., and the weight per horsepower from 0.173 tons to 0.111, or a reduction of 36 per cent. The electrical equipment has been changed from previous designs because it was decided to use 50-hp. motors. Having this power available on four axles the acceleration rate was stepped up from 2 m.p.h.p.s. to 3 m.p.h.p.s., permitting an average speed of 14 m.p.h. instead of 12 m.p.h. Having attained rapid acceleration it was considered that rapid braking was also of paramount importance to safe operation. The new car has in its braking system a quick-service valve, in connection with a straight air brake with emergency feature. An application up to 50 lb. per sq.in. in the brake cylinder can be obtained in 0.85 seconds.

As the doors are on one side of the car only the left side-panels have been combined so as to form one straight panel, thus accentuating the low lines obtained through the low truck design. In the interior, straps are omitted and standees are provided for by grips on the backs of the seats along the aisle, while above the longitudinal seats a horizontal bar has been placed to take the place of straps.

SINGLE TRUCK CAR WITH LONG WHEELBASE BUILT BY BRILL

Unusual in many respects is a new single-truck car built by the J. G. Brill Company. This car has the new Brill No. 283-A four-wheel truck with a 12-ft. wheelbase. It is equipped with 28-in. diameter solid wheels pressed on and fixed to solid axles, which through a special type of suspension at the journal boxes permit sufficient radial motion to enable the car to negotiate short radius curves. Its alloy steel side frames



Large capacity car of the Department of Street Railways, Detroit, mounted on Timken worm-drive trucks

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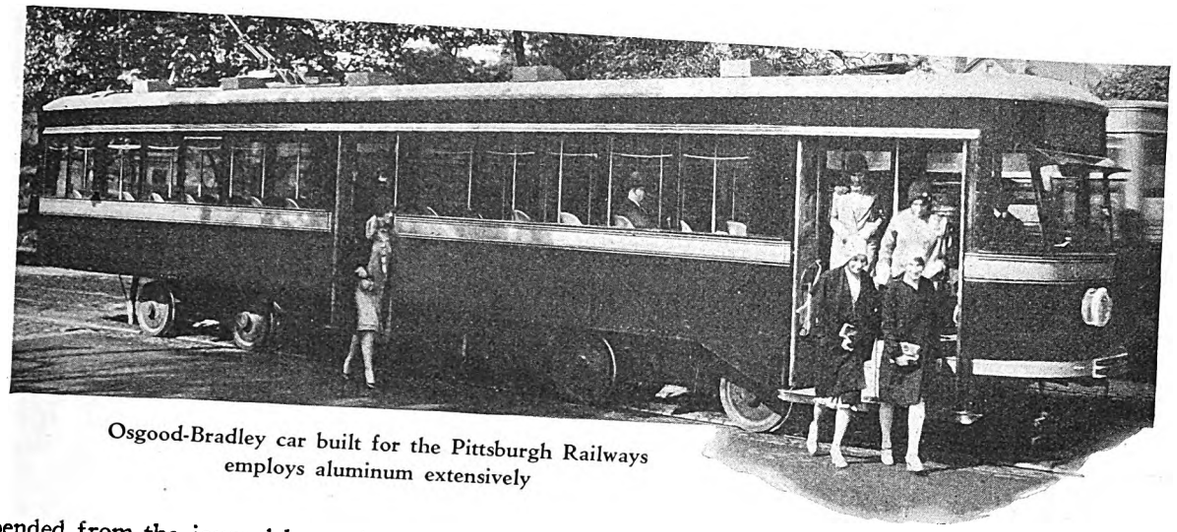
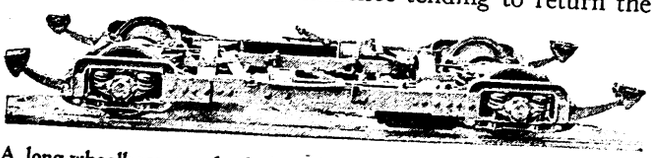
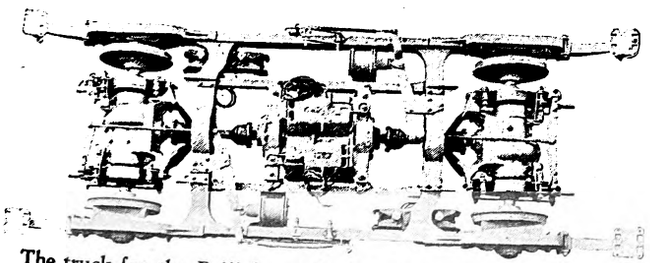


Osgood-Bradley car built for the Pittsburgh Railways employs aluminum extensively

are suspended from the journal boxes by double spring-cushioned links, each having a single bearing at the top and double bearings at the bottom of the journal yoke casting, which contribute greatly to the riding stability of the car. This arrangement permits a radial motion of each wheel and axle assembly on curves. At the same time it exerts a powerful influence tending to return the wheel and axle assembly to its normal position in relation to the tangent rail and to keep it there until a curve in the track again sets up this radial motion. This feature together with the suspension of the car body on four cantilever alloy steel springs, 19-ft. spring base, assures steady and comfortable riding action.



A long-wheelbase truck designed by Brill for a four-wheel car. The axle mounting permits sufficient movement to negotiate sharp curves

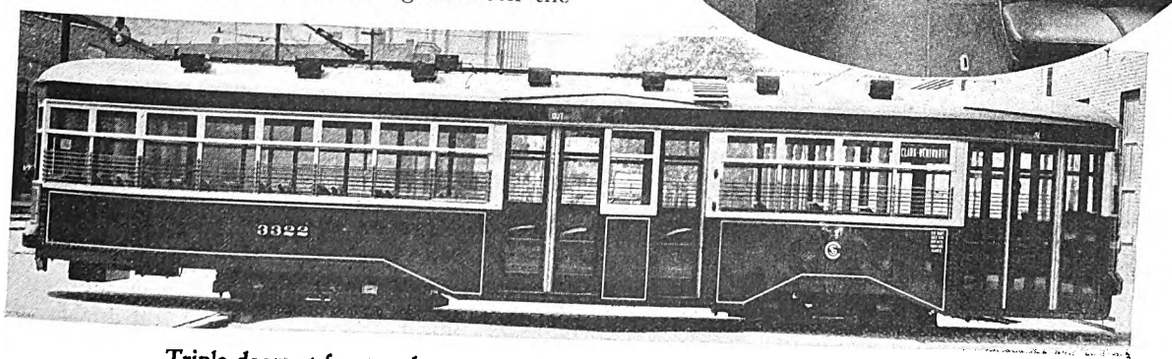


The truck for the Brill four-wheel car is equipped with both magnetic track brakes and air brakes

Two 50-hp. high-speed automotive type motors are jointly spring-supported in the center of the truck on two longitudinal angle members extending between the two large crossing castings, on which also the wheel and axle assemblies pivot when radial motion is set up. Each motor drives its axle through a conventional type propeller shaft, on the center line of the car. There is a single spur type gear, the housing of which is directly connected to the motor frame, which reduces the propeller shaft speed over that of the motor armature in the ratio of 3.25 to 1. At the center of each axle there is a secondary bevel gear transmission which reduces the speed of the axle to that of the propeller shaft in the ratio of 2.5 to 1. Both sets of reduction gears run in oil, to insure long life and a minimum of noise.

Two external contracting type clasp drum brakes, air-actuated, are mounted on each axle, supported by the bevel gear housing. The total brake pressure of these drum brakes is 100 per cent of the loaded car weight. Supplementary to these brakes, if desired, a magnetic

Wide aisles with grip-handles instead of hand-straps facilitate the carrying of heavy loads in the Chicago car



Triple doors at front and center are features of New Chicago Surface Lines cars

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PRINCIPAL DIMENSIONS OF NEW DOUBLE TRUCK CARS

	B-M-T.	Albany	Pittsburgh	Chicago	Detroit	Milwaukee	Lynchburg	Scranton
Length over all	45 ft.	42 ft. 8¾ in.	45 ft. 3 in.	49 ft.	48 ft. 5 in.	45 ft.	40 ft. 10 in.	42 ft. 6 in.
Width over all	8 ft. 4 in.	7 ft. 8¾ in.	8 ft. 2 in.	8 ft. 6 in.	.....	8 ft. 8 in.	8 ft. 4 in.	8 ft. 5¼ in.
Height over all	9 ft. 9 in.	9 ft. 11 5/16 in.	9 ft. 9 in.	10 ft. 9½ in.	10 ft. 9¼ in.	11 ft. 3 in.	10 ft. 6½ in.	11 ft. 6¼ in.
Interior headroom	6 ft. 11½ in.	6 ft. 9¾ in.	6 ft. 9 in.	7 ft. 8¼ in.	.....	.....	7 ft. 16 in.	6 ft. 11¾ in.
Height rail to step	15 in.	17 in.*	16½ in.	15 in.	15 in.	.....	13 in.	15 in.
Height step to floor	15 in.	15 in.*	16½ in.	13 in.	14 in.	.....	14 in.	14¼ in.
Wheel diameter	24 in.	26 in.	26 in.	26 in.	26 in.	26 in.	26 in.	26 in.
Truck wheelbase	6 ft.	5 ft. 4 in.	6 ft.	4 ft. 10 in.	5 ft. 6 in.	4 ft. 10 in.	4 ft. 10 in.	5 ft. 6 in.
Distance between truck centers	24 ft.	22 ft. 9¾ in.	21 ft. 8 in.	22 ft.	23 ft. 9 in.	20 ft. 9 in.	17 ft. 5 in.	21 ft.
Weight of truck without motors	3,500 lb.	3,865 lb.	4,160 lb.	6,600 lb.	4,640 lb.	4,750 lb.	4,745 lb.	4,540 lb.
Total car weight	26,800 lb.	32,450 lb.	27,000 lb.	43,000 lb.	32,500 lb.	38,000 lb.	32,250 lb.	37,900 lb.
Seating capacity	52	44	42	60	52	48	41	54
Builder	Twin Coach Corp.	Cincinnati Car Corp.	Osgood-Bradley Car Co.	J. G. Brill and Cummings Car and Coach Co.	Dept. of St. Rys.	St. Louis Car Co.	J. G. Brill Co.	Osgood-Bradley Car Co.

*Front entrance—heights at center exit are slightly lower.

track brake may be installed on each side of the truck, supported by the truck cross member.

Another interesting double-end car was one of the twenty built for Lynchburg, Va., by the J. G. Brill Company. The dimensions of these cars are given in an accompanying table. Full details appeared in an article published in this paper Jan. 26.

Somewhat similar to this is a car built by Osgood-Bradley for the Scranton Railway. This follows closely the design of cars previously built for the railways in Worcester and Springfield.

Trucks are of the conventional four-wheel pivotal type. They employ 26-in. diameter solid wheels, pressed on cylindrical seats on heat-treated solid parallel axles. Journals can be either of the anti-friction type or plain type. The conventional axle-borne type motors with single reduction are used. Foot operated electric control and air brakes are provided.

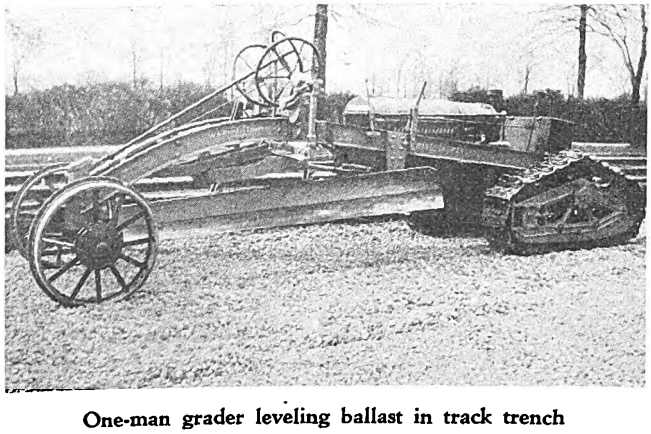
Handling Ballast With a Grader

By H. H. George

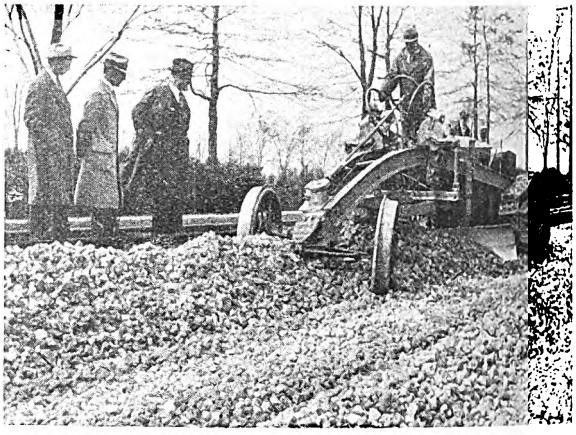
Superintendent of Way, Cleveland Railway

SPREADING ballast in a track trench in preparation to rolling has always presented a problem to the track engineer because of the amount of labor involved in handling it by stone forks or shovels, and the time required in the operation. It is usually deposited in the trench after the ballast has been graded and rolled, from side-dump car equipment, which is, of course, a relatively simple operation. From that point on, the labor cost of spreading ballast has usually been quite expensive. During the current season, the Cleveland Railway made some experiments in handling and spreading ballast in single and double track trenches by using a tractor-propelled road grader of the type illustrated.

The result of the first hour's operation was more than sufficient to justify every claim that had been made, and far exceeded expectations. The machine was able to spread the ballast, which had been dumped along one side of a double-track trench, evenly over the entire trench, and did as many lineal feet of trench in approximately six hours as had been accomplished previously by twenty men and a foreman in three eight-hour days,



One-man grader leveling ballast in track trench



Condition of ballast after spreading

using shovels and stone forks. By using a slightly shorter blade in single track trench, the machine was found to be equally effective. In addition, the man who operates this machine also operates the roller and, because of the rolling effect of the wide tractor treads, the work of the roller is much simplified.

On the day the equipment was first placed in service, it was possible to do away with eighteen laborers and one foreman. Two of these units are now in use on the Cleveland Railway. In addition to spreading the ballast, they level the subgrade behind the electric shovels.

Traffic Lights Operated By Approaching Train

TRAIN controlled traffic lights for street crossing protection were put in service recently by the South Shore Line at Chicago Avenue in Michigan City, Ind. Designed by the company's engineers, the apparatus consists of standard traffic signals installed on the right hand at corners close to the railroad's tracks. These signals allow automobile traffic to pass across the tracks until an approaching train closes a track circuit 1,500 ft. from the crossing, at which time the light goes to yellow for a moment, then to red. The light remains red until the train has crossed the street. The motorman is given a green indication when the red light appears to halt the cross traffic.

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Local Transportation Improving Its

Industrial Relations

Electric railways active in educational work. Wages have increased more rapidly than cost of living. Strikes are becoming rare. Fundamental principles outlined

By
LESLIE VICKERS

IN A RECENT statement the executive council of the American Federation of Labor declared its intention "to conduct an investigation of the policies of public service corporations in general, including holding companies, in order to determine their attitude toward labor and in consequence the attitude of the Federation toward them." This statement was issued after considering the support that the American Federation should give the Amalgamated Association of Street and Electric Railway Employees of America in its fight against the New Orleans Public Service, Inc., whose employees have been on strike since July 2. This announcement of the intent of the American Federation of Labor to investigate the labor policies of our industry provides an opportunity to state the principles which govern the relationship between local transportation companies and those whom they employ in public transportation work. The author has had long and intimate contact with this phase of the industry's activity.—EDITOR.

IN THE electric railway industry, operating in many different cities, under many different managements and in the midst of varying industrial conditions, it would be futile to expect uniformity of thought on the part of the operators and managements, or unanimity of agreement as to the proper treatment of labor. It is safe to say, however, that the liberal, forward looking operators greatly outnumber the conservatives, and that there is little trace to be found today of any harsh, oppressive or intolerant attitude on the part of street railway operators. Whatever change has occurred in the attitude toward labor has been in the direction of liberalism, a change not actuated always by motives of humanity but sometimes because operators have come to realize that contented employees make for efficiency and thus for success.

But the term "contentment" as applied to employees is a relative one. Few of us are thoroughly content with our lot and ambitious nature makes us strive for better things which usually can be achieved only through the possession of more money. As the standards of living of our neighbors advance, we naturally desire to keep pace with them and enjoy the physical benefits which civilization has to offer. This is as true of the worker in his overalls or blue uniform as of the white collar man who sits in his office. It is a tendency which every reasonable man wishes to encourage. For this reason many of our companies have established schools where the employees, without cost to themselves, may improve their education and thus fit themselves for more responsible positions either within or without the company.

The movement to educate the worker is growing. In so far as it is improvement in the technique of his work which this education is calculated to bring out, it naturally helps the employing company. But when that improved education is destined, as happens frequently, to raise the standards of our employees to such an extent as to cause them to leave us to fill jobs where higher earnings are justified, then it represents a loss to the company not only for the education thus imparted but also on account of the necessity of filling the place which the worker has vacated.

It can be said to the credit of our companies that they have gone ahead with such educational programs as they could provide, not merely with the selfish motives of improving the workers in their own tasks but with the unselfish end of making those workers fit for better jobs.

This industry is awake to the necessity for good industrial relations. It does not regard its employees as pieces of machinery which it can "hire or fire" as it pleases. It recognizes them as partners in an enterprise entitled to as favorable conditions and as good a living as the business will warrant. It is a public utility. It is supplying an essential service which must be given day in and day out and will permit of no hindrance. The workers in the shops, the clerks in the department stores and offices and the customers that enter these stores and offices to transact their business are, in general, carried to and fro by our public transportation systems. The business must be carried on without interruption and it relies upon the faithfulness of its employees and their recognition of the essential nature of its service to prevent any interruption.

It is for this reason that, in so many of our contracts, there is a provision that disputes regarding wages and working conditions shall be submitted to arbitration. The writer knows of no other industry where arbitration is so generally set forth in the agreements between employer and employee as in ours, nor any other industry that has put the control of its expenses for wages and for working conditions so completely in the hands of the public through impartial boards of arbitration.

On the whole our arbitrations have worked out well. Seldom have they been entirely satisfactory to both sides of the controversy, but they have prevented strife, they

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have maintained continuous service and they have presented an opportunity for both sides to express their views and grievances.

But there are varying lengths to which representatives of managements are willing to go in the matter of arbitration. Some few of them feel that any dispute with the employees or with a single one of the employees is a fit subject for arbitration. Under this system, conflicts with the management are liable to occur over petty details and the initiative is taken away from the management to a degree that sometimes becomes intolerable. The great majority of electric railway companies feel that wages and working conditions can be arbitrated but that there should be no trespassing by labor on the field of management. Some companies have met the difficulty, in a certain sense, by appointing representatives of labor on the board of management. But since these labor representatives have always been outnumbered by those of the management, it is difficult to say how far the mixture of management and labor on a single board has been a success.

Individual disputes in our industry are decreasing, as is shown by the following tabulation prepared by the United States Department of Labor, published in ELECTRIC RAILWAY JOURNAL NEWS Aug. 3, page 111.

Year	Number of Strikes	Result: Favorable to Employers	Result: Favorable to Employees	Result: Compromised	Result: Undetermined	Year	Number of Strikes	Result: Favorable to Employers	Result: Favorable to Employees	Result: Compromised	Result: Undetermined
1919	75	11	20	25	19	1925	5	2	3	..	..
1920	59	10	10	23	16	1926	7	5	..	1	1
1921	11	2	1	6	2	1927	2	..	1	..	1
1922	18	3	5	4	4	1928	3	1	1	1	..
1923	20	11	1	5	3	1929	1	..	..	..	*1
1924	13	2	6	3	2	*Not settled.					

The bureau's records do not show strikes which provoked "sympathetic" or general strikes. Upon several occasions general strikes have been threatened but the bureau is unable to find any record of a general strike having taken place in any city in recent years.

This is relatively a splendid record and managements ascribe to their employees their full share of credit for the fact that this industry has been so little disturbed in recent years by industrial strife. It is fair to say that, generally speaking, the industry has granted to its men, either by arbitration or by agreements, as great wage increases as could be afforded. At the present time the electric railways are not prosperous, as that word is applied to many manufacturing industries today. We have passed through, or are passing through, a time of great transportation changes made possible by the invention of the automobile and its manufacture at a price which brings it within the range of almost all. This industry is not generally in a position to pay premium wages or to do many of the things that have been done in other industries not subject to regulation and where prosperity abounds. But trainmen's wages today are more than double those of the basic year 1913, while the cost of living is generally only about 65 per cent above what it was in that year, which means that the employees have shared in the increase in national wealth and have been able to purchase with their wages a higher standard of living. Besides this, their working conditions have been vastly improved by the shortening of hours and the installation of labor-saving devices.

The electric railways recognize the necessity for paying a living wage. This statement has been made consistently by managements in every arbitration case with which the writer has been associated and in every wage agreement but it would be foolish to suggest that there has been unanimity of opinion as to what constitutes a living wage. As a matter of fact, we all know that what will constitute a living wage for one man in one place may be a starvation wage for another and comparative luxury for still a third. Agreement in the matter as to what constitutes a living wage cannot be expected and we can only be guided by a careful observation of the living conditions of our employees, by a study of comparative wages in other industries, and by a determination from scientific studies of what is the cost in various localities of maintaining a decent American standard of living. This industry is well aware of its responsibilities in this direction, but it must be realized by the labor it employs that while it is in a position to be just it is in no position to be generous.

INDUSTRIAL RELATIONS PRINCIPLES SUMMARIZED

The principles of industrial relations which guide the managements of street railway properties today have been set forth in the report of the industrial relations committee of the American Electric Railway Association. Without doubt they express the views of a large part of electric railway managements. In condensed form they are:

1. To pay all employees adequately for services rendered.
2. To maintain reasonable hours of work and safe working conditions.
3. To provide continuous employment consistent with business conditions.
4. To place employees in the kind of work best suited to their ability.
5. To help each individual to progress in the company's service.
6. To aid employees in time of need.
7. To encourage thrift.
8. To co-operate in social, athletic and other recreational activities.
9. To accord to each employee the right to discuss freely with executives any matters concerning his or her welfare or the company's interest.
10. To carry on the daily work in a spirit of friendliness.
11. To recognize the fact that the street railway business is a public utility.

These principles express not merely the ideal at which we should aim but the actual fundamental principles which have for many years guided and are today guiding the activities of electric railway managements. They represent humanitarianism and good business at the same time, and there is not an industry in the United States today that has the interest of its workers more at heart than have the electric railways. As an industry, we have nothing to fear from a labor investigation. If it is made impartially it should bring credit to us. If, on the other hand, it should expose some sore spots or some cases in which managements are not yet enlightened as to their own best interests, the electric railways will be the gainers thereby, for remedial changes must soon come about. The industry is jealous of its record and will look askance at the continuation of conditions which militate against its progress and run counter to its idea of fair dealings with its employees. It is essential, however, that managements and labor both realize the fundamental nature of this public service, its competitive nature today as opposed to its comparatively monopolistic character a few years ago, and its dependance for its continuation on fair dealing to capital and managements as well as to labor.

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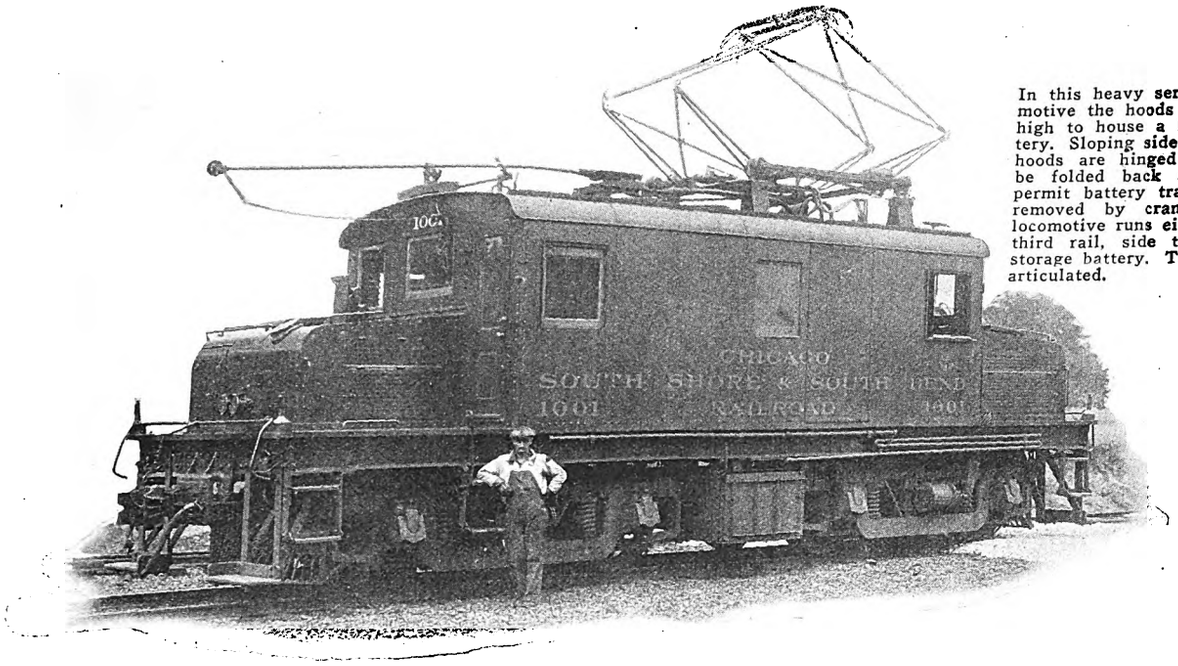

In this heavy service locomotive the hoods are made high to house a large battery. Sloping side covers of hoods are hinged and can be folded back so as to permit battery trays to be removed by crane. This locomotive runs either from third rail, side trolley or storage battery. Trucks are articulated.

Choosing Electric Locomotives To Fit the Service

It is important to have an electric locomotive fitted to the class and weight of trains it is to haul. While some provision must be made for future growth in traffic, this should be carefully studied so that the efficiency meanwhile will not be impaired too much

By

W. R. TALIAFERRO

Railway Equipment Engineer
Westinghouse Electric & Manufacturing Company

BEFORE undertaking the design of an electric locomotive it is desirable to determine not only the characteristics of a machine that will meet the requirements of the present, but also to consider, as far as can be foreseen, the requirements of the future. The weight, speed, voltage, power and physical dimensions of a machine can seldom be made to meet these requirements in the most economical manner, on account of the conflicting factors involved.

Consider, for instance, locomotive speed. There is a speed for each road at which freight can be moved most cheaply consistent with satisfactory delivery to users of the service. However, several outside factors determine the freight train speed. The chief element that tends to raise the speed above that most economical theoretically is the need of preventing delay to other traffic.

Closely related to the economical speed are the weight and tractive effort of the locomotive. Long trains may be moved at any speed by heavy locomotives with greater economy than small trains, but here again other factors enter. Long trains require long passing, side and classification tracks, which may be too costly or even impossible to install. Hence smaller trains and locomotives may be more economical on a road. Two or more small locomotives with multiple-unit control can be coupled when greater power than a single unit is needed.

The question of voltage is too involved to go into deeply here. In general, if it is not already fixed the line voltage should be as high as physical conditions and over-all costs permit. While there is a most economical voltage for each system when it is laid out, the possibility of expansion must not be overlooked, as the voltage most economical today may be too low tomorrow. The most useful voltages are 600 to 750, 1,200 to 1,500, and 3,000 volts d.c. for small and medium-size electrifications and 11,000 volts a.c. or higher for extensive heavy ones.

The limiting physical dimensions of a locomotive are determined by the road clearance required, while within these limits the actual dimensions are determined by the particular design adopted.

The cab or body and the trucks or running gear of an electric locomotive are built in many forms. The most conventional types of locomotive cabs are generally known as "box" type and "steeple" type, the box type

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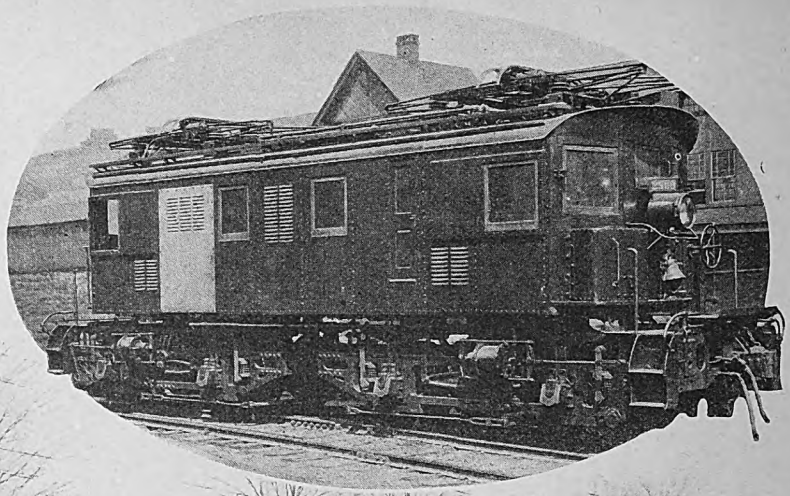
being similar to an ordinary car body except for window and door arrangement, while the steeple type takes several forms, the most usual being



The conventional box type cab and articulated trucks are used on locomotives for light or heavy duty

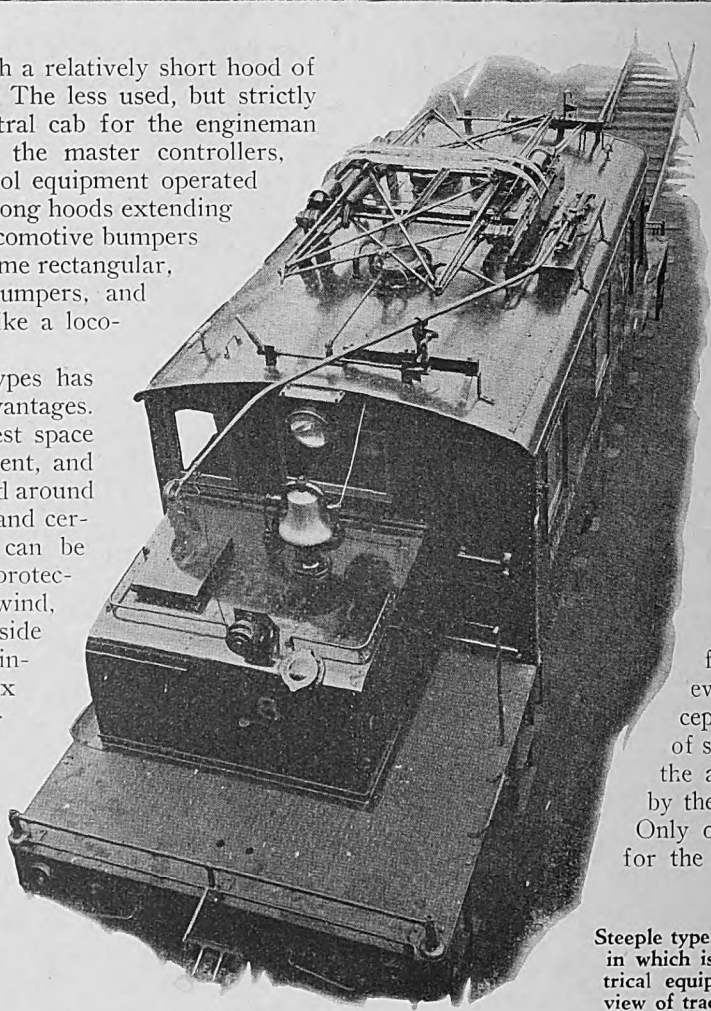
Below — This locomotive for heavy passenger service has exceptionally long rigid wheel base, with two large motors on each end, geared to a jack shaft which drives the side rods

a medium length box cab with a relatively short hood of reduced height at each end. The less used, but strictly steeple type has a small central cab for the engineman and helper, containing only the master controllers, brake valves and other control equipment operated directly by the engineman. Long hoods extending from the central cab to the locomotive bumpers are made in several forms, some rectangular, some sloping toward the bumpers, and others rounded on the top like a locomotive boiler.

Each of the above cab types has certain merits and disadvantages. The box type has the greatest space for the mounting of equipment, and good clearance can be obtained around apparatus so that inspection and certain repairs of equipment can be made inside the cab with protection from rain, snow and wind, when they must be made outside of the shop. The cost of maintenance is low with a box type cab because of the accessibility of the apparatus.

The air compressors and blowers for cooling the electric motors make considerable noise in a box type cab. In the steeple type cab these pieces of equipment are mounted under the hoods. Since inspection of blowers and compressors is simple and the machines are rugged and not likely to give trouble, this imposes no hardship. It has the great advantage of permitting them to be removed and installed by means of a crane. To do this the hoods must be arranged so that they can be lifted off as a unit. The other equipment is located in the central cab between the engineman's compartments, where it is accessible.

The short hood steeple cab is preferable for small, medium and even large locomotives, except when the equipment is of such size and quantity that the additional space provided by the box type cab is needed. Only one advantage is claimed for the long hood steeple cab—



Steeple type of cab with low hoods, within which is contained most of the electrical equipment. Driver has excellent view of track ahead or to rear

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greater visibility for the engineman when looking or running backward. Maintenance and inspection costs will be high with the long hood steeple type cab.

The three general types of trucks used on electric locomotives are swivel, articulated and rigid. Each type may carry two or more driving axles and one or more idle axles. In the swivel truck locomotive, like the ordinary railroad car, the load is pulled through the cab or car underframe and transferred to the trucks through center pins. The articulated truck locomotive pulls its load through the truck frames, by means of a drawbar or hinge connecting the two trucks and couplers on the outside ends. The cab is carried on center pins but takes no drawbar pull. The rigid truck is used for small two-axle and three-axle locomotives and also for some of the largest types having as many as four driving axles. Drawbar pull is taken through the truck frame.

For locomotives of not more than about 100 tons for freight haulage at speeds not exceeding 40 m.p.h., two four-wheel swivel trucks are the most economical in first cost and maintenance. For higher speeds and weights, articulated trucks should be employed. The rigid truck is generally limited to industrial locomotives and to locomotives for heavy service at either high or low speed.

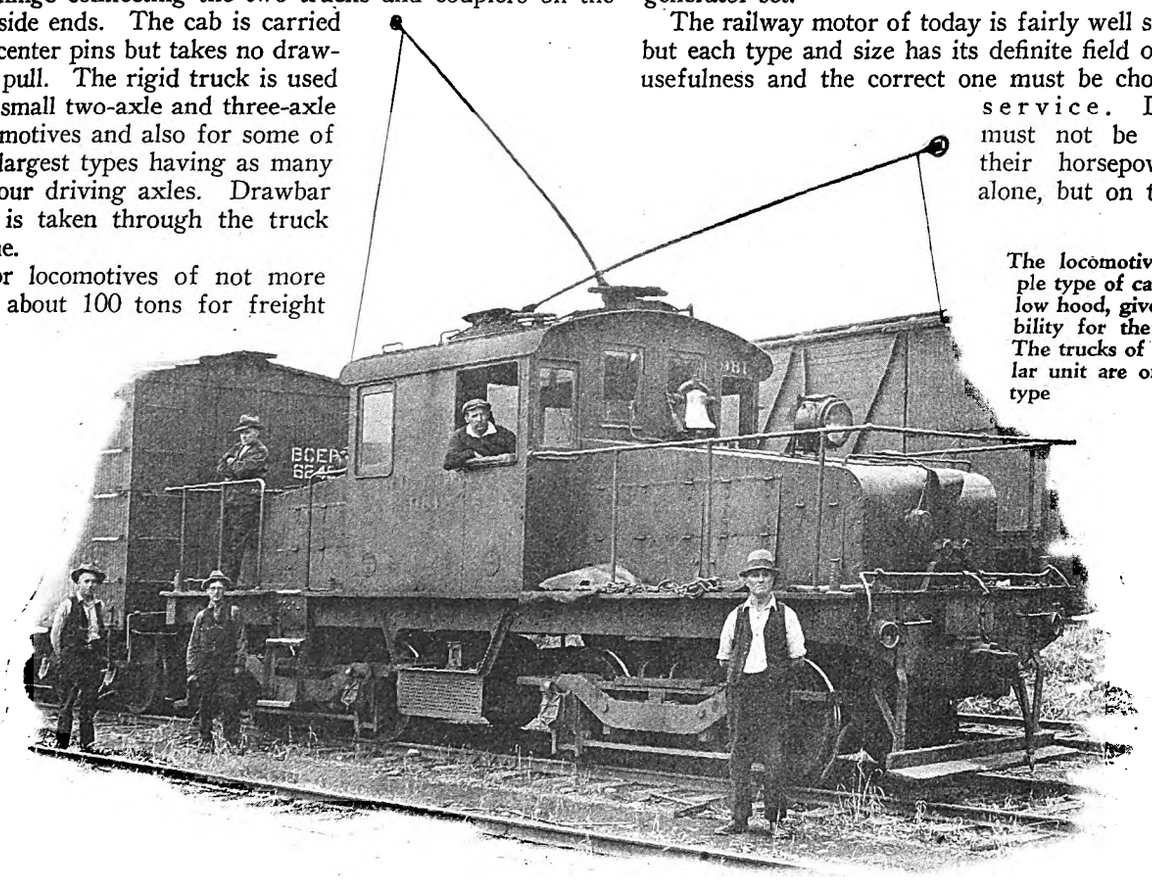
Locomotives should have double-end control, that is, with an operating compartment in each end of the cab, except that when two units are permanently coupled to form one locomotive, the outside ends only need operating compartments.

In direct-current locomotives, the grid resistors require careful design to insure correct starting characteristics and the resistors must have sufficient capacity to meet the service. A properly designed passenger locomotive will not carry resistors suitable for freight service, nor will a freight locomotive carry resistors suitable for heavy switching service. However, if such double duty characteristics are specified, the locomotive can be designed to perform it, although with less economy than for a locomotive designed for a single service. Relays, contactors, fuses, etc., must be carefully chosen for the service and must be vibration-proof.

Power for energizing the control circuits may be taken directly from the line through a control resistor. This method, known as line control, is suitable for locomotives operating on voltages up to 750 volts d.c. and is most economical in first cost and maintenance. It has the disadvantages that the electric lights cannot be used when power fails and that the control cannot be tested when power is off the line or when defects on the locomotive prevent the raising of a pantograph or other collector.

While line control is used on some 1,500-volt installations, battery control is to be preferred. The storage battery may be charged in series with the ground lead of the blower and compressor motors or by a small motor-generator set.

The railway motor of today is fairly well standardized, but each type and size has its definite field of maximum usefulness and the correct one must be chosen for the service. Locomotives must not be judged by their horsepower rating alone, but on the tractive effort-speed characteristics in the service which they are to perform.



The locomotive with steeple type of cab and short, low hood, gives good visibility for the motorman. The trucks of this particular unit are of the swivel type

An important feature of any locomotive should be field control of the driving motors, with which tractive efforts for starting heavy trains may be obtained at considerably lower currents than would otherwise be required. This reduces the cost of power and often the size of the substations required.

Field control is obtained by two means: tapped fields and shunted fields. The tapped-field motor has two field windings. When both are in series the motor has high tractive efforts at low speeds for relative low values of current. When only one field winding is in the circuit the tractive effort is lower for a given current but the speed is higher. These changes are made by suitable switches. For shunt control the motor is built with but one field winding, corresponding to the full field winding of the tapped field motor. To obtain higher speeds the motor field is shunted by a resistor and an inductor in series.

The tapped field motor itself is more costly than the shunted field motor, but including the inductive shunt, the shunted field motor is more expensive. Valuable space in the locomotive cab is taken up by the inductive shunts and the total weight is greater.

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Chartered Bus Revenue Increased by

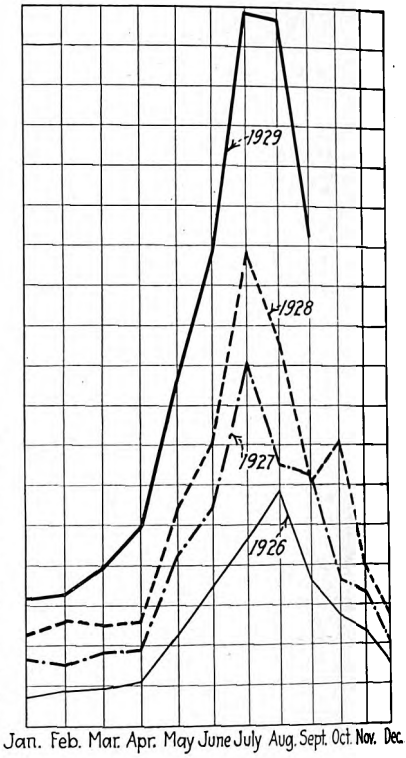
Skillful Merchandising

BUS operation was commenced by Public Service Co-ordinated Transport, Newark, N. J., in the latter part of 1923, and during the next three years the principal effort was directed to perfecting the organization and developing the vehicles to the highest possible degree. As time went on, however, more and more special service was rendered, and it was realized that this type of business could be made a source of considerable profit if more attention was given to it. In 1927 a special department was created to stimulate this kind of service, and subsequent results have more than justified this expectation.

More than 8,000 buses were used in chartered service in 1927. During the next year this service was increased to nearly 15,000. The first six months of this year show a considerable increase over 1928, and if this trend continues the average number of buses for this type of service will be 60 each day, or about 18,000 for the year. An example of the great demand for this special service is the fact that on May 30 of this year 133 buses were operating for special service. During each of seven Sundays in 1928 more than 100 buses were chartered. The maximum week-day schedule calls for slightly less than 2,000 buses in ordinary service, while on Saturday the maximum schedule is not more than 1,800 and on Sunday it is considerably less than that—not over 1,400. This leaves available for special service at least 200 buses on week days and 500 on Sundays. Hence, the chartered service utilizes vehicles which would otherwise be standing idle.

The fleet of the Public Service Co-ordinated Transport consists mainly of two types of buses—first, the city service bus, and second, the so-called de luxe bus, which differs from the first-mentioned type mainly in the seating arrangement, and the type of seat itself.

The rates of the chartered service vary with the type of equipment used. For the city-service bus, 50 cents per mile is charged for the first 50 miles, 45 cents per mile for the next 25 miles, and 40 cents per mile for all trips over 75 miles, while a charge of $2 per hour is made for layover time, unless the mileage rate exceeds $50. However, if the total elapsed time exceeds fifteen hours, the layover time is added. Necessary bridge, ferry or tunnel tolls and parking charges are added, while the minimum rate per bus, regardless of mileage, is $10. The charge for the de luxe equipment is 60 cents per mile straight, and a charge of $2 per hour for layover time is charged in the same way. In cases where it is not possible to charge the mileage rate, as for instance on funerals, a flat rate of $5 per hour, or any fraction thereof, is charged from the time the bus leaves the garage until it returns therein. The approximate seating capacity of the equipment is 30 passengers, which makes a rate of about 2 cents per passenger per mile or less, when a full load is carried. About 95 per cent of the total mileage operated in chartered service is for one-day trips. However, there have been several instances in which buses have been chartered for weeks at a time, and distances of 5,000 miles have been covered per trip. Recently, trips were made which lasted sixteen days and started in New York, covering Washington, Cincinnati, Chicago, Niagara Falls, and back to New York, a total distance of 2,000 miles.



Yearly increase in chartered bus revenue

The special service department is under the direction of H. B. Whitman, passenger agent. Immediately after its organization, a mailing list was compiled containing the names and addresses of all organizations and individuals that had used this type of service in the past. Contact was established with all churches, Sunday schools, lodges, athletic associations, large employee organizations, political clubs, high school teachers' associations and athletic coaches. The development of the real estate field, where sales of lots were taking place, was followed up also. A list is kept up to date of the officers of the aforementioned organizations, particularly of the chairmen of entertainment and outing committees, and literature, advertising outings by means of buses, is continually sent out to the names appearing on the above-mentioned mailing list. The daily newspapers are looked over carefully each day to see where an outing is being planned, personal calls being made on the individual in charge, and buses are suggested as a means of conveyance. A considerable part of the chartered special service results from the athletic activities of high schools. This is obtained by securing from the proper authorities of each school schedules of the games and then mailing to the coach a letter quoting rates for each game away from home. An outstanding example of transportation of a large number of people is furnished by the Prudential Insurance Company Athletic Association excursions from Newark to Asbury Park, where almost 3,000 people had to be transported. Previously, this was always done by trains of the steam roads, running in three and four sections. Last year the Public Service Co-ordinated Transport discussed this method with the company, with the result that 96 buses were used for conveying 2,900 people, and after the excursion was completed it was declared that the steam road would not be used in the future, although the charge of the bus company was 25 per cent higher than the steam road rate.

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Gains Continue on Canadian Properties

Statistics compiled by Canadian Electric Railway Association and Dominion Bureau of Statistics show increased traffic and greater gross and net revenue in 1928 than in any previous year

REVENUES of the Canadian electric railway systems continued to mount in 1928, reaching a new peak of $55,632,761, which was 4 per cent above the figure for 1927. This was produced largely by an increase of 3.4 per cent in the revenue passengers carried on the cars and buses of the properties. Figures are now available from two sources and are presented in this article.

Statistical information relative to Canadian electric railways has been prepared for the third year by the Canadian Electric Railway Association and is published in a 36-page booklet under the title, "Electric Railway Statistics." The information included consists of charts and tabular material obtained in part from the Dominion Bureau of Statistics and supplemented by questionnaires sent out by the association. Some of the most interesting of the charts are reproduced herewith. Others included in the pamphlet are similar to those prepared by the Canadian association last year, and reproduced in ELECTRIC RAILWAY JOURNAL for Dec. 1, 1928, page 951. Following is a digest of a portion of the material in the booklet.

Passenger revenue by five-year periods from 1900 to 1920, and annually for the last four years, is shown in the first chart. In 1900 there were 675 miles of single track operated in the Dominion; in 1928, 2,502 miles. Table I gives the passenger revenue, total and per mile of single track, along with the operating expense per mile of single track, for the years included in the chart. It is interesting to note that the passenger revenue per mile of single track was approximately the same for 1905, 1910 and 1915. Owing to increased cost of operation, fares were increased shortly after, thus increasing the revenue per mile of single track in the later years. The passenger revenue per mile of single track is now 2.44 times as great as it was in 1900 but the trend of operating expenses shows a greater increase, the present cost per track-mile being 3.14 times as high as in 1900.

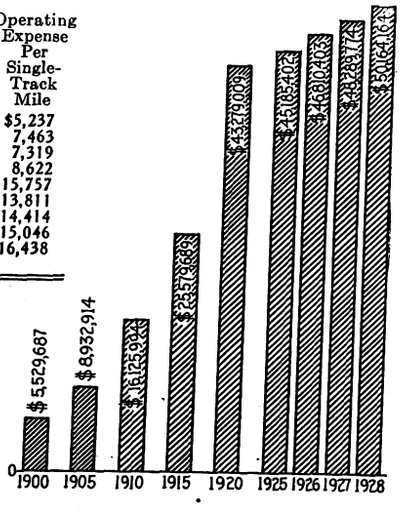
A second chart shows the passenger revenue and operating expenses in cents per car-mile from 1901 to 1928. From 1901 to 1912 there was a gradual increase from 17.46 cents per car-mile to 27.45 cents. As this was a period of fixed fares, it would indicate increasing density and the use of larger cars. When the war period was reached revenue fluctuated considerably and would have been exceeded by expenses had not relief been obtained in the form of increased fares.

A peak in revenue was reached in 1922 at 40.36 cents per car-mile. The recent drop is due largely to extensions of bus services which have not as yet developed full revenue in relation to miles operated and which may not require so much to justify their operation. The number of car-miles increased more than 17 per cent in this period, whereas the revenue increased only 9.5 per cent. Revenue per car-mile increased 120.5 per cent from 1901 to 1927 and operating expenses per car-mile 173 per cent. It is interesting to note the decline in operating expenses since 1921. The use of one-man cars has been an important factor in that movement.

TABLE I—PASSENGER REVENUES OF CANADIAN ELECTRIC RAILWAY SYSTEMS SHOW CONTINUED GROWTH EVER SINCE 1900

Compiled by Canadian Electric Railway Association

Year	Passenger Revenue Total	Per Single-Track Mile	Operating Expense Per Single-Track Mile
1900	$5,529,687	$8,192	$5,237
1905	8,932,914	11,265	7,463
1910	16,125,994	11,660	7,319
1915	25,579,689	12,211	8,622
1920	43,279,009	17,832	15,757
1925	45,185,402	17,616	13,811
1926	46,810,403	18,516	14,414
1927	48,289,774	19,521	15,046
1928	50,164,164	20,050	16,438



Operating expenses in 1909 absorbed 56.24 per cent of the gross revenue; in 1911 only 54.88 per cent. Costs then began to mount, the peak being reached in 1921 with an operating ratio of 74.59 per cent. Since that time conditions have been more favorable and in 1927 a ratio of 63.79 per cent was secured.

Deductions from income have grown steadily. In 1909 the portion of gross revenue absorbed in this way was 9.61 per cent; in 1927 the percentage was 27.48. This was because bonds have been issued to finance electric railways which have been transferred to public ownership whereas formerly stock was issued. In 1921 there was 19.5 per cent of the total revenue available for payment to investors and for capital reserves. In 1927 this had grown to 32.96 per cent, as compared with 32.5 per cent in 1926. This is pointed to as a very favorable indication of the stability of the electric railway industry in Canada.

Another chart, not reproduced, compares the cost of living in Canada with electric railway fares and wages. In 1918, with fares the same as in 1913, wages increased 42.9 per cent. From 1918 both fares and wages con-

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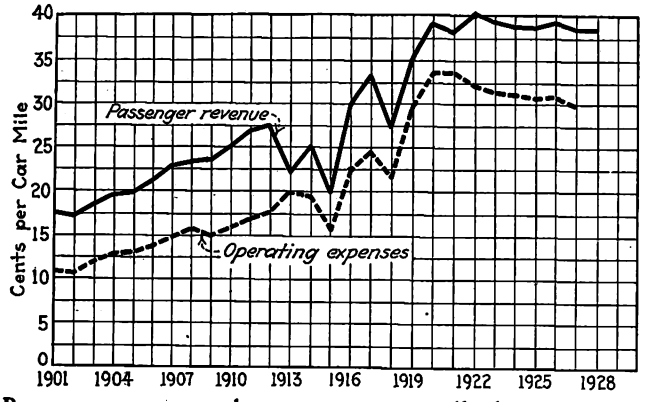
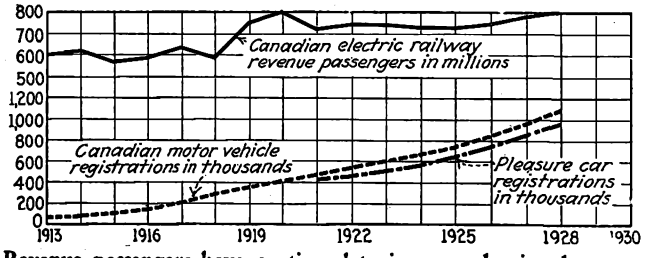
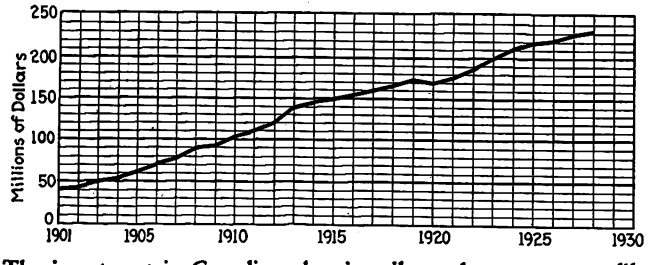


Passenger revenues and expenses per car-mile have both increased, but for the past few years have shown a slight recession



Revenue passengers have continued to increase despite the enormous growth of motor vehicle registration in Canada



The investment in Canadian electric railways has grown steadily over a period of nearly 30 years, with only minor halts in its advance

tinued to climb, the latter at a higher rate. In 1920 wages reached their peak at 94.2 per cent above the 1913 level, while fares had increased only 22.5 per cent and did not reach their peak until 1925, when they were only 46.76 per cent higher than in 1913. The cost of living outran wages until 1920 and reached a peak of 83.1 per cent higher than the 1913 value in that year. In 1921 the cost of living dropped back to 53.3 per cent above 1913 and has continued at much the same level since. Up to the end of 1928 the increase in fares was still considerably behind the increase in wages. Fares were 49 per cent higher than in 1913, whereas cost of living was 53.8 per cent higher. Wages were 94.1 per cent higher than in 1913, or nearly 5 per cent higher than in 1927. Wages, therefore, show an increase almost twice as great as shown by fares and living costs.

An interesting comparison is made in the chart showing motor vehicle registration in Canada and revenue passengers. The automobile registrations have increased from 50,000 in 1913 to 1,058,000 in 1928. For the first three years of this period the annual increase was at the rate of 24,000 vehicles per year. Since then the increase has been greater, with an average of nearly 78,000 annually. The number of revenue passengers continued nearly constant until 1918 at an average of 595,000,000. From then the number increased until 1920 when 804,711,333 were carried, or 35.2 per cent over 1918. In 1921 there was a decrease of 85,405,892 passengers from the preceding year, or 10.6 per cent. From 1921 to 1925 the number of passengers showed little if any change. In 1926 the figure went up to 748,710,836 against 725,491,101 in 1925, an increase of 3.2 per cent. In 1927 a still greater improvement was made, 781,398,194 passengers being carried, or 4.5 per cent above the preceding year. In 1928 the revenue passengers totalled 804,630,491, or practically the same as in the peak of 1920.

In the face of the large increase in automobile registrations during the past three years this showing is particularly encouraging. In 1928 automobile registrations were 12.5 per cent above those in 1927 and 28 per cent above 1926. Returns for the first seven months of 1929, however, indicate an average gain of 3.8 per cent in revenue passengers over the corresponding period of 1928. Thus it appears that by the end of the current year the peak of 1920 will be substantially exceeded.

In one of the charts the total investment in Canadian electric railways from 1901 to 1928 is shown. Although this differs slightly from figures given elsewhere in this article, the discrepancies are slight and are undoubtedly due to differing sources of information. A steady growth has taken place from 1901, when only $40,553,170 was invested, to 1928 which shows $234,586,755. This is taken as indicative of the enormous part electric railways play in the life of the Dominion, and the stability of the investment is shown by the continued increase. Profits on electric railways have not been very great in recent years. The latest figures available are more encouraging, the net income as reported by companies in 1927 being $3,229,943 as against $1,240,477 for 1925 and $2,361,750 for 1926.

The remarkable development of the motor bus and motor coach in Canadian transportation is shown in another chart. This year, for the first time, it has been possible to distinguish between the feeder buses operating and the special coaches used for interurban work, special fare routes, charter, sightseeing and similar services. From thirteen buses in 1921 the total has grown to 488 in 1928. The growth is particularly marked in the past three years. The use of motor buses for feeder service has increased considerably during the past year or two. There undoubtedly is a field for their use in outlying districts which have not yet developed sufficient traffic to justify extensions of tracks and distribution systems. The chart shows that more than half the buses and coaches owned by electric railways in Canada are used in feeder services.

There is a distinct trend toward the absorption of independent bus lines by the electric railways. Many of

TABLE II—STATISTICS OF CANADIAN ELECTRIC RAILWAYS FOR 1928

Complied by the Dominion Bureau of Statistics

Total gross revenue	$55,632,761
Total operating expenses	$38,782,719
Net revenue from operation	$16,850,042
Total income from operation	$22,388,331
Taxes	$1,994,192
Interest on funded and unfunded debt	$8,973,632
Total deductions from income	$11,946,944
Surplus for year	$10,441,387
Reserves and special charges	$7,485,663
Dividends	$3,012,493
Total miles of track	2,218.78
Fare passengers carried	808,023,615
Tons of freight carried	3,892,114
Total car-miles	133,689,589
Conductors, motormen and conductor-motormen	9,095
Total employees	18,697
Total salaries and wages	$26,494,063

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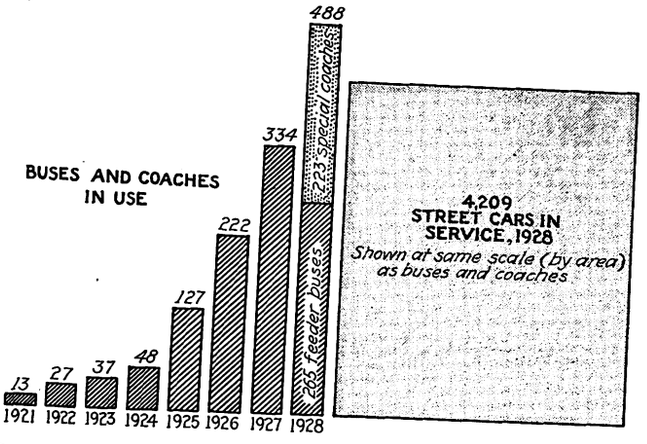
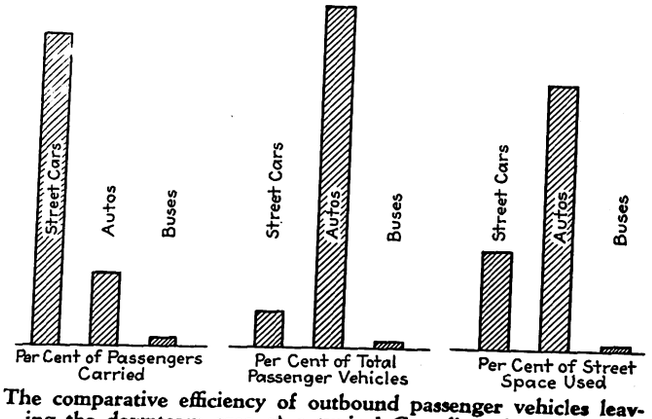
these lines running on suburban and interurban routes have been carrying passengers to the centers of cities and depriving the street railways of their passengers. During the past year a greater number of independent bus lines has been purchased by electric railways than in all previous years.

A portion of the booklet is taken up with a discussion of traffic problems. Typical comparisons of the relative efficiency of street cars and buses and automobiles are made in charts and text. The diagram reproduced was made up from a count of all traffic leaving the downtown area of a typical Canadian city during the evening rush hour (5-6 p.m.) on normal week days during February, 1929. Street cars comprised only 9.04 per cent of all passenger vehicle movements and 5.35 per cent of all traffic movements. They carried 80.77 per cent of all passengers and occupied 26.4 per cent of the street space taken up by passenger vehicles. Buses comprised only 0.66 per cent of all passenger vehicle movements, carried 1.17 per cent of all passengers and occupied 1.25 per cent of the street space taken by all passenger vehicles. Automobiles comprised 90.3 per cent of all passenger vehicle movements, carried only 18.06 per cent of the total passenger traffic and occupied 72.35 per cent of all street space taken up by passenger vehicles.

The foregoing count shows that on any basis of comparison which takes into account the number of vehicle movements or street space occupied in relation to the work done in transporting passengers, the street car is by far the most efficient vehicle in mass transportation.



Buses and coaches have become an important factor in the Canadian transportation industry. The growth is shown here along with the relation of the total number of buses to the street cars in service



The comparative efficiency of outbound passenger vehicles leaving the downtown area of a typical Canadian city during the evening rush hour is seen in this chart

Statistics Bureau Figures Show Gains

Canadian electric railway systems carried 808,023,615 passengers during 1928, according to the preliminary report of the Dominion Bureau of Statistics, released separately in manuscript form. This is an increase over the 1927 traffic of 3.4 per cent. The totals include passengers carried on both cars and buses of electric railway companies. Gross revenues amounted to $55,632,761, an increase of 4 per cent over 1927, and operating expenses were increased $1,166,151. The net operating revenue accordingly was $16,850,042, or $960,209 more than for 1927.

On account of a number of minor fare increases during the year the average fare for all railways, measured by revenue per revenue passenger, was 6.27 cents against 6.25 cents in 1927.

Of the 59 railways reporting, including the Hamilton & Dundas Street Railway, which leased its facilities, and the Yarmouth Light & Power Company, which discontinued operation Aug. 20, eleven railways failed to earn operating expenses. The other 48 reported a net revenue from operation of $17,122,658. After paying interest, rentals and other charges against income, 21 railways showed a loss and the other 38 reported a net income of $11,403,130. Six railways paid dividends.

Nine properties had gross revenue of more than $1,000,000; eight between $500,000 and $1,000,000; eleven between $200,000 and $500,000; fifteen between $100,000 and $200,000, and sixteen below $100,000. Of the eleven companies with receipts of more than $700,000, all earned a surplus over charges. Sixteen of the seventeen properties between $200,000 and $700,000 gross earned operating expenses and eleven of them had a surplus at the end of the year.

TABLE III—STATISTICS OF CANADIAN ELECTRIC RAILWAYS, 1922–1928

Compiled by the Dominion Bureau of Statistics

	Capitalization			Operating Revenues and Expenses		
	Stocks	Bonds, etc.	Total	Gross	Expenses	Net
1922	$76,949,185	$111,309,789	$188,258,974	$49,660,485	$35,986,872	$13,673,613
1923	76,674,185	122,395,685	199,069,870	50,191,387	36,171,923	14,019,464
1924	76,482,085	137,285,575	213,767,660	49,439,559	36,125,213	13,314,346
1925	58,567,242	163,201,978	221,769,220	49,626,231	35,426,487	14,199,744
1926	57,779,518	158,029,002	215,808,520	51,723,199	36,453,709	15,269,490
1927	58,873,778	163,678,939	222,552,717	53,506,401	37,616,568	15,889,833
1928	50,653,072	170,649,165	221,302,237	55,632,761	38,782,719	16,850,042

	Miles of Track Operated			Number of Passengers Carried	Tons of Freight Carried	Passenger Car Miles	Employees	Salaries and Wages
	First	Second	Total					
1922	1,725	513	2,238	738,908,949	2,445,425	113,403,912	18,099	$24,988,118
1923	1,736	511	2,247	737,282,038	3,145,863	115,768,713	17,779	25,039,286
1924	1,737	525	2,262	726,497,729	2,546,928	116,438,733	17,379	24,964,440
1925	1,738	543	2,280	725,491,101	2,706,312	115,715,733	16,933	24,543,855
1926	1,684	553	2,237	748,710,836	3,493,457	118,566,321	16,961	24,686,549
1927	1,652	563	2,215	781,398,194	3,269,028	127,062,864	18,090	25,891,020
1928	1,653	566	2,219	808,023,615	3,892,114	128,888,905	18,697	26,494,062

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One of the typical electric track switch installations in Toronto

Constant Vigilance Needed in Maintenance of Electric

By

L. H. McADAM

General Inspector of Electric Switches and Signals
Toronto Transportation Commission, Toronto, Canada

AN OPERATING electric track switch is an asset, but an electric track switch not operating is a liability. To keep electric switches in good operating condition requires constant vigilance on the part of the maintenance staff. There are 87 operating switches in use on the lines of the Toronto Transportation Commission. While at first they were looked upon with some measure of suspicion, the switches now have the complete confidence of the operators. This result is due to improvements introduced by the manufacturers and particularly to the careful system of maintenance.

Five different types of switches are used. Three of these represent various stages of improvement for the same switch. A fourth represents a greater improvement with radical changes in all parts. The fifth is the product of an English company. All are actuated by the well-known "power on" "power off" system. No locking devices are used. The mechanism is called upon to throw a point weighing from 200 to 250 lb. as used with the 122-lb. steel rail.

Switches are inspected at intervals varying from six to twelve days, according to the season. This work requires two men almost constantly on patrol, cleaning, greasing and gaging the parts. In rainy weather these men are employed renewing cylinder coils or contactor plates.

In addition a tower truck is employed with a crew of four men under a foreman, whose duties include the care of switches, signals, headway recorders, etc. These men inspect and maintain the overhead parts of switches, but seldom do any of the regular inspection work on track parts. They are, however, required to make a number of complete overhauls every week based on the gage reports of the two inspectors or on emergency trouble reports. For this purpose they carry a complete stock of spare parts.

The early winter season discloses the weak spots, if there are any. The switches are working in a mixture of salt, sand, oil and slush. All cylinder and conduit joints receive a severe test and sometimes they break down. For this reason as many switches as possible are

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Track Switches

The winter season is a difficult period because slush, water, salt, sand and oil combine to give all mechanical parts a severe test. Careful analysis of most frequent troubles assists in better maintenance

given a complete overhaul just before the winter. It is at this time that the greatest number of part replacements are made. For the same reason the inspection work becomes more intensive as the winter advances.

Analysis of the principal causes of trouble with electric switches is helpful. One of the most frequent troubles is a tight graphite plunger in the circuit breaker. This causes the circuit breaker arm to remain in a closed position and if a car stands on the contactor the resistance coil is burned. If the circuit breaker arm is left in the open position the switch will not operate at all. A careful setting of the plunger is necessary to prevent this trouble, which, however, due to recent improvements, does not occur in the new type of switches.

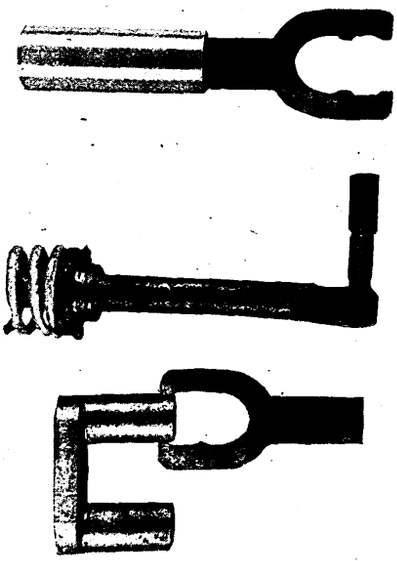
Sometimes a slight arc occurs that welds the plunger to the curve contact, or there is some loosening of the mica back plate that holds the circuit arm in the open position. This causes the switch to throw only for the curve. Careful cleaning of the contactor at each inspection and installation of a new back plate when required will keep this trouble down to a minimum. Instances occur, however, when sleet forms in the circuit changer box and freezes one or the other contact, so that it will not move. This can be prevented only by making the boxes as weathertight as possible.

With a tilted contactor the switch will miss for some cars and operate for others. This trouble may be caused by a wild trolley pole, by trolley wire being out of line or by a loose contactor tip. The remedy is obvious. Although contactors as supplied by manufacturers are large and heavy, they are easily installed. None of the lighter types have proved satisfactory in Toronto, most of them having a tendency to bow under the strain of the trolley wire.

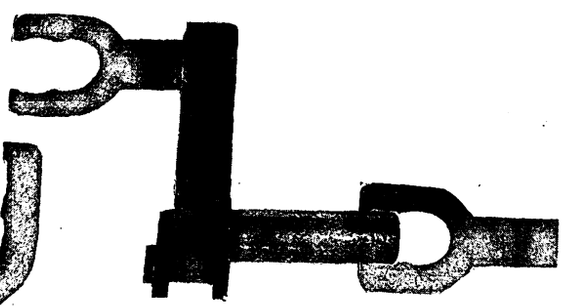
A loose or broken connector is characterized by lessened, or entire absence of, spring pressure; the point may be left in any position and may cause a derailment. The Toronto Transportation Commission uses a new connector invented by F. Drowley of the way department, which has proved satisfactory and will go a long way toward correcting this trouble. Details of the new connector were given in an article published in the maintenance contest section of ELECTRIC RAILWAY JOURNAL for Oct. 20, 1928, page 732.

Cylinder trouble is sometimes caused by a broken lead in the cylinder or by the entrance of water into the cylinder. Although a switch may work while almost completely covered with slush and brine, due to the drain being plugged or frozen in winter weather, it is only a matter of time before the cylinder will fail, no matter how well the parts have been put together.

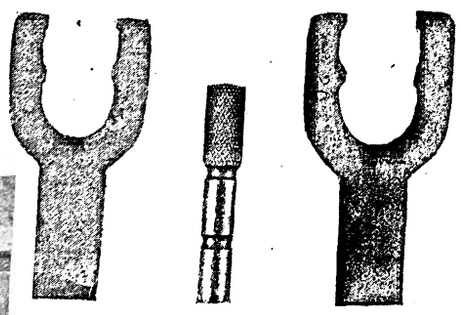
When the inspectors lift up the end of the cylinder for cleaning or to examine the recoil spring, the leads are moved. This happens frequently and in course of time the leads, unless carefully watched, will break off and cause trouble. The leads may break off close to the end of the conduit, in which case it is difficult to pull



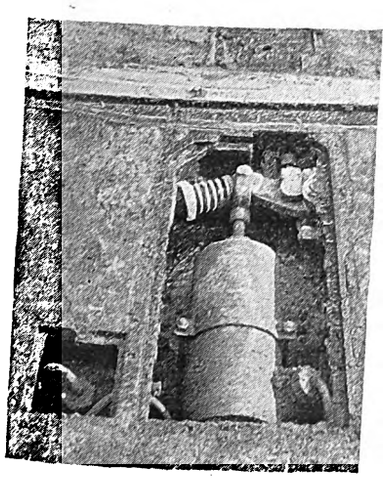
Checking bushings. When the gage goes all the way down in the bushing it must be renewed



The use of the gages is shown. When the part under test goes between the inner jaws of the gage it must be discarded



Above, a set of gages used in checking switch parts in Toronto



At left, the most satisfactory switch in Toronto has no radical change in fittings. It uses an auxiliary track box

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Another installation of an electric track switch in Toronto

the cable. Sometimes, owing to the presence of water in the conduit, the cable freezes and under these circumstances cannot be pulled without breaking. In order to get the switch back into service as soon as possible, it may be necessary to dig up the conduit line. We have to some extent lessened this trouble by the use of the auxiliary track box at the track end of the conduit line, which is shown in the illustration at the bottom of page 1053. The design of this box was described in an article published in ELECTRIC RAILWAY JOURNAL for Dec. 15, 1928, page 1043. Close co-operation exists between the general inspector of switches and the general foreman of the frog shop. Due to the latter's wide experience and knowledge of mechanical problems, he is an ever-present help in time of trouble. Switch trouble on the lines of the Toronto Transportation Commission is infrequent, but we are not relaxing our efforts to keep the apparatus in such good condition that there will be freedom from failures.

Paving in the Track Area

Way engineers are keenly interested in this important subject. A survey of the practices followed on more than a score of leading electric railways will appear in the December issue.

Concrete Duct for Track Switch Control Wires

BY H. A. BROWN
Foreman Return Circuit, Switch and Signal Division
Cleveland Railway, Cleveland, Ohio

BY USING concrete duct for wires running from electric track switch boxes to poles located at the curb line, difficulties due to corrosion of iron conduit pipes have been avoided by the Cleveland Railway. The duct mold is a piece of 1½-in. rubber hose. A trench of necessary depth is dug as straight as possible between the ground box and pole, and a 2-in. concrete base is poured, upon which the rubber duct mold is placed. At the pole end of the duct line the rubber mold is run through a vertical piece of 1½-in. iron conduit approximately 8 in. long, which is threaded on one end. This short piece of pipe is placed in such a position that the threaded end extends just above the surface of the ground adjacent to the pole to which the electric switch-operating wires are run. At the track box end of the duct line another piece of 1½-in. iron conduit is placed in position, with the threaded end extended about 2 in. beyond the concrete of the duct line. Concrete is then carefully tamped around the rubber mold and the two short pieces of iron conduit. After the concrete has set for 24 hours the mold is withdrawn, leaving a smooth concrete duct into the ends of which the two pieces of iron conduit are firmly lodged. After the wires have been pulled through the duct a special watertight Crouse-Hinds type "CGB" contactor is screwed on the iron conduit at the track box end, to prevent water and dirt from entering the duct line.

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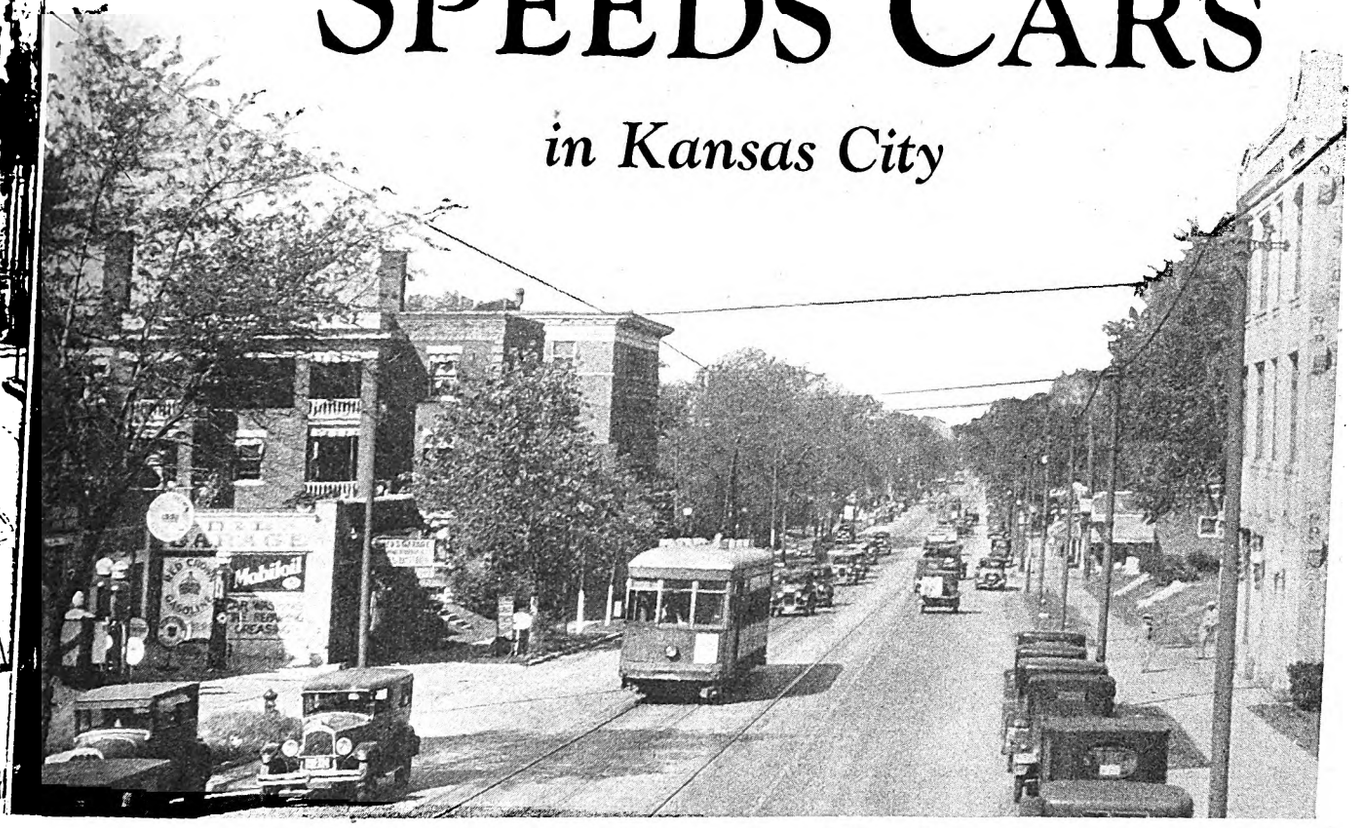
Limited Stop Plan

SPEEDS CARS

in Kansas City



Patrons of the high-speed lines can reach the business district from outlying parts almost as fast as by automobile

By

D. L. FENNELL

General Superintendent of Transportation
Kansas City Public Service Company
Kansas City, Mo.

RECOGNIZING that automobile competition is a major factor in reduced revenues, electric railways are faced with the necessity of improving service. Much has been said as to the need for greater comfort to patrons and attractive appearing equipment, but without higher speeds, making possible less time spent on cars between home and place of employment or shopping, the advantage is still with the automobile as a means of transportation. To overcome this advantage the Kansas City Public Service Company on June 16, 1929, adopted, on three of its important car lines, a system of selected or limited stops along arterial streets.

The three lines, known as Independence-Rockhill, Fifteenth Street and Prospect Avenue, are all heavily traveled and serve characteristic residence, business and industrial parts of the city. Their relation to the entire system is shown on an accompanying map.

The plan has greatly increased car speeds on these lines and other lines for that portion of the time that they operate over the limited stop routes. Average speeds on weekday schedules have been increased from 9.2 m.p.h. to 11.5 m.p.h. Reductions in time per trip, in one direction, are from five to eleven minutes. By such a plan, with speeds greatly increased and trip time materially reduced, it is possible either to furnish the same service as formerly at a much reduced operating cost, or to reduce headways, making more service available without increasing the number of cars on the lines. Car speeds now effective on these three lines render it possible for patrons to make the trip from outlying parts of the city to the business district and return almost as fast as by automobile, considering the time necessary to find parking space in the downtown business center.

Not only is there convenience to the car riders in this saving of time, but the reduction in number of stops adds to the comfort of the passenger, in that much of the former slowing down, starting and stopping has been eliminated. The patrons in general are well pleased with the plan, and many letters commending the high-speed service

Outside of business district, total stopping points on three lines were reduced from 321 to 187, or 41.7 per cent. Stops per mile now only 5.4 instead of 9.6. Average speed increased from 9.2 to 11.5 m.p.h. Time savings range from five to eleven minutes one way

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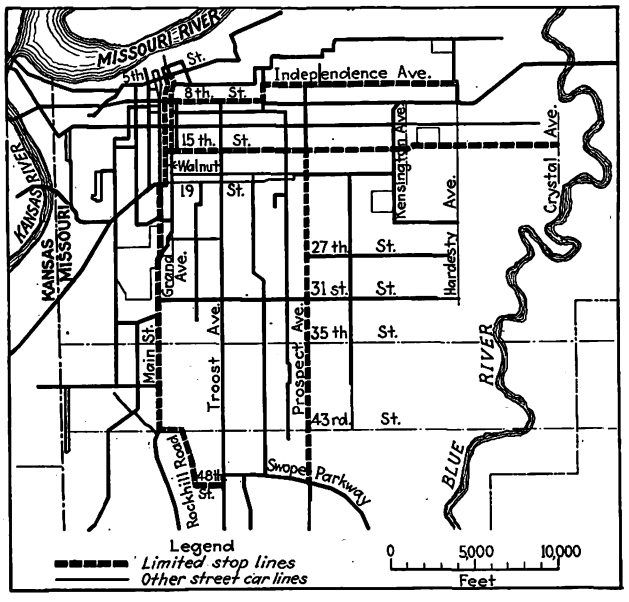


The limited stop plan was adopted on three heavily-traveled lines, serving characteristic residence, business and industrial parts of the city

have been received, asking that the plan be extended to other lines.

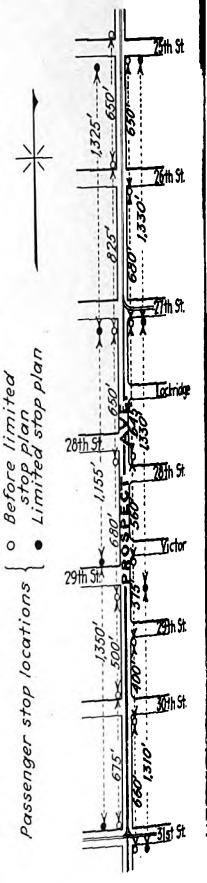
The plan has not been in operation a sufficient length of time to justify accurate predictions as to its effect on revenues. However, there has been no falling off of patronage, and, in fact, the first two months of operation showed an increase in revenues on these lines of 0.2 per cent, as compared with the balance of the system. For the same two months of operation on the entire system, as compared with 1928, there was a loss in revenue of 1.1 per cent.

Extensive Reduction of Car Stops

In Kansas City, east and west streets are divided approximately sixteen blocks to the mile. Car stops on these streets were on an average of ten to the mile. With the installation of the "limited stop" plan, however, a stop was located, in general, at every third block, or at an average of approximately 1,000 ft. apart. On the north and south streets outside of the business center there are approximately eight blocks to the mile, with occasional shorter ones, and there were car stops at almost every cross street. The new plan called for stops at alternate blocks on the north and south streets, or approximately 1,330 ft. apart. It was necessary to provide for stops at all transfer and principal loading points, and in the actual laying out of stops they were located at the most advantageous places. No change in stop location was made in the central business district. After 11:30 p.m. cars stop on signal at all street intersections for receiving or discharging passengers.

The accompanying map of Prospect Avenue illustrates how the locations of old and new stops compare. The total possible passenger stops in both directions on the three lines were reduced from 399 to 265, 33.6 per cent, or from 9.7 to 6.4 per mile. Excluding the business district, the reduction in number of stop locations was from 321 to 187, 41.7 per cent, or from 9.6 to 5.4 per mile. This gives a general average of approximately 980 ft. per stop outside of the business or congested district. These figures are shown in greater detail for individual car lines in Table I.

Another accompanying chart, comparing distances covered by cars from the central business district, gives the actual time required to travel outbound over the different routes before and after installation of the limited stop plan. Time on the Fifteenth Street and Prospect Avenue lines is measured from Fifth Street, the north terminus of both lines. For the Independence Avenue - Rockhill line, the time is measured from Twelfth Street, a mid-point on the line. The greatest reduction in time, eleven minutes, was made on the Prospect Avenue line during the afternoon peak period. The others show reductions of five, six and seven minutes. These differences are caused partly by the variations in the lengths of the lines, grades and traffic congestion. Time savings effected in most instances were slightly less in the non-rush periods than they were during the rush hours.



Comparison of passenger locations and intervening distances on section of Prospect Avenue, before the limited stop plan was put into effect and after

On weekday schedules, terminal to terminal speeds are 11.5 m.p.h., exclusive of layover time, and 10.7 m.p.h., including layovers. On Sunday schedules on these lines, terminal to terminal speeds exclusive of layover time, average 12.2 m.p.h. Including layover time, they average 11.6 m.p.h. Previous to the adoption of the limited stop plan the layover times at outlying ends were three minutes where wyes are used and two minutes where loops are in use. Under the new plan the layover time for both loop and wye is four minutes.

TABLE I—COMPARISON OF NUMBER OF PASSENGER STOPS PER ROUND TRIP

	Route in Miles	Independence Avenue–Rockhill Line: Previous Stops	Independence Avenue–Rockhill Line: Present Stops	Independence Avenue–Rockhill Line: Decrease in Stops	Independence Avenue–Rockhill Line: Decrease in Per Cent	Independence Avenue–Rockhill Line: Previous Stops Per Mile	Independence Avenue–Rockhill Line: Present Stops Per Mile
48th and Harrison to 19th and Main	8.10	71	49	22	31.0	8.8	6.0
19th and Main to 8th and Grand	2.18	20	20	0	0	9.2	9.2
8th and Grand to Independence and Hardesty	7.04	67	38	29	43.3	9.5	5.4
48th and Harrison to Independence and Hardesty	17.32	158	107	51	32.3	9.1	6.2
15th Street Line							
16th and Crystal to 15th and Grand	9.02	93	52	41	43.2	10.3	5.8
15th and Grand to 5th and Walnut	1.92	23	23	0	0	12.0	12.0
16th and Crystal to 5th and Walnut	10.94	116	75	41	34.5	10.6	6.8
Prospect Avenue Line							
48th and Prospect to 15th and Grand	10.87	101	59	42	41.7	9.3	5.4
15th and Grand to 5th and Walnut	1.92	24	24	0	0	12.5	12.5
48th and Prospect to 5th and Walnut	12.79	125	83	42	33.7	9.8	6.5
Total of the Three Lines	41.05	399	265	134	33.6	9.7	6.4

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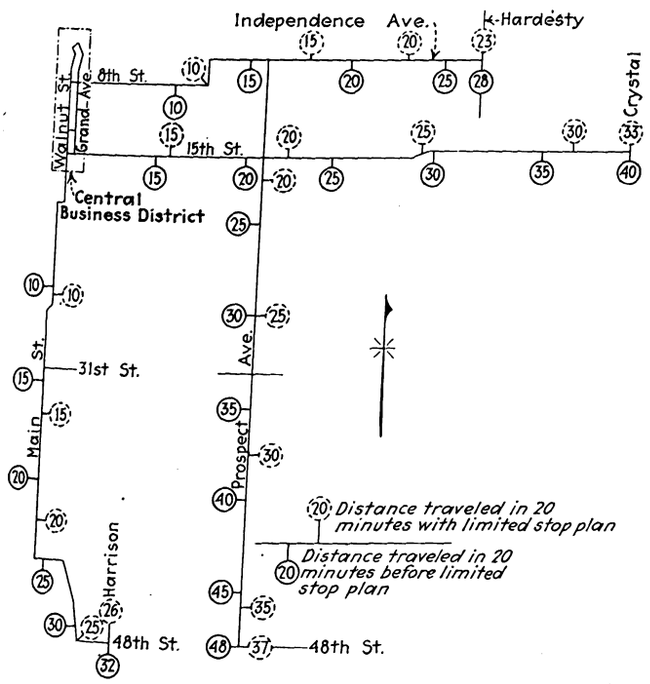
Following its decision to speed up service by some effective plan, the Kansas City Public Service Company made a careful study to select lines for the experiment. The Independence Avenue-Rockhill, Fifteenth Street and Prospect Avenue lines were selected, partly because of the volume of traffic and territory served by them and largely because a part of their routes was on streets already designated by the city as arterial highways. Surveys of car speeds, number of passenger stops being made, length of stops and passengers carried, disclosed that with the number of stops then effective it would be impossible to increase car speeds appreciably, and that to obtain higher speeds a material reduction would have to be made in number of stops for passengers. These studies also disclosed that, at street intersections where stops were not actually made for passengers, it was necessary for operators to reduce greatly the speed of their cars, because of the danger of collisions with cross vehicular traffic.

After completing surveys and making selection of stops desired, the company requested from the City Council the designation as "safety stop" or arterial streets the entire routes of the Independence-Rockhill, Fifteenth Street and Prospect Avenue lines. An ordinance was drafted and passed by the Council on March 25, 1929, making all the desired streets arterial, with the exception of those in the downtown business section. The ordinance requires all cross traffic to stop before coming into these streets, with exceptions at points where boulevards cross car line streets and where automatic signals are installed. A total of 220 stop signs were needed on the streets intersecting the new arterials. These were installed by the company at a cost of approximately $3,100.

Having already secured the indorsement of the Chamber of Commerce and the Kansas City Safety Council for the proposed experiment, the next step was to secure the consent of the Missouri Public Service Commission, which has jurisdiction over service, stops and routings.



Comparison of distances covered by cars from central business district at five-minute intervals by the old and the recently-adopted systems

TABLE II—COMPARISON OF RUNNING TIME IN MORNING RUSH PERIOD OF INDEPENDENCE AVENUE-ROCKHILL LINE

	Route in Miles	Time in Minutes			Decrease in Per Cent
North Bound		Previous	Present	Decrease	
48th and Harrison to 19th and Main	4.05	28	20	8	28.5
19th and Main to 8th and Grand	1.09	9	8	1	11.1
8th and Grand to Independence and Hardesty	3.52	21	17	4	19.0
48th and Harrison to Independence and Hardesty	8.66	58	45	13	22.4
South Bound					
Independence and Hardesty to 8th and Grand	3.52	23	18	5	21.7
8th and Grand to 19th and Main	1.09	9	8	1	11.1
19th and Main to 48th and Harrison	4.05	24	20	4	16.7
Independence and Hardesty to 48th and Harrison	8.66	56	46	10	17.9
Round trip, excluding layover time	17.32	114	91	23	20.2
Round trip, including layover time	17.32	119	99	20	16.8

TABLE III—COMPARISON OF SCHEDULE SPEED DURING EVENING RUSH PERIOD OF PROSPECT AVENUE LINE

	Miles per Hour			Per Cent Increase
North Bound	Previous	Present	Increase	
48th and Prospect to 15th and Grand	10.5	13.6	3.1	29.5
15th and Grand to 5th and Walnut	6.4	6.4	0	0
48th and Prospect to 5th and Walnut	9.6	11.6	2.0	20.9
South Bound				
5th and Walnut to 15th and Grand	5.8	5.8	0	0
15th and Grand to 48th and Prospect	8.6	12.1	3.5	40.8
5th and Walnut to 48th and Prospect	8.0	10.4	2.4	30.0
Round trip, excluding layover time	8.7	11.0	2.3	26.5
Round trip, including layover time	8.4	10.3	1.9	22.7

After the plan was submitted to the commission a few complaints from business interests were received by the company, and merchants in one outlying business center made protest to the commission as to location of stops in their vicinity. They protested at a hearing held on May 2, and since their request for a change in plan seemed to be well founded a compromise was effected. On June 4 the Public Service Commission issued an order authorizing installation of the limited stop plan and retaining jurisdiction over the matter.

Before the commission authorized the change the two daily papers announced the plans as proposed and carried a list of the relocated stops. The papers also made favorable editorial comment, stating in effect that higher speed was a much-needed improvement, and that while, no doubt, there would be some slight inconvenience to a few of the patrons, the greatly reduced time over that then necessary to make a trip would more than compensate for such inconvenience. They also commented on the fact that no doubt complaints would be received from small stores and other business interests at locations where stops had previously been effective, but that any slight inconvenience or damage that might result was secondary to the convenience of car riders.

Immediately following the authorization, publicity was given to the plan becoming effective. Circulars were placed in all cars showing locations of all stops and the savings in time to patrons at different periods of the day. The new operation was started on Sunday, June 16, 1929.

Positive Safety Stops Decreased

The transportation company in Kansas City has been required to install many "slow orders" or "positive safety stops" where, in the opinion of the operating officials, they were not considered necessary. Installation of these stop and slow orders has caused vehicular traffic to put the burden of safe operation entirely on street car operators, slowing up the movement of cars and

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having a tendency to increase vehicular accidents, as drivers expect car operators to either slow up or stop, even at streets where slow orders or positive stops are not effective. Establishing "safety streets" on these routes, giving right-of-way over cross traffic, has made possible the removing of a majority of the positive or safety stops. While slow orders have not been reduced in total, they have been relocated so as to be of greater assistance to safe operation.

By the removal of a number of positive stops, the speeds attained between stops were increased from an average rate of 18 m.p.h. up to 25 m.p.h., which is the maximum allowed in Kansas City for street car operation. The greater distance between stops and protection given from cross street traffic permits cars to accelerate to full speed and makes possible the maintaining of this speed over a great portion of the route.

Few More Accidents at Start

Before putting the limited stop plan in effect, it was recognized that the higher speeds would for a time at least increase the number of vehicular accidents. This proved to be correct, particularly during the first few weeks of operation. However, as motorists and other drivers are becoming familiar with the fact that cars are traveling at a much higher speed, they are becoming more cautious and are giving the street cars the right-of-way to which they are entitled. Despite the increase in vehicle accidents, with one possible exception these have been of minor importance, both as to property damage and personal injury. Approximately 80 per cent of these vehicle accidents are caused by the carelessness of vehicle drivers. There has been no perceptible increase or decrease in other classes of accidents.

While few objections were received prior to adoption of the limited stop plan, there have since that time been several requests made for additional stops. Most of these originated from drug stores or business interests located on streets, formerly stops but now skipped. Drug store owners at several of these locations sponsored petitions, and in some cases, placed large signs in their windows, requesting persons to sign petitions to have the stops restored. As the plan was put into effect only after a careful survey and with the approval of the Public Service Commission, no changes are likely to be made without thorough investigation by the commission.

At 26th and Prospect, the community business interests banded together, secured petitions with several hundred signers, employed attorneys and made request of the Public Service Commission that stops be restored in their district. The commission recognized their objection and held a hearing in Kansas City on July 26 and 27. Prior to the hearing, the traffic department of the company prepared a large spot map on which were shown the locations of business concerns, residences and population characteristics in the vicinity of 26th and Prospect, as well as at other points along the Prospect line, formerly stops, but which under the new plan, have been eliminated. Residence locations of signers to this petition were also spotted on this map, showing graphically that many of those who had signed the petition were more convenient to a car stop a block north or south of 26th and Prospect. It also developed on cross-examination at the hearing that a number of the persons who had signed the petition were not car riders. After a two-day hearing the commission took the matter under advisement. It has not yet rendered a decision. There have not been any other objections filed with the commission.

Stop signs were installed at all streets intersecting those designated as arterials for the limited stop plan

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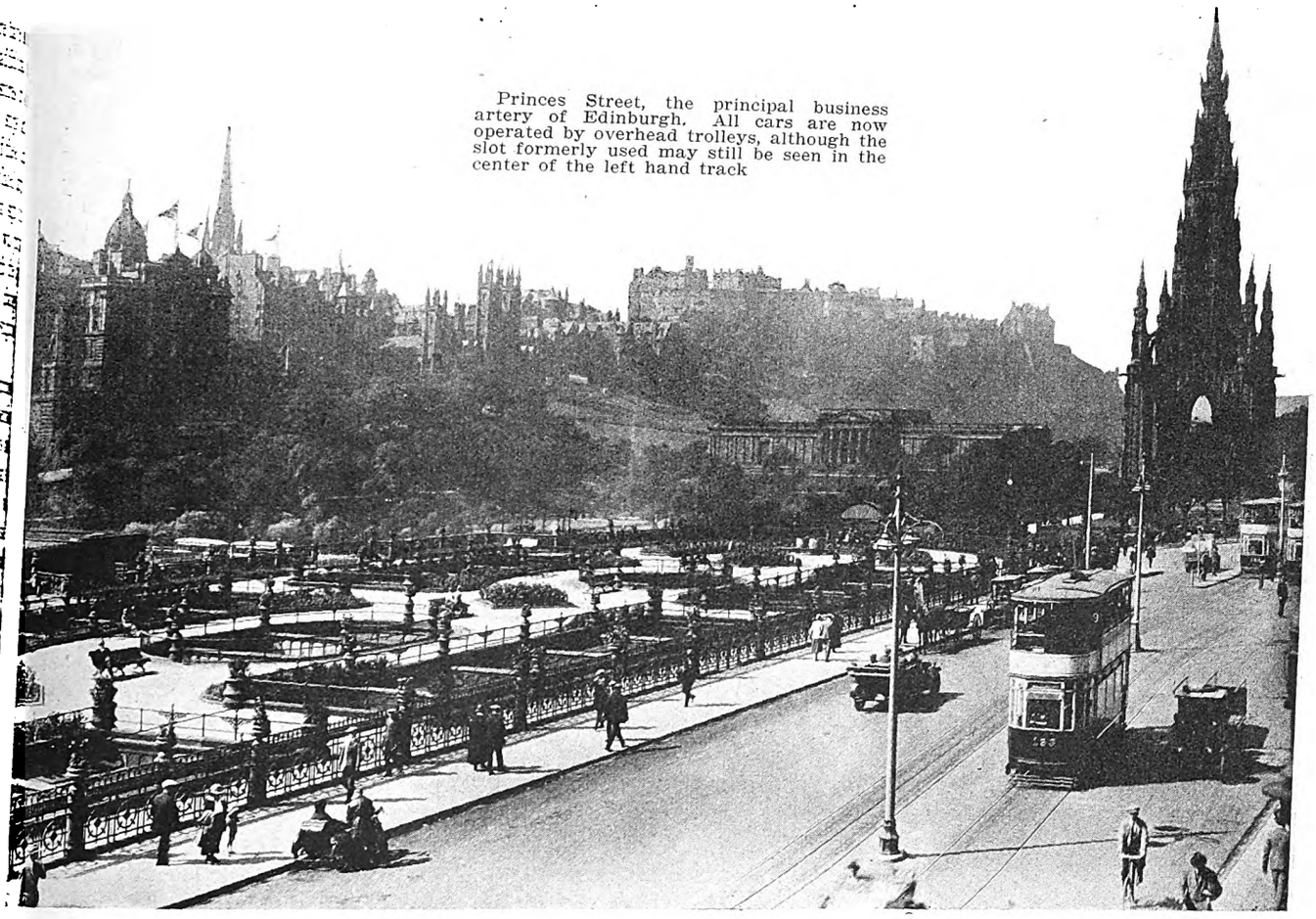

Princes Street, the principal business artery of Edinburgh. All cars are now operated by overhead trolleys, although the slot formerly used may still be seen in the center of the left hand track

Edinburgh Moves With the Times

Lower fares and improved equipment, capable of higher speed, are establishing new records in popularity

By

WALTER JACKSON

Consultant on Fares and Motor Buses
Mount Vernon, N. Y.

IN TRAVELING from tramway to tramway throughout Great Britain one is struck by the evident effort being made to modernize equipment. In some cases, the work has not advanced beyond the recommendations of the general manager to his committee, but in others, fine progress has been made. A notable example is the Transport Department of the city of Edinburgh. R. Stuart Pilcher, formerly general manager of the department and now general manager of the Manchester Corporation Tramways, can properly be regarded as a pioneer for what the Britisher is calling "Pullmanized tram cars." A decade ago, while general manager of the Aberdeen Corporation Tramways, he installed upholstered seating in some cars at a time when no one feared the motor bus or automobile. No doubt, many of the Aberdonians were aghast at such liberality to a mere tram-car rider.

Late in 1925, after the electrification of the original cable system was well advanced, Mr. Pilcher took the bold step of introducing air brakes. Previously, all braking had depended on hand and magnetic brakes. The present equipments were used on lines with grades exceeding 7.7 per cent. The track brakes were applied by air, and the magnetic brakes were used in an auxiliary capacity. In later equipments, air has been used for less strenuous conditions to secure higher schedule speeds with less fatigue to the car operator. At present, 97 out of 345 cars in Edinburgh are equipped with air brakes.

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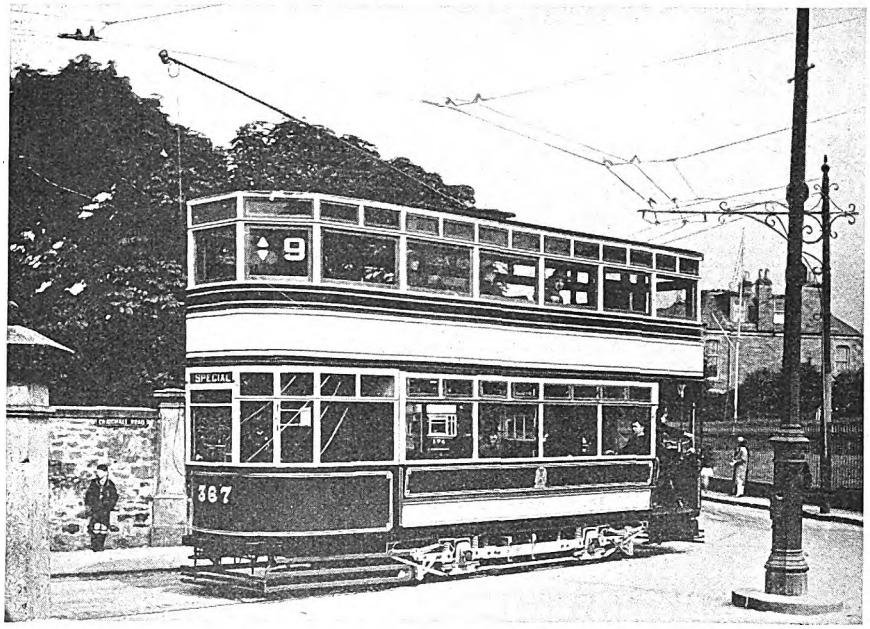
All 56-passenger double-deck cars are fitted with 24 40-watt, 90-volt, gas filled lamps of the inner frosted type. Mr. Pilcher likens the tram car to a shop window and believes that it should be well advertised by good lighting.

During 1927, the equivalent of $50,000 was voted for the inclosure of the top deck of 162 cars. This was accompanied by a change from rigid wooden seats to reversible upholstered seats. There are now 235 cars of this type in service. During 1927 and 1928, the lower deck seating of approximately 106 cars was changed from longitudinal to the cross seat type with either green leather or cloth upholstery. It is Mr. Pilcher's view that while the cross seats are less convenient at busy times, the comfort they give during non-rush hours clearly offsets this temporary disadvantage. The combination of upholstered seats and duralumin fittings has been found to give the attractiveness which he believes to be so vital to successful transport at the present time. In addition to these improvements, the car program included the building of twelve new cars during 1928. A new feature of these cars is the use of stainless fittings.



Latest type of car placed in service in Edinburgh. It has a seating capacity of 58, has both ends fully enclosed and is equipped with magnetic, air and hand brakes

More Speed and Less Noise

Up to 1928, the maximum running speed on the level of the ordinary car in Edinburgh was 21 m.p.h. This speed is now being raised to 30 m.p.h. through re-gearing. Primarily, this is being done to demonstrate to the public the better speed characteristics of the car in contrast to the bus. In Mr. Pilcher's experience, it is not so much the schedule speed of the vehicles that matters as the actual maximum speed which the vehicle can maintain.

The nosing or "jazzing" of single truck, double-deck cars has been a common fault on many systems, due largely to the age of the rolling stock. Edinburgh, however, has been practically free from this complaint. Nosing cars not only produce heavy upkeep costs for the cars themselves, but also seriously affect the permanent way. Above all, they produce discomfort to the passenger.

Mr. Pilcher believes that most of the noise on a car is due to worn gearing, and that operators should not be so reluctant to scrap old gears. For nine years, Edinburgh has operated 350 cars with wrought-steel gears and pinions which are hardened by the "Shorter" process. The gears run in oil. The motors are of high-speed type, but regular inspection shows very little gear wear. As a result, the cars are less noisy than on many other systems.

Edinburgh is the center of a great bus traffic, there being some 450 vehicles in the district aside from the buses and char-a-bancs of the municipality. Since legislation cannot effectively prevent the pick-up of local riders, the Transport Department must depend upon its service and fares to win passengers. This situation has doubtless had its effect in lowering fares, although the management recognizes that higher fares will not keep people off buses if the latter are appreciably faster.

On Aug. 27, 1927, there was a cut in fares, lengthening the penny distance to an average of 1.5 mile. On May 16, 1928, a further reduction was made, permitting a possible 4½ mile ride between the city boundary and the city center for a fare of 2 cents. Close to 70 per cent of the riders pay only the penny fare. Bus fares are the same as tram fares except that the buses have no workmen's round trips. Tourist fares and char-a-banc services are special. In general, car fares have been so reduced that for many rides they are actually below prewar rates. Following the institution of the lower fares, the revenue fell behind, but this loss is gradually being regained, with the tramways continuing to hold their leadership.

Rapid Transit Speed High in Boston

IN BOSTON the highest speed attained by subway trains is 45 miles per hour in the Cambridge subway, between Harvard Square, Cambridge, and Ashmont Station in Dorchester. The average speed between terminals to keep schedule time is 26.3 miles per hour.

On the elevated section, which includes subway operation under Washington Street, the highest speed is 40 miles per hour, and the average schedule speed between terminals is 16.5 miles. The stations on this line are close together and the frequent stops reduce the average speed materially.

On the East Boston Tunnel, a short line with three stops, the highest speed is 30 miles, and the average 12.7 miles.

The Cambridge Tunnel has the largest cars. They are 69 ft. 6 in. long, weigh 86,412 lb., and have seats for 72 passengers.

The elevated subway cars are 46 ft. 11 in. long, weigh 69,448 lb., and have seats for 44 passengers.

The East Boston Tunnel cars are of the same size and seating capacity as the elevated cars, but weigh only 44,000 lb. All subway and elevated cars have two motors.

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Standard copper graphitic brush showing shunt attachment

Maintaining Carbon Brushes for Good Commutation

Brushes should be designed to fit the characteristics of the railway motor or other electrical machine on which they are to be used. The maintenance of brushes is equally important

By
J. V. DOBSON
Chief Engineer Stackpole Carbon Company

VERY strict design limitations fix themselves around the commutator and the current collecting mediums in electrical machines. Immediate future developments will be in commutators, brush-holders and brushes and in the improvement of commutating characteristics. Not a great deal may be expected in higher efficiencies. Weight economy will be secured by higher armature peripheral velocities and higher current densities. Present design limitations to higher speeds must be pushed back. Just as electric motors and generators are designed for specific service, so also the brushes must correspond. Long commutator life is emphasized on a power generator, motor-generator set, rotary converter or on a railway motor. It is not of commanding importance on utility motors for household appliances such as vacuum cleaners, fans or the like. Quietness of brush operation until recently has not been as important on railway motors, as it has been on refrigerator motors, fan motors, elevator motors, etc. With the trend toward greater riding comfort, the need for noise elimination in railway motors is in the foreground.

Successful brush operation, briefly, demands long commutator and brush life. Of the two, the former is usually the more important because the cost of a commutator and the cost of removing a motor for commutator turning greatly outweigh the cost of brushes used.

With the trend toward higher armature peripheral velocities a brush of low frictional resistance is extremely desirable. Some brushes possess practically ideal electrical characteristics but, lacking mechanical strength, they are entirely unsuited for railway service. The railway motor passes through a continuously varying temperature cycle, with relatively great expansion and contraction. Not all commutator bars are affected identically. Between turnings the condition of the commutator is gradually impaired, due possibly to the brush, the commutation characteristics, changes in the commutator itself, or to flashing, overloads or excessive brushholder wear. Recent tests have shown that extremely small eccentricity variations between adjacent commutator bars will cause severe brush vibration, chattering, chipping or breakage. Rough track or worn gearing may impose severe shocks.

Possibly in the past too much attention has been given to the continuous rated current capacity and too little to short-time overloads. Experiences both in this country and in Europe show that carbon brushes are deteriorated more rapidly by short-time overloads than by continuous loads of lower peak values. In comparative laboratory tests some brush grades of the same continuous capacity will show a difference of over 33 per cent in their overload rating. In comparison with other classes of service the railway motor accelerating current is very high in respect to its continuous load. In actual figures this may mean 100 to 150 amp. per square inch with a continuous rated capacity of 50 amp. per square inch, which is high for a carbon brush. It is even higher because not all of the brush is making intimate contact with the commutator. This explains the glowing that is observed frequently in abnormally severe acceleration.

The hardness and abrasiveness of a carbon brush

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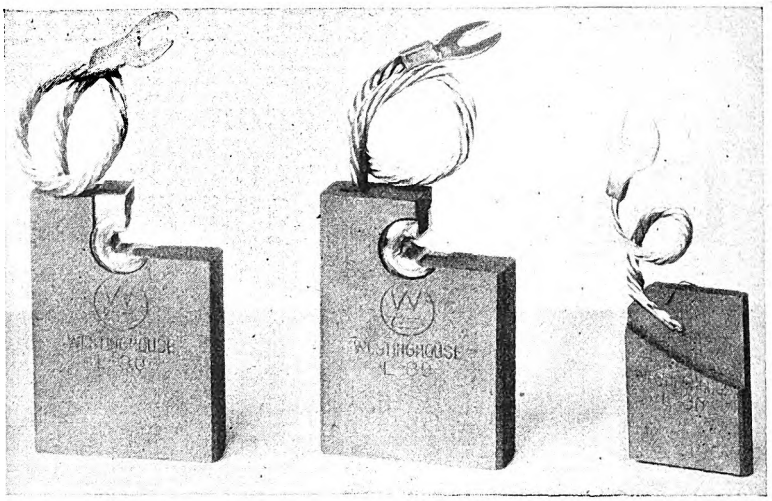
should not be confused. A hard brush may be almost non-abrasive while a soft brush may be highly abrasive. The hardness of a brush depends upon the manufacturing process while its abrasiveness is controlled to a large degree by the materials used and, in an electro-graphitic brush, the degree of graphitization.

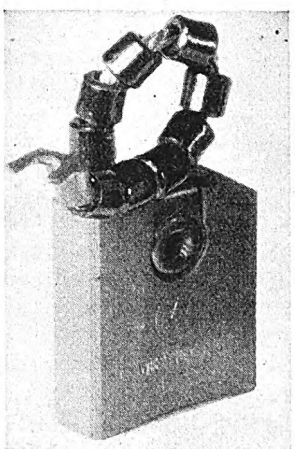
A soft brush usually cannot withstand severe mechanical stress. A hard brush is ordinarily stronger, but if too hard it is subject to chipping and breaking.

Undercutting of railway commutators has become almost universal. This practice has permitted the use of so-called non-abrasive brushes. However, a certain low proportion of abrasive is found desirable in practically all brushes. The proper amount of abrasive is difficult to determine. Too much cleaning action scores the commutator and causes rapid wear, too little permits smutting. This becomes cumulative and usually results in burned commutator bars, flat spots, eccentric commutators and flashing. Coupled with the abrasive in the brush is the cleaning action of sand, brakeshoe dust, etc., which enter the motor with the ventilating air, and in effect become even a grinder of the commutator. The velocity at which the commutator scrubs the brush and the amount of cleaning due to other dirt determine also how abrasive the brush should be.



Three standard types of brushes showing method of shunt attachment

The railway motor has considerable running at no load when the car is coasting or braking. This is very effective in cleaning and polishing the commutator and therefore in large part corrects for the damage of the immediately preceding heavy acceleration. This is doubtless the reason why the railway motor can safely withstand the heavy duty.



Carbon brush showing beaded shunt

Brush contact is important. For railway work there is not much permissible variation. There may exist a relatively small variation between one approved railway brush grade and another which, along with the other above noted characteristics, may give differing results. In the main, however, the brush drop may be classed as "high."

The types of brushes in common use include:

(a) Plain carbon brushes; (b) plain graphite brushes; (c) carbon and graphite brushes in varying proportions of mix; (d) electric-graphitic brushes in which by heating in the electric arc the carbon is converted into graphite; (e) metal graphite brushes; (f) carbon, graphite or metal-graphite brushes bonded with bakelite or similar material; (g) carbon brushes impregnated with a lubricating material. Of these the electro-graphitic, the carbon-graphite and graphite brushes are the most important for industrial, power and railway use on commutator machines and the graphite, electro-graphitic and metal-graphite are the most important for use on slip-rings.

Plain carbon grades will carry 35 to 50 amp. per square inch continuously. The highest graphite grade will carry 65 amp. per square inch and the metal graphite brushes will rate 125 to 150 amp. with momentary overload capacity of 450 amp.

Operating conditions affecting commutation and carbon brush performance are: (1) Mechanical vibration, (2) overloads, (3) dirt, (4) flashing. The first two of these conditions have already been discussed.

The brush should move freely, otherwise arcing, flashing, or excessive brush and commutator wear may result. Dirt in some types of motors and on some railroad properties has presented a difficult problem. Sand or brakeshoe dust entering with the ventilating air may cause binding of the brush in the brush box. The insulating of the brush from the pressure finger by small sand particles may cause undue heating of the brush and brushholder. This has been corrected by closing the bottom commutator openings; by closing off the commutator chamber from the entering air or occasionally using the so-called dust-cap brushholder. The writer wishes to emphasize, however, that where dirt exists, inspection periods should be such as to insure that the brushes move freely in the box.

There is much less trouble due to flashing today than there used to be. Its causes are better understood and corrective measures are taken.

In the maintenance of brushholders, brushes and commutators the following points are outlined:

1. Turn and undercut railway commutators, being careful to remove mica slivers. Remove burrs and rough edges from the surface of the commutator. If sandpaper is used finish with fine paper, with armature turning in lathe or in its own bearings. A good practice is to tighten the commutator bolts or commutator ring nut when the armature is out for commutator turning, and with the commutator hot. Keep the commutator and its V-ring free of oil or grease.

2. Establish condemning limits for worn brushholders. Standards have been worked out for new brushes and new brushholders and similar standardization should be adopted for worn brushholders.

3. Inspect brushholders for broken shunts to prevent overheating. By far the best performance will be obtained when the commutator brushes and holder are operating within the temperature limits of the A.I.E.E. rules.

4. Maintain correct and uniform spring pressure. In general 5 lb. per square inch is good practice on d.c. motors and 3 to 3½ lb. on a.c. motors. In some instances pressures considerably in excess of this are necessary, as on rough track or to correct a flashing tendency.

5. Keep brushes free in box. A brush should drop slowly but freely through the box when it is held in a vertical position. Many ills result from stuck brushes.

6. Maintain a uniform clearance of ⅛ in. between the brush-

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holder and the face of the commutator. Brushholders too close to the commutator produce brush chattering.

7. Maintain neutral setting, parallelism of brushholder and commutator bars and correct brushholder spacing.

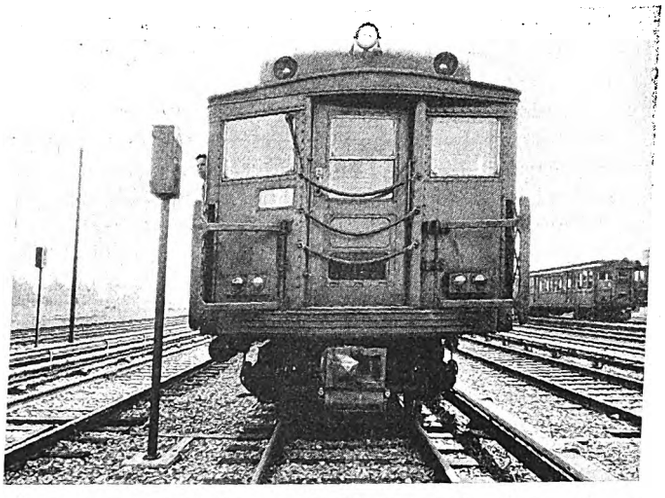
Many railroad properties have adopted the one-piece brush to good advantage. For some at least this has upset some past theories. This subject, the writer understands, has been considered by a committee on carbon brushes in the A.E.R.E.A. The old theory was that two or even more brushes per holder were better than one, as they would provide a more intimate brush contact by reason of a better brush follow in the face of the small irregularities of the commutator. The theory behind the one-piece brush is that because of the wider seat on the commutator the mechanical stability is greater and that even though the brush is heavier it follows the commutator better. The adoption of the one-piece brush should be made only after tests to prove its satisfactory performance. It is recommended that when such tests are made the commutator should be newly turned; otherwise the large brush will probably not seat itself on the commutator.

Dispatching Trains by Loud Speaker

System developed for Philadelphia subway yards to enable motormen to communicate with dispatcher without leaving trains

INSTALLATION of a loud speaker system in the Broad Street subway yards in Philadelphia for the dispatching and controlling of trains marks the first large scale use by any transportation company of the loud speaking telephone principle with audio amplification. The system, designed by engineers of the city of Philadelphia, Mitten Management and T. & T. Engineers & Constructors, Inc., is proving particularly effective at the Fern Rock yards where trains are dispatched and routed at intervals of two or three minutes.

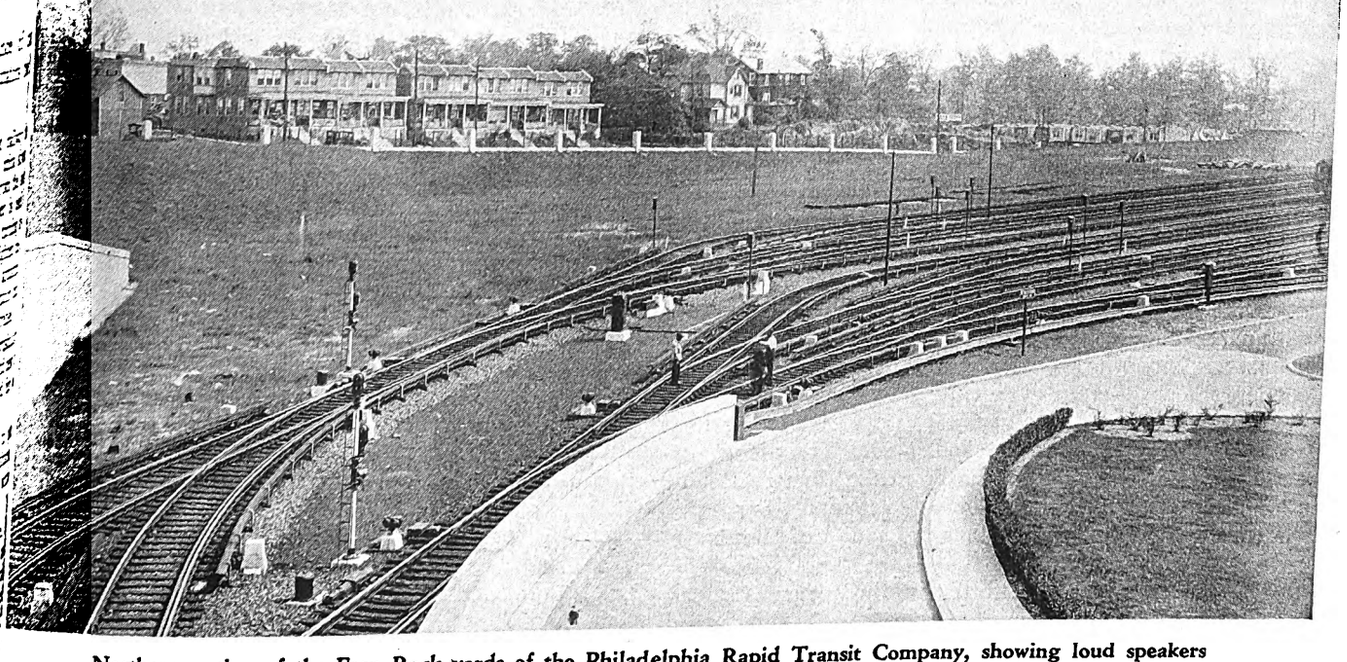
A four-track tunnel connects the yards with the subway proper. Converging at the mouth of this tunnel are 22 tracks, eleven on each side of the inspection and repair shops situated in the center of the grounds. The control tower, from which the signals, lights and switches are operated, is located directly over the mouth of the tunnel and commands a clear view of the yards below.



The motorman stops his train beside the speaker box, pushes a button and then talks to the dispatcher

The making up and dispatching of trains and the routing of cars from one track to another present difficult problems. Some cars must enter the shops for inspection, others for repairs. An enormous volume of shifting and shunting over the maze of yard tracks is necessary and this work must be accomplished rapidly, without confusion, and with a minimum of labor. During the morning and evening peak hours when trains run as closely together as is consistent with safety, a delay in shifting or dispatching produces disastrous results.

Formerly this work was conducted with the aid of an interyard telephone system connecting the dispatcher in the signal tower with strategic points throughout the property. Yard operators and motormen, under this plan, were compelled to leave their cabs, make their way



Northern section of the Fern Rock yards of the Philadelphia Rapid Transit Company, showing loud speakers located along each track for dispatching trains on the Broad Street subway system

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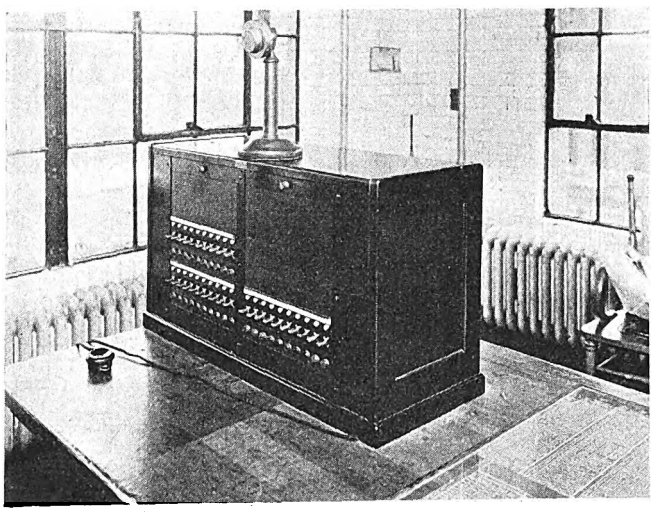
to the nearest telephone, and receive their directions from the tower dispatcher. This system was found to have several disadvantages. Precious time was lost by the motorman in leaving and re-entering his cab. Noises caused by moving trains and shop machinery made hearing difficult, and lastly, the dispatcher, his hands occupied with the telephone, could not operate the battery of signal and switch levers several feet away.

To secure a more rapid and orderly method of dispatching, a study of the problem was made in order to remedy the various flaws which made the usual telephone system impracticable. This study continued for several months with the result that the present method, developed through a combination of the principles of telephone and loud speaker, was installed.

A microphonic type of transmitter closely resembling a telephone in appearance is located in the signal tower directly above a telephone switchboard. This transmitter through an amplifier is connected by underground



Microphonic transmitter in the signal tower through which the dispatcher communicates with the trainmen

wire to 22 telephone boxes, located one along each track just far enough beyond the point at which it converges upon the adjoining tracks to provide safe clearance for cars. The boxes are placed on poles at a height exactly level with the window in the motorman's cab and about 18 in. to the right of each track. Thus a motorman or operator, no matter on what track he is located, can bring his train to a stop in a position which will enable him to speak into the transmitter in the box. It is only necessary for him to push a button near the face of the box, after stopping at the speaker.

Each of these 22 yard boxes is equipped with a sensitive telephone transmitter and a loud speaker used as a receiver. The mechanism for both is contained within the box, which itself is devoid of all levers and hooks, its smooth surface being broken only by two copper screened circular openings located one directly beneath the other. Behind the top opening is the loud speaker carrying the amplified sound from the dispatcher's microphonic transmitter in the tower. Behind the bottom opening is a sensitive telephone transmitter, equipped with a horn to gather the sound of the motorman's voice.

The microphonic transmitter in the tower is so adjusted as to send in clearly the voice of a speaker standing 10 ft. away. The dispatcher's receiver consists of an ordinary telephone earpiece worn around the head. A push of a button on any of the yard boxes is immediately reflected by a light on the tower switchboard associated with that particular station. Should there be occasion for the dispatcher to cut off a motorman in the middle of a conversation, the board is so arranged that this can be done without the disappearance of the attention-attracting light.

Under this new dispatching method the objections to the former system have been eliminated. The dispatcher can stand at almost any point in the tower and while operating his switch levers speak across the room into the microphone. His voice coming through the amplifier receiver can be heard by the motorman or operator just as clearly as he hears a radio program at home through his loud speaker. In fact, tests have shown that the dispatcher's voice is clearly audible for a distance of 40 or 50 ft. across several rows of tracks even though he be speaking only in a normal talking tone. The motorman has no ear-piece, hook or lever to manipulate in the yard box. He merely stops his train beside the box, pushes a button which makes the connection and reflects a light on the board, and then talks. The horn which surrounds the transmitter gathers in his voice and carries it clearly to the dispatcher. The loud speaker receiver brings back the directions which he is to follow. There is no lost motion on either end and the possibility of misunderstanding through failure to hear clearly, with resultant confusion, has been removed.

The Readers' Forum

Well-Informed Operators a Valuable Asset

IRVING IRON WORKS COMPANY
NEW YORK, N. Y., Oct. 21, 1929.

To the Editor:

In my travels—and I do not use an automobile—it is frequently necessary for me to ask directions and my point of departure is not always from a station where information can be secured. In order that discomfort may be avoided I endeavor to get the information from hotel clerks or sometimes from police officers; but this much I can state without fear of contradiction—the mass of misinformation given out by motormen and conductors, and the lack of information bureaus for the street railway lines, are appalling. On one large system it seems almost impossible to ascertain from motormen or bus operators anything regarding connections or running time of lines other than their own. There is utter indifference in replying to queries; yet this system advertises how well it serves and the number of lines it operates. It publishes a map showing connections, but there is never a word about running time or layovers. Its bus operators are, in general, ignorant of cross streets. In contrast another system stands out as a particularly bright example of what a transportation company should be. To learn how well the men were informed I asked some of them for information that they might well be excused from knowing, but they directed me quickly and cheerfully and correctly. There was not a failure anywhere.

We can well realize the discomforts often endured by car operators; the annoyances created by ill-tempered

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and ill-bred travelers, bad weather crowding that causes the breakdown of schedules, and many other things the casual passenger does not notice and would not consider if he knew. Some failures are expected by the general run of passengers and are forgiven and forgotten except by the one who thinks he may prove a claim. So we will overlook these deficiencies (but reserve the complaint regarding misdirection).

If more railway executives had had experience in on-the-road selling, it would be very helpful to them; if these officials met with salesmen, it would open their eyes to many needful things. Unfortunately, they are not buyers, but are supposed to be sellers of certain merchandise—car rides.

No salesman can be successful who simply expects buyers because the goods are exposed for sale. The public carrier must sell his transportation; there must be a managing salesman to instruct the salesmen, whether they be motormen, conductors, bus operators or ticket sellers. Every employee is a potential salesman; the personnel manager should know more than how to hire and fire.

If you have something worth selling, tell the public; but do not get the idea that a thing once told is not worth repetition. Remember the many really good things that have gone by the board because something else has been better advertised. Why, even Ford cars are advertised now.

LINSON H. DE VOE.

Make the Interurbans Railroad-Minded!

SOUTH MANCHESTER, CONN., Sept. 30, 1929.

To the Editor:

It doesn't pay an interurban railway to look like a street car line, if one can judge by the results that a number of progressive main-line interurbans have obtained. Evidently the abolition of street railway methods, equipment and appearance have been worth their while on these properties.

There is a reason for this. The interurban of today competes with fast steam trains, buses and automobiles, and the airplane. The public no longer is content to drag along on an outgrown street railway. What it wants is high-speed electric train service comparable to that furnished on the modern electrified steam road. If the interurban cars are dressed up like street cars, with awkward fenders, horse-car gongs, and blue-uniformed motormen, the public will at once brand the line as non-progressive, and will not take it seriously.

This does not mean that the interurbans should not give local service, nor that they should not be operated in conjunction with city lines. A sharp distinction should, however, be drawn between the city and interurban divisions and the personnel of each kept separate.

From an experience of twenty years with the interurbans, it does not seem good judgment to me, particularly from the standpoint of safety, to put a trainman on a street car one day and on an interurban the next.

I believe the greatest menace to our heavy interurban lines is that their officials are slow, in some instances, to become railroad-minded. No automobile dealer could sell a car dressed up in 1908 appliances, and the same is true of the interurbans. If the public is referring to the line as a street railway, then it is not receiving, and probably is not entitled to, the respect of the public. There is something wrong, for it is not railroading.

WILLIAM H. SNOW.

Convention Number a Syllabus on Fundamentals

THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD

NEW HAVEN, CONN., Sept. 26, 1929.

To the Editors:

Your Annual Convention Number is a most creditable issue and certainly does get down to fundamentals as you intended. It is indeed a syllabus of information on the present state of the art, and deserves the place it will have in our libraries as a very valuable reference book.

C. E. SMITH,
Vice-President.

* * *

BOSTON ELEVATED RAILWAY

BOSTON, MASS., Sept. 20, 1929.

To the Editors:

Congratulations on the fine convention issue. From long experience I know what a job it is to get up each year a special issue of this sort, with sufficient originality to make it outstanding and at the same time cover the fundamentals of the business up to date. You have made excellent use of the material.

H. H. NORRIS,
Educational Advisor.

Maintenance Award an Incentive to Better Performance

SAN DIEGO ELECTRIC RAILWAY
SAN DIEGO & CORONADO FERRY

SAN DIEGO, CAL., Oct. 11, 1929.

To the Editors:

We greatly appreciate the certificate of merit awarded to the San Diego Electric Railway maintenance department for proficiency along the lines of mechanical performance. We agree with you that it will be quite an incentive to the department to continue its work, and even to excel past performances.

This is certainly one of the many phases of operation of the association and ELECTRIC RAILWAY JOURNAL that is a benefit to the industry as a whole, and we wish to give our whole-hearted indorsement to such activities.

S. E. MASON,
General Manager.

Convention Report Number a Complete Record

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

NEW YORK, N. Y., Oct. 14, 1929.

To the Editors:

After the convention I had an opportunity to review rather carefully the Report Number of ELECTRIC RAILWAY JOURNAL covering the convention papers and discussions. In view of the tremendous number of words used in the discussions and the length of the numerous papers, I feel that the JOURNAL staff has done a very fine job in picking out the high spots and worth-while references, and in giving it to the industry as a whole.

In a word, anyone reviewing the report number can get, in a very short time, a clear picture of everything of importance that took place at the convention.

M. B. LAMBERT,
Transportation Sales Manager.

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New Maintenance

Individual Cash Prize of $100 Offered for Best Maintenance Idea of the Year

Twelve Cash Prizes to be Distributed Among Maintenance Men in Various Departments

Handsome trophy will be presented to the company making the best showing

DURING the coming year, ELECTRIC RAILWAY JOURNAL Maintenance Contest, arranged in co-operation with the American Electric Railway Engineering Association, will continue along substantially the same lines as in the past. Quarterly prizes of $25 will be given for the best items submitted in each of four departments. The best maintenance idea submitted during the entire contest period will receive an award of $100. To the company which makes the best showing in the contest, a handsome trophy will be presented.

In addition to the individual prizes and the company award, a special certificate of merit will be presented to each department making the best individual showing upon the same general conditions as for the company award.

As in the previous contest, the purpose is to arouse interest among maintenance men in the development and adoption of improved methods for performing routine work, or new methods or fixtures that save labor, time and money in maintenance on a transportation property.

All entries are to be made in the form of short articles describing briefly methods or devices that improve maintenance practice. These will be judged primarily on the value of the idea presented and its adaptability to the maintenance work of transportation companies.

The form of presentation will be judged only as to the clearness with which the method or device is described and illustrated, and the extent to which information is given which would be needed by other properties interested in using the idea.

GENERAL INSTRUCTIONS

Write on one side of the paper only. Have your article typed if possible, but manuscript written long hand will be accepted. Write the article as though you were writing a letter to another maintenance man giving him your experience with a new method or device. "Fine writing" is not necessary. Merely give the facts and a description of the device or method. Whenever possible include data on cost savings effected.

Manuscript should be marked "Maintenance Competition." Any number of items may be sent in the same envelope.

Men employed in the electric railway field

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tenance Contest *Begins*

in foreign countries also are invited to submit their maintenance articles in the contest. Articles may be submitted in the native language of the writer, and ELECTRIC RAILWAY JOURNAL will have them translated into English.

Rules of the Contest

1. The contest will be judged and the prizes awarded by a committee of the American Electric Railway Engineering Association consisting of one representative of the standing committee on way and structures, A.E.R.E.A.; one representative of the standing committee on rolling stock, A.E.R.E.A.; one representative of the standing committee on power A.E.R.E.A.; the general secretary American Electric Railway Association, and the managing editor ELECTRIC RAILWAY JOURNAL. All decisions of the judges in interpreting the conditions of the contest and in making awards will be final.

2. Any employee or official of an operating electric railway or bus company may compete for the prizes.

3. Each contestant may submit any number of items he desires, each of which will be judged separately. An individual may win several of the prizes.

4. The author does not necessarily have to be the originator of the idea, but it must be adopted and be in use on the property with which he is connected. The idea submitted may have originated on another property or may have been furnished by a manufacturer. No device or method, a description of which, to the knowledge of the contestant or the judges, has been previously published, will be eligible for this competition.

5. The competition is not limited to those who originated or developed the idea or apparatus described. Any employee, *with* the *approval* of the department head concerned, may submit a maintenance practice or device used on his property. More than one article covering the same device or method will not be accepted, however.

6. Where the management of a railway has a practice of requiring approval of articles sent out for publication, such approval *must accompany* the manuscript. If written approval does *not* accompany the manuscript it will be assumed that such approval is *unnecessary*.

7. An article may be submitted by several persons or by a department, and need not be written by the person in whose name it is submitted. The prize will be awarded to the individual or department whose name appears on the manuscript, and may be distributed among the winners on any basis determined upon by them. Should there be a tie for any prize the full amount will be awarded for each of the articles involved in the tie.

8. Articles may describe any maintenance practice or device used by any department of a railway, such as the maintenance of rolling stock, buses, shop equipment or methods and equipment for overhead line repairs, power distribution and power generation devices, signal work, track and way maintenance, etc. Unless manuscript submitted is marked to indicate the department to which it is to be credited, the judges will determine the classification under the following divisions: (1) rolling stock and shops; (2) way and structures; (3) electrical and line; (4) buses and garage.

9. Articles submitted for these prizes should be *preferably* 100 to 200 words in length and should be accompanied by *one* illustration. Brevity consistent with a proper presentation of necessary information will be given weight in judging articles. In *no* event should they be longer than 400 words with *not more* than *two* illustrations. Articles will be published as promptly as space permits.

10. In rating the various articles the committee will consider the primary value of the method or device as of highest importance. The committee will also consider its practicability, the advantages and economies that are set forth and the clearness and completeness with which the idea is presented.

11. The original manuscript and illustrations will be turned over to the committee of judges for making all awards.

12. Any material submitted in the contest may be published at any time after its receipt.

13. All articles should be addressed to the contest editor of ELECTRIC RAILWAY JOURNAL, 10th Avenue at 36th Street, New York City. Items to be eligible for the first group of department prizes must bear a postmark not later than midnight, Jan. 31, 1930; for the second group not later than April 30, 1930; for the third group not later than July 31, 1930. All material bearing a postmark not later than the last mentioned date, will be eligible for individual cash capital prize, company trophy award and departmental certificates of merit.

14. The announcement of winners of departmental prizes will be made in the issue of ELECTRIC RAILWAY JOURNAL in the month following the closing date for each group of departmental prizes. Winners of the company trophy, individual capital cash prize and departmental certificates of merit will be announced in the September, 1930, issue, and awards made, at a date to be announced later.

15. ELECTRIC RAILWAY JOURNAL shall have exclusive right to the publication of all material entered in this contest. All articles submitted will become the property of ELECTRIC RAILWAY JOURNAL and no manuscripts will be returned.

16. A minimum of $5 will be paid for each item published.

Additional copies of these rules and full details of the contest may be obtained upon application to ELECTRIC RAILWAY JOURNAL *or the American Electric Railway Association.*

Maintenance Contest Produces Valuable Results

From the report of the judges' committee presented at the general session of the Engineering Association, Atlantic City, N. J., Oct. 1.

IT IS needless to say that the American Electric Railway Association and the electric railway industry at large are greatly in the debt of the *Electric Railway Journal* for inauguration and financing of these contests. There is widespread evidence of their value in the results to date and it is the hope of those most interested that the contests may continue and reach higher levels of attainment.

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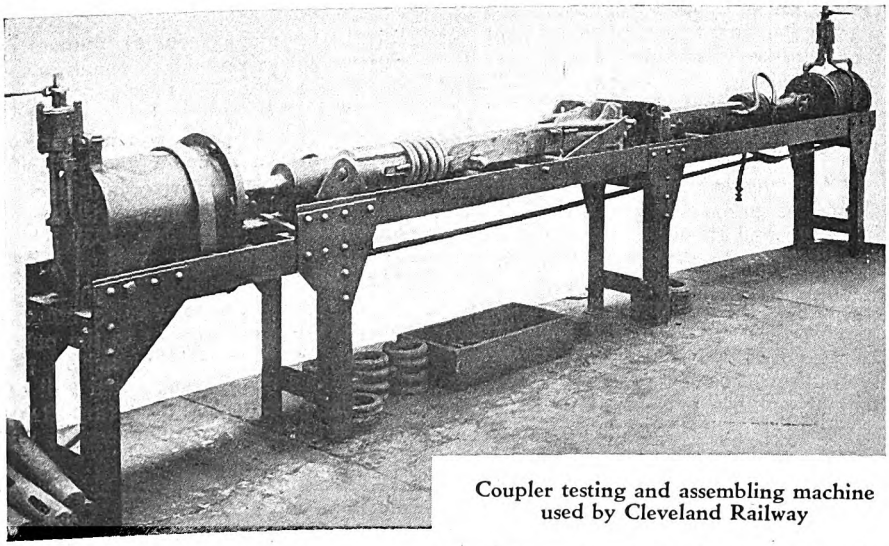
Many Handy Maintenance Devices Developed by

Coupler Testing and Assembling Machine

By Terance Scullin
Superintendent of Buildings and Equipment

CONVENIENT equipment has been developed at the Harvard shops of the Cleveland Railway to test overhauled couplers and to facilitate assembling them. Previously there existed no good way of testing the couplers prior to putting them into service, nor any quick and efficient method of assembling them. If it was desired to try out the coupler before mounting it on a car, it was necessary to butt one against the wall and jack the other onto it, thus forcing them to engage. The draft springs had to be removed in the wheel press. This method was entirely too slow and cumbersome for frequent overhaul and it was necessary to find some quicker way of assembling and testing couplers.

The apparatus now used is built of angle iron frame of suitable dimensions to support the coupler to be tested. On each end of the frame is an 8-in. air cylinder, so piped that air can be admitted on either side of the piston. The air in each cylinder is controlled by a straight air-brake valve. One master coupler is always left mounted on the frame, and the coupler to be tested is put in place at the other end and air applied, forcing the couplers together. The couplers are unlocked, the air reversed, and they are then uncoupled. This operation is repeated several times in order to show up any defects in the coupler tongues or other parts. When assembling the draft spring, the coupler to receive the spring is placed in proper position and secured by fixing a strap or bar across its face to prevent longitudinal movement. The spring and tailpiece are then put in place and a sleeve installed of suitable size to slip over the tail-piece and up against the spring on one end and against the special push rod on the other. The air is applied, thus compressing the spring far enough to allow the key which locks the tailpiece in place to be inserted. This equipment is a great time saver and insures that perfect couplers leave the shop.



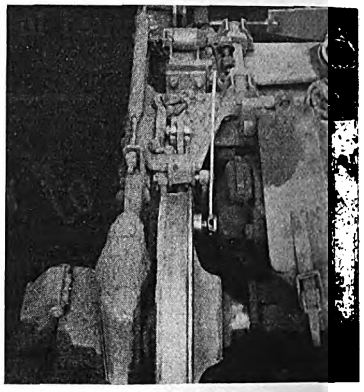
Coupler testing and assembling machine used by Cleveland Railway

* *

Jack for Installing Dust Caps

By E. H. Nobis
Assistant Foreman Mechanical Department

TO INSTALL dust caps securely on motors when mounted on the car truck it was found necessary at the Harvard shops of the Cleveland Railway to develop a special jack. On account of the small clearance between the commutator end of the motor housing and the car wheel it is difficult to install dust caps tightly. Previously, this was done by use of an ordinary hammer but it was found that many caps were loosening and dropping off. The new tool made is a small screw jack of proper size to slip in between the commutator housing and the wheel. One end is placed against the wheel and the other end, which is concave, is placed against the cap. By screwing up on the jack the dust cap is pressed into place as easily as though the motor were on the bench. A man can now apply a dust cap in about half the time that it formerly took. The cost of this jack was about $10.



Handy jack for placing dust cap on motor cases

* *

Molding Staining or Varnishing Machine

By R. C. Sohl
Engineer Mechanical Department

WOOD moldings are stained and varnished by a special machine developed for that purpose in the Cleveland Railway shops. Formerly it was the practice to saturate a sponge with the stain and pass the beading or molding through the sponge. This method was entirely too slow and expensive. It was difficult to keep the sponge filled with the liquid, which was absolutely necessary to insure uniform spreading of the material on the molding. Now the molding is simply passed between two wheels covered with $\frac{1}{4}$-in. felt and held in an 18-gage sheet metal frame. The lower wheel dips into the stain or varnish in the bottom of the container, and when the molding emerges from the rolls the stain or varnish is thoroughly brushed in by two ordinary paint brushes which are

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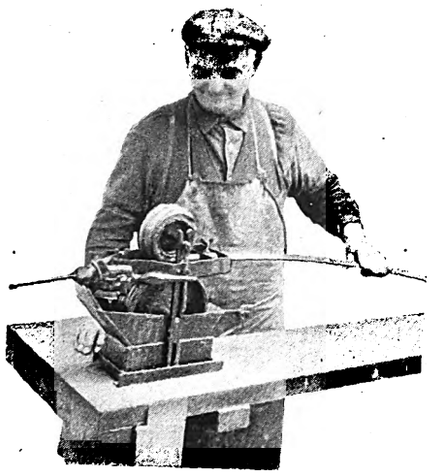
Practices and Devices

Cleveland Railway



This machine stains or varnishes moldings cheaply and rapidly

fastened in place by means of small brackets. These brushes also wipe off all excessive material which drips back into the container, thus conserving it. With this machine one man can turn out as much work in a day as two men formerly could, using the old method. One of these machines can be made for approximately $10.

* *

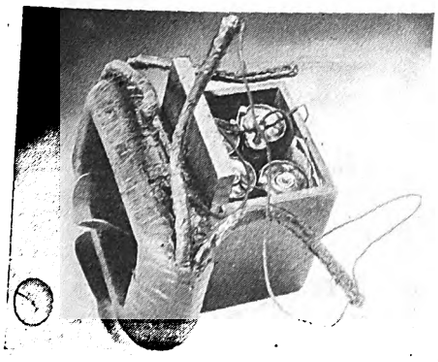
Field Polarity Testing Device

By CHRIST REINKER
General Foreman Mechanical Department

AT THE Harvard shops of the Cleveland Railway the field polarity of motors is tested by means of ordinary dry cell batteries and a compass. When new fields are put in electric motors the main pole and commutating pole fields are tested to ascertain if the polarity of each field is correct. Previous practice was to use current from the trolley wire by means of a special trolley pole and suitable resistance. This method was too slow. Moreover, when the current was interrupted quite an arc was caused when using 550 volts. By using batteries this danger is eliminated, as is also the danger of a severe shock.

The batteries are placed in a box in the center of which is mounted a wood core, and around this core is wound resistance wire of about 2 ohms. A current of 3 amp. flows through the fields, which is enough to overcome any residual magnetism in field poles or motor frame and does not reverse the compass. A sheet iron yoke, made of 14-gage iron, is mounted on the back of the box for testing single fields when out of the motor.

The lower half of the field coil is placed in this yoke and a compass held at the ends of the field.



Cleveland Railway tests the polarity of new fields with this low voltage test set

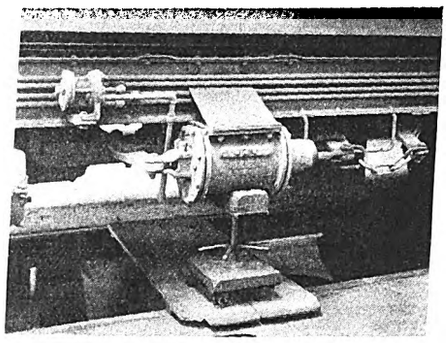
* *

Brake Cylinder and Air Tank Removing Jack

By M. J. LEARY
Assistant Superintendent of Buildings and Equipment

A HANDY device for lifting into place and removing brake cylinders and air tanks has been developed in the shops of the Cleveland Railway. Previously, ordinary double-acting jacks were used and sometimes it was even necessary to block up under the cylinder or tank and slide it out sideways after it was loosened from its base. These methods were slow and dangerous. The new hoist consists simply of a 2x12-in. plank with four castors and a screw jack in the center upon which rests a suitable block hollowed out on the top to the proper contour to allow the cylinder to rest with no danger of rolling off.

The hoist is rolled into place and raised until the upper block securely holds the cylinder to be removed. Then the nuts on the cylinder bolts are taken off and the jack lowered and rolled to where the cylinder has to be taken. The reverse is done when installation is made. This work can be done in about half the time previously taken and with a greater degree of safety.



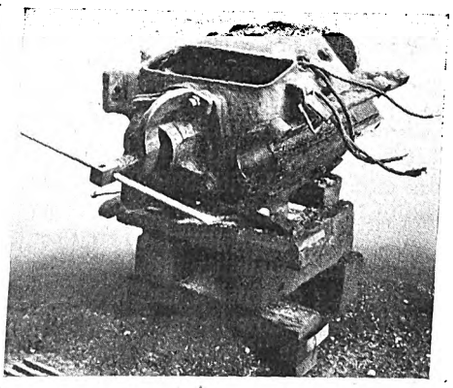
Jack facilitates the removal or mounting of brake cylinders of air tanks

* *

Yoke for Removing Armature Bearing Housings

By R. DUMKE
Foreman Mechanical Department

BY MEANS of a special yoke made at the Harvard shops of the Cleveland Railway armature housings on box-frame motors are readily removed. Formerly, the motor was placed on a stand and set-screws applied to push off the housings. This method was slow and considerable trouble was experienced from stripping the threads on the motor case or breaking the screws or bolts. Sometimes the housing would be forced out too far, allowing the armature to fall on the pole pieces and do considerable damage. With the new device this trouble is eliminated. Where it took one man twenty minutes to remove both housings the old way, the same man can do the



Apparatus for removing armature bearing housings which greatly facilitates this work and saves much time

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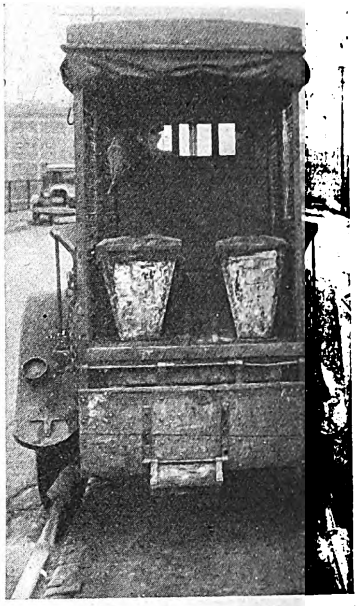
work now in five minutes. The present practice is to remove three of the four cap screws on the pinion end housing and loosen the fourth about half its length. The dust cap on the commutator end housing is then taken off and also the two capscrews nearest the setscrew holes in the housing. This permits the yoke to be applied. The yoke is then fastened in place by two ¾x2-in. capscrews. Pressure is applied on the armature shaft by turning the screw of the yoke device against it, forcing the pinion end housing out the distance required. The remaining two bolts on the commutator end housing are then removed and by continuing the pressure on the armature shaft this housing is likewise forced off.



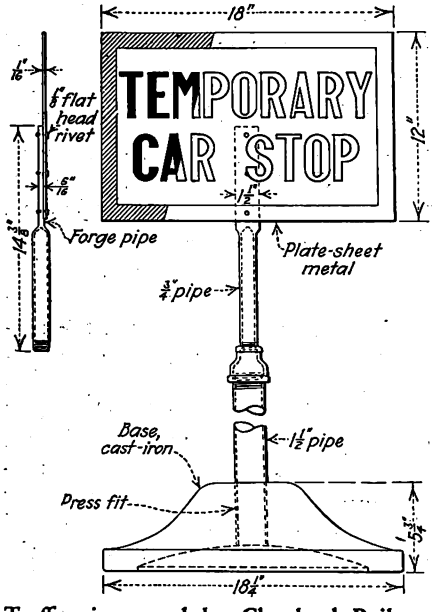
A ¾-ton delivery truck used by the Cleveland Railway for sanding track on steep grades

NEW IDEAS IN TRACK WORK

Traffic Signs Used During Track Reconstruction

By A. B. COPELAND
Superintendent of Construction Way Department

PLACING traffic signs to direct and warn the driving public during periods of track construction is considered a matter of great importance by the Cleveland Railway. After careful consideration, the company has adopted signs patterned from those now in general use by the Cleveland Police Department. These signs are made entirely of metal, having a heavy cast-iron base that gives them the necessary stability. The weight of a complete sign is about 126 lb. They stand 5 ft. 8 in. high and are painted with blue letters on a white background with a red border. This combination gives them prominence and visibility at a distance, preventing confusion and accidents.



Traffic signs used by Cleveland Railway reduce danger of accident and assist the public

The signs now in use by this company are: the "No Road" sign, which is equipped with a reversible detour arrow and has red lantern brackets; the "Danger Warning" sign, equipped with red lantern brackets; and the "No Parking" sign. In addition to the traffic signs, this company uses also a "Temporary Car Stop" sign, mounted on a standard base, which can be placed at a point convenient for passengers to board cars when the regular car stop is inaccessible. In connection with this sign, another is placed on the pole which carries the regular stop sign, having an arrow on it, directing the passengers to the temporary car stop. This combination eliminates the necessity of placing a man at the regular car stop to direct the passengers.

* *

Rail Sanding Truck

By E. B. SPENZER
Way Department

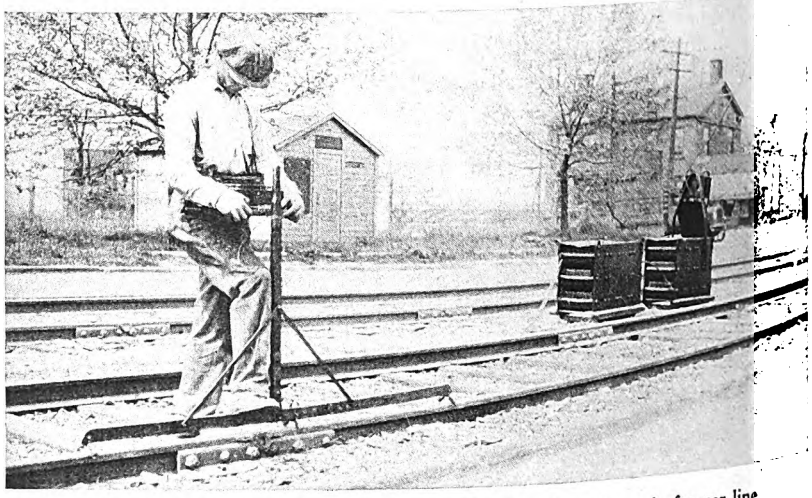
SANDING track on long steep grades at Cleveland is done with the aid of a motor truck. Formerly this was done by a man with a sand can, but the hazard of walking in the center of the street and the increased cost of labor resulted in the development of the sanding truck, which is more efficient and not as costly as the old method. At the rear end of a ¾-ton truck were installed two large sand boxes, one on each side. On the bottom of each box is a sand trap of the same design as used on a street car. From each of these a tube extends down behind each wheel to within 3 in. of the rail. The flow of sand is controlled from the driver's seat by a lever similar to the emergency brake, which can be locked into position. The driver keeps the wheels of the truck on the rails, as he goes up and down the hill, and releases the sand at will. This truck has cut the cost of sanding these hills to a third and has proved satisfactory in every respect for six years.

* *

Artificial Load for Rail Joint Testing

By H. A. BROWN
Foreman Return Circuit Switch and Signal Division

FREQUENTLY, when using the ordinary type of portable rail joint testing meter at the end of a car line,



Testing rail joints by means of an artificial load at the end of a car line

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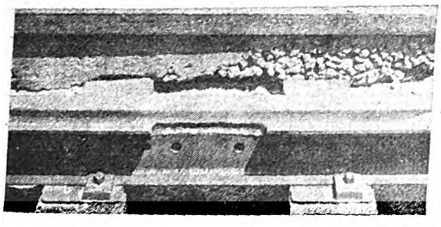
or on a line which has little current flow in the rails, efficient joint testing becomes a difficult task, as it is practically impossible to obtain readings on the instrument. To overcome this difficulty the Cleveland Railway has designed an artificial load tester, which is connected between the trolley wire and rails, and gives the current flow necessary to furnish reliable rail joint data. The unit consists of two sections of heavy street car resistance grids in series. Each weighs 538 lb. Connection to the trolley wire is made through a G.E. 400-amp. railway type circuit breaker, which is mounted above one section of the unit, as shown in the accompanying illustration. The strength of current used is 100 amp.

* *

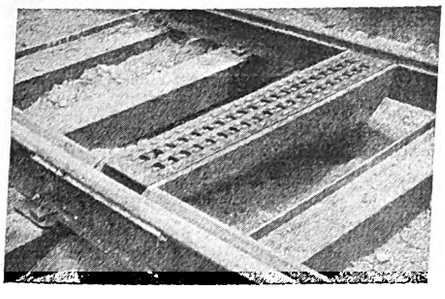
Reinforced Grooved Girder Rail for Track Drain Installation

By C. B. Bennett
Way Department

USE of the A.E.R.E.A. 122-lb. 7-in. grooved girder rail, adopted in 1928 as standard at Cleveland for track in paved streets, has led to a change in the design of the track



Reinforcement for grooved girder rail where track drains are installed



End-opening track drain used by Cleveland Railway

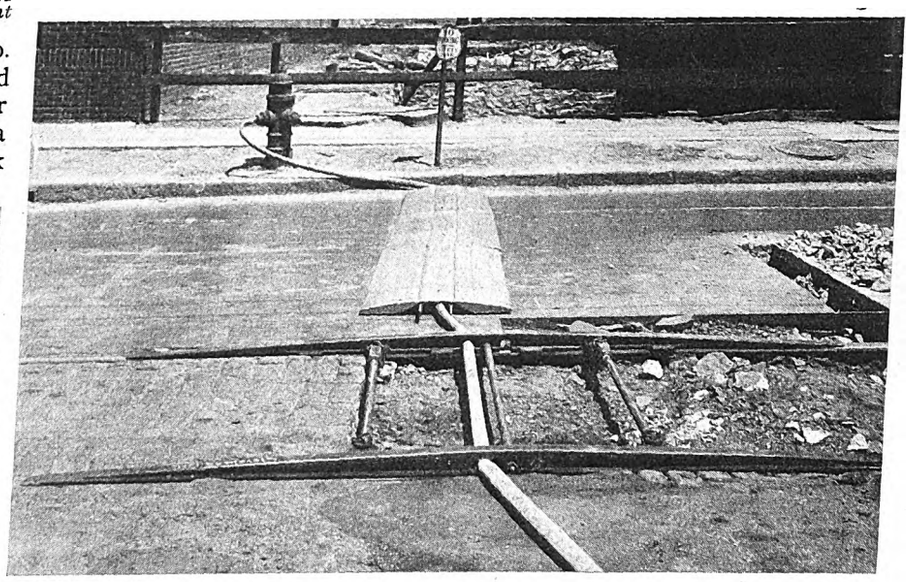
drain. This had an end opening to drain the water from the rail groove, making it necessary to cut away a section of the lip of the rail. The operation of cutting the lip consisted of two saw cuts at right angles to the gage and burning away the intervening section of the lip with an acetylene torch. During the first winter that this track was in service, a considerable number of breakages occurred through the rail at the points where the saw cuts had been made. Examination showed that where such breaks had occurred the saw cut had extended a very slight distance below the point where the acetylene torch had started, leaving a small nick in the rail. In order to avoid the possibility of a recurrence of this condition, the present practice is to install a pair of splice bars where such cuts are made, the center of the bars coinciding with the center of the track drain box. The inside bars have been machined down from $1\frac{1}{8}$ to $\frac{7}{8}$ in. in thickness, and $\frac{1}{4}$ in. machined off the top at an angle of about 45 deg. with the face of the splice bar to permit the placing of a welding rod back of the outside face of the splice bar. After these splice bars have been drawn up tight with bolts, they are seam-welded, top and bottom. The bolts are then removed except the two at the end. This permits the drain box to fit snugly between the two splice bars resting on the base of the rail. A further precaution which is being taken is to end the saw cut a sufficient distance away from the gage line of the rail to permit burning with a torch so as to form a small fillet in the corners of the opening that is left to receive the drain box. The total cost of reinforcing the rails in this manner is about $16 per drain. Since this practice has been followed no failures have been observed.

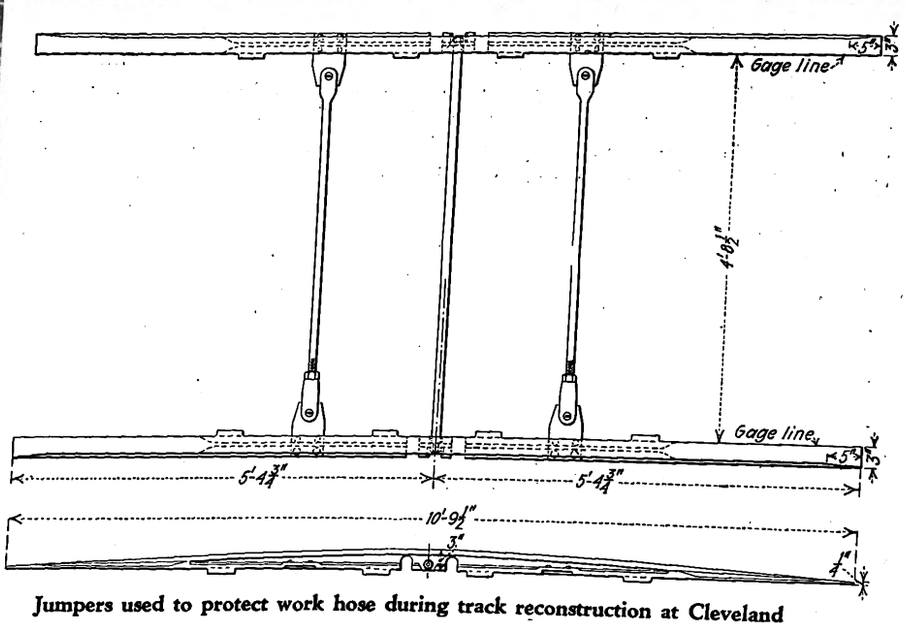
* *

Jumpers Built for Work Hose

By F. E. Davidson
Way Department

WHEN mixing concrete for track jobs it is usually necessary to run a hose line from a hydrant on the curb across the roadway, and, in some cases, across the track in operation. At Cleveland this was formerly done by placing a plank on each





Jumpers used to protect work hose during track reconstruction at Cleveland

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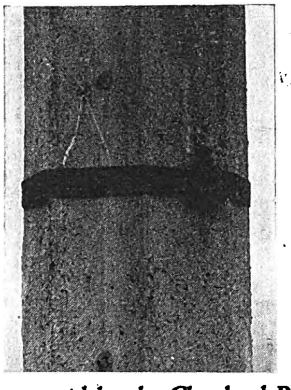
side of the hose in the roadway and throwing the hose over the trolley wire. This method was unsatisfactory and dangerous, as the planks get out of place and slow up vehicular traffic, while the hose over the wire may become wet and carry current. The Cleveland Railway is now using on all its large construction jobs a set of jumpers for work hose. The track hose jumper is made of solid cast manganese and lies on top of the rail. It is 10 ft. 9¼ in. long and weighs 400 lb. It has adjustable tie rods to fit a wide or narrow gage. The roadway hose jumper is made in sections 4, 5 or 6 ft. long, which can be bolted together to fit a road of any width. This jumper is made of oak, reinforced with an iron plate.

MAINTAINING OVERHEAD

Strapping Equipment to Trolley Poles

By H. A. Brown
Foreman Return Circuit Switch and Signal Division

AN EFFICIENT, neat and easy way of strapping conduit pipes, ground wire protecting strips and other pieces of equipment to trolley poles is used by the Cleveland Railway. A galvanized band or hoop



Hoop iron used by the Cleveland Railway to strap pipes or wires to trolley poles

iron measuring $\frac{1}{16}$ in. x 1 in., and a special malleable steel slotted key are utilized. The band iron is cut of sufficient length to circle the pole and the pipe to be strapped thereto, with about 3 in. excess allowed at each end. The slotted key, which is ½ in. in diameter with one end squared, is slipped over the protruding end of the band and is turned up tightly to the pole with a wrench fitting the square end of the key, designed especially for this purpose. It is not necessary to utilize any locking device to prevent the unwinding of the band iron. Pipes so installed will remain in close contact with the pole. The cost of the material is slight and a great saving in labor and material is effected due to the fact that it is not necessary to carry in stock a great number of shapes and sizes of forged pole straps.

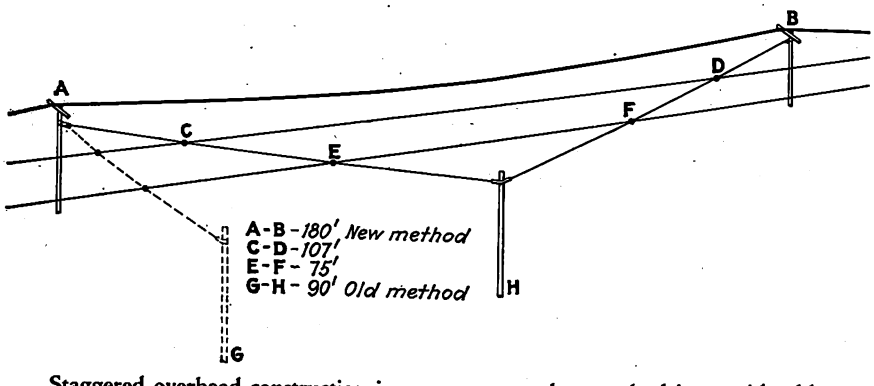
* *

Staggered Location of Poles

By Angus G. Scott
Assistant Superintendent of Overhead Lines

ON LIGHT traffic lines on narrow streets the Cleveland Railway has saved considerable money by the use of staggered pole construction instead of the normal 90-ft. cross-span pole spacing. This staggered construction can be used with a maximum spacing of 180 ft. between poles on each side of the street, which will give trolley sections of approximately 107 ft. and 75 ft. on a street 50 ft. wide. This type of construction can be profitably installed with spacing varying from 120 ft. to 180 ft. between poles.

With this type of construction approximately 60 poles per mile can be eliminated, which represents a saving of about $3,000. By using the 120-ft. spacing, a saving of approximately $1,500 per mile can be effected.

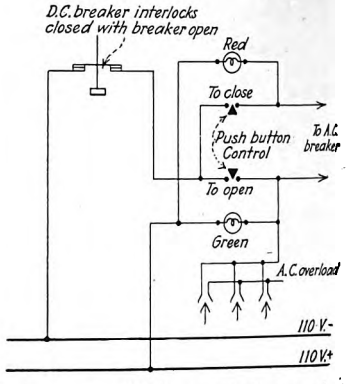


Staggered overhead construction in narrow streets has resulted in considerable savings for the Cleveland Railway

Interlocking Sequence Switching in Conversion Plants

By W. A. Masters
Assistant to Superintendent of Power Conversion

TO PREVENT substation tie-ups and damage caused by oversight on the part of attendants, the Cleveland Railway has found it desirable to make sequence switching as near fool-proof as possible. A method has been divised whereby the control circuits for the electrically-operated oil-



Hook-up of tell-tale switch in control circuits of A.C. supply to converter with hand operated carbon circuit-breaker

circuit-breakers, in the a.c. supply circuits to the converter, interlock with a tell-tale switch on the hand-operated carbon circuit-breaker in the outgoing d.c. supply circuits. The interlocking switch is such that it is impossible to open or close the high tension oil circuit-breaker unless the d.c. carbon circuit-breaker is open.

* *

Reclaiming Worn Converter Brushes

By F. W. Braund
Superintendent of Power Conversion

SYNCHRONOUS converters purchased by the Cleveland Railway in 1912 are equipped with d.c. brush boxes on the commutator side to accommodate a carbon brush 1¾ in. wide, ½ in. thick and 3½ in. long. These brushes are of the detachable shunt type with but one bolt hole located centrally in the top portion of the brush. Due to the construction of the box, only 1 in. or approximately ⅓ of the material is available for wear, leaving some 2½ in. of brush stock to be discarded. Converters purchased in 1917 are equipped with d.c. brush boxes and take a brush 1¾ in. wide, ½ in. thick and 2½ in. in length. This brush equipment also is of the detachable shunt type but of different design, requiring two holes through the thick-

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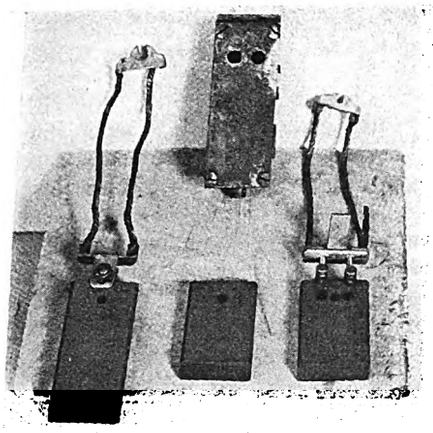


Worn brushes used on converters of one type are redrilled and can be used again on converters requiring a smaller size

ness of the brush and two through its length drilled to the thickness holes. This type is known as the screw and plug type of shunt and 1 in. of material is available for brush wear.

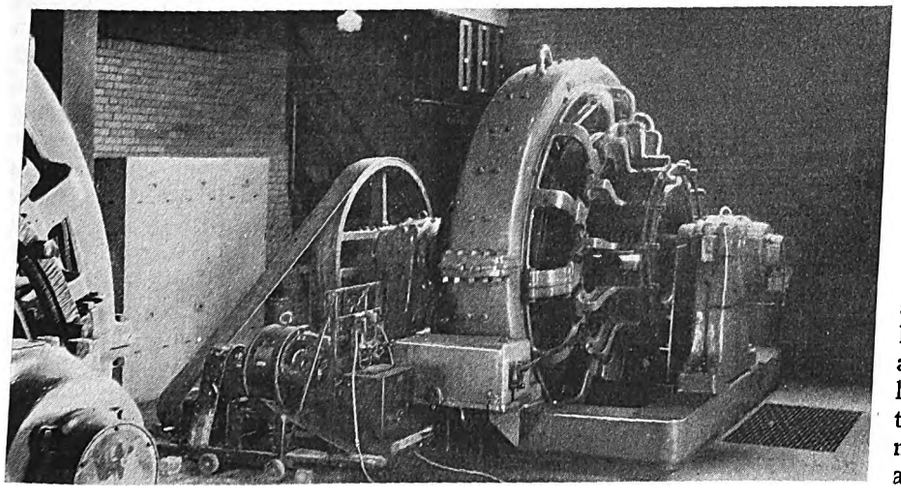
A jig has been made for redrilling the discarded 3½-in. brushes, worn to a length of 2½ in., so as to convert them into the new 1¾x½x2½ in. stock. The fifteen converters equipped with brushes 1¾x½x3½ in. make available more than enough brushes of ¾x½x2½ in. for the eight converters using the smaller size. The saving per year, with brushes costing approximately 60 cents a piece and with each converter equipped with 112 brushes, while eight such converters are in service, approximates $537.60.

* *

Turning Converter Armatures

By JOHN J. SCHULTIS
Maintenance Foreman

TO REDUCE the cost of turning commutators and slip rings on synchronous converters the electrical maintenance division of the Cleveland Railway has developed a compact apparatus consisting of a 600 volt motor and reducing gear mounted on a four-wheeled rubber-tired truck, a 5-ft. split wood pulley bored to fit the overhang of the converter armature shaft, and a screw jack and blocking to adjust the pulley center distance. The motor control is mounted on a panel carried by the truck and the connection is made to the main station bus. With this light portable apparatus two men can set up and turn a set of slip rings between the end of the morning peak load and the beginning of the evening peak. One man can be released for other work while the actual turning operation is being performed, and called again to help dismantle the rig when the job is finished.



Compact apparatus used by Cleveland Railway for turning converter armatures during overhauling

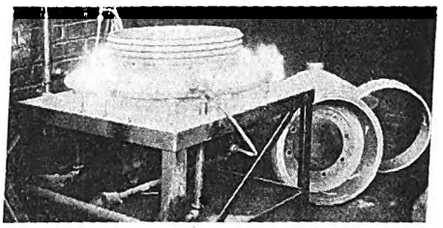
BUS AND GARAGE DEVICES

"Shrunk-In" Brake Drum Liners

By LEONARD S. ROSE
Superintendent Motor Coach Division

BRAKE drums of the modern motor coach represent a considerable expense to the operator if he finds it necessary to discard them as soon as they have become worn oversize. In order to solve this problem the Cleveland Railway has developed so-called "shrunk-in" drum liners. A cast liner is shrunk into an oversize drum and held in place as follows: The liner is turned 0.02 in. oversize, the drum heated and then dropped over the liner ring. The liner is held in place with six radial dowls, which are used because they prevent any vibration or strain caused by loosening. Liners used for this purpose are of the so-called "gun iron." This material is used since it is of a uniformly fine grained structure and will not chip, which often causes scoring of the liner.

Before installation the drum is set up in the lathe and a light trueing or smoothing cut is taken off the inner surface. This operation is necessary for the initial installation only. The liners are then turned to size, with the outer diameter 0.02 in. larger than the drum and the inner diameter under the nominal 16½ in. finished size, to permit of a light trueing up on the grinder or lathe. The liner itself is about ⅜ in. thick when finished to size. The drum is then heated in a small hooded furnace with a circular gas burner directing a flame on the outer surface, until it will readily drop over the prepared liner. If the liner be placed on a clean sheet-iron plate next to the heater it is merely necessary to drop the drum on the liner at this time in order to secure satisfactory alignment. When cool, six radial dowel holes are drilled through the drum and about 1/16 in. into the liner. Dowels, of ⅜ in. gas pipe, are then inserted. A drive fit is used and the pipe brazed both to the liner and to the drum. The final operation consists in mounting on an arbor and trueing up on the grinder or lathe.



Heating brake drum preparatory to inserting rim liner

When this drum liner has been worn sufficiently oversize so that it will no longer pay to regrind it, the dowels are drilled out and a narrow slot is chiseled through the gun-iron liner to the steel drum. It is then a simple matter to remove the old liner. The chief advantages of this type of installation are that it permits us to continue to keep in service all of the old steel drums originally equipped with removable two- or three-piece liners. The three-piece

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liner was found to be unsatisfactory for the service because of its severe brake action and abuse of tires. Another advantage is that we are enabled to operate newer and more popular forms of "bolt-on" brake lining against a one-piece braking surface, thereby increasing their life considerably. Finally, it gives us a more economical method of obtaining new braking surfaces than by buying new drums. This is particularly important when one is considering the value of using the bolt-on type of shoe lining, since the mileage of this type of lining against a three-piece drum liner is often very disappointing in city service.

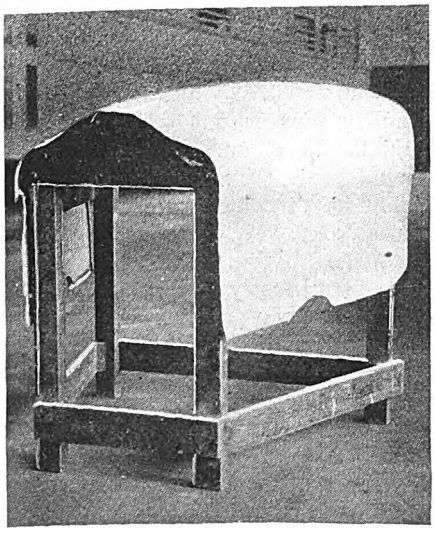
The time required to make and install a drum liner is approximately eight hours. The material cost is about $5 each. When considered against a comparable cost of $26 for a similar new drum it will be seen that this method is more economical. From the standpoint of results obtained we have been unable to detect any way in which our lined drums are not at least equal to cast drums. We believe that if these liners are properly installed there is less drum warpage than with solid drums.

* *

Hood Mounting Fixture

By JACK KEHOE
Foreman St. Clair Overhaul Garage

IN THE main overhaul garage of the Cleveland Railway a handy jig is used for preparing repaired hoods for mounting. The front end is cut to the shape of the coach radiator, while the rear end is of the same profile as the cowl, and at the proper height with relation to the radiator. When the hood comes from the sheet metal shop it is from 1 to 3 in. too long, it has spot-welding marks, requires the mounting of fasteners and is generally unready for immediate installation. It is convenient therefore, to mount the repaired hood on this jig in order to do all of the hand finishing necessary to fit each hood to its individual coach. This includes squaring up or shaping the ends and trimming them to the proper length, grinding or filing down the rough edges, hammering out any dents and in general preparing the hood for installation on the coach.



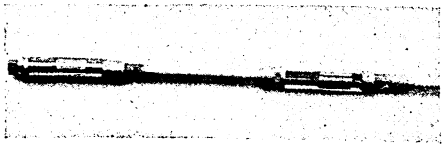
Jig used in the overhaul garage of the Cleveland Railway for finishing repaired bus hoods

* *

Brake Cam Line Reamer

By ROY STEVENS
Assistant Superintendent Maintenance

DIFFICULTY in reaming the bushings of the brake camshafts on coaches equipped with air brakes has led the Cleveland Railway to develop a special tool for this purpose. In this type of brake rigging the two shaft bushings are separated about 13 in., the outer one being in the brakeshoe spider and the other being in a bracket belted to the rear axle, near the air-brake cylinder. The bushings have the same inside diameter and must be in alignment. An attempt to ream these two bushings separately usually results in misalignments, making it necessary to ream oversize in order to get the shaft in place. The advantage of a reamed fit is lost and bushing life is materially shortened. At the request of the company a reamer manufacturer designed a double expansion reamer on one shaft, the two units being spaced the distance between the two cam bushings, as shown in the illustration. This permits placing the reamer in position by reducing the diameter of the "inside" reamer, and slipping it through the outside bushing simultaneously. This tool cost approximately twice as much as regular reamers of the same size. From a comparison of the quality of the work done, however, and the shorter time required to do the job, it is worth considerably more, and its use has become standard practice.

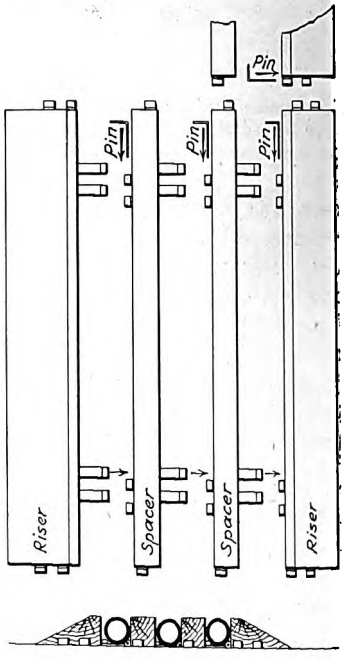


Double expansion reamer for brake camshaft bushings

Hose Jumpers for Buses

By LEONARD S. ROSE
Assistant Superintendent Motor Coach Department

FOR use on city coach lines special fire hose jumpers have been designed and built by the Cleveland Railway. These have been made necessary since a number of important routes traverse streets from which no detour can be made in case of fire and where a fire of any magnitude would result in a suspension of coach service. These jumpers are made up sectionally so that they can be extended in either direction to take care of any number of traffic lanes or any number of hose lines. Each unit is 6 ft. wide, three units being required to take care of double line of traffic. As may be seen from the accompanying illustration, individual units of this length conform to the crown of the road, and are short enough to be easily handled under the most adverse conditions. A jumper unit consists of two "risers" as a minimum and as many spacers as are necessary to cross the required number of hose lines. Individual pieces are assembled by pins which are automatically held in place when the hose is in position. When consideration is given to the fact that one fire hose, crossing the street merely as a precautionary measure, may hold up an important line for a number of hours, it may be seen that the value of these jumpers in maintaining the good will of the public may be very great.



Assembled section of fire hose jumper used by buses of the Cleveland Railway

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New Products for the Railways' Use

The new Hyman fare register is designed to accommodate three denominations of coins—nickels, dimes and quarters

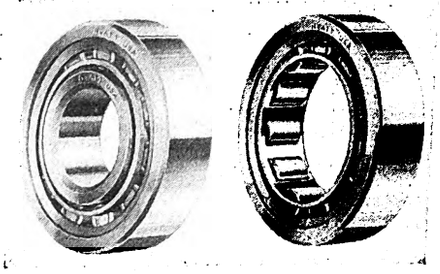
Mechanical Coin Fare Register

A REGISTER, designed to take three different denominations of coin, and to provide the operator with a particularly good view of the coin inserted, has been brought out by the Hyman Register Company. Two small electric bulbs are installed for night use, and an individual sounding bell is attached to each of the three receptacles in order that the operator may know what denomination coin has been inserted. After passing through the counter the coin drops to a plate, where it is clearly visible to both the passenger and the operator before the latter trips the plate which releases the coin and drops it to the bottom of the register. This is constructed somewhat after the manner of a change holder, so that change of quarters, nickels or dimes can be taken out easily by the operator.

The register is mounted on a regulation stand near the operator. It is mechanically operated throughout and does not rely on any power other than gravity to operate. The electric bulbs in the registers are operated separately from the battery on the bus and are used for lighting purposes only; therefore, the burning out of one or two of these does not hinder the operation of the register in any way.

Single-Row Radial Bearing Has Large Carrying Capacity

TO SATISFY an increasing demand for a roller bearing interchangeable with standard S.A.E. single-row ball bearings but having greater load capacity, the Hyatt Roller Bearing Company of Newark, N. J., is now manufacturing single-row radial bearings. This new type, made up of solid rollers, is not intended to replace the standard Hyatt roller bearing, which uses spirally wound rollers, but is offered as a supplement to it for use where space limitations exist, and for loads beyond the capacity of ball bearings to sustain. The design employed is one in which the rollers are permanently retained within the outer race by heat-treated end rings. The inner race is separable. A separator, floating on the rollers, spaces the rollers properly. The rollers and races of this bearing are made of a special analysis chrome nickel alloy steel, and the end rings are of vanadium steel to minimize wear by the ends of the rollers. The roller separator is so made that the pockets are parallel and equally spaced, thus assuring uniform load distribution on the rollers. The bore, outside diameter and width of Hyatt single-row radial bearings correspond to standard S.A.E. metric dimensions. They are therefore interchangeable with all single-row ball bearings of equivalent size, providing greater load capacity within the same space and increasing the efficient life of the installation.



Single-row Hyatt radial bearing assembled with the inner race in position and, at right, with the inner race removed to show roller construction

Power Amplifier for Station Announcements

APPARATUS manufactured by the Radio Receptor Company, Inc., of New York City is designed to amplify the sound of the human voice without distortion and with a volume that can rise above noise backgrounds caused by people and machines.

This may be used in conjunction with a microphone pick-up, or with a special record used on a phonograph or similar instrument. For moderate conditions an amplifier known as the "Powerizer" PXP-245 is used. This "Powerizer" has two 245 power tubes in push-pull arrangement, and amplifies the signal sufficiently to be carried by wires to all parts of a terminal or waiting room. If a relatively wide area is to be covered and large volume is necessary, the "Powerizer" PXP-250 may be used at these distant points, working in conjunction with PXP-171 as the voltage amplifier. The PXP-250 employs the 250 power tubes as well as two 281 rectifiers in one unit, and a 227 and two 1 1-A tubes for the other unit. It is capable of a total undistorted output of 15 watts, and may furnish as many as twelve loud speakers, to be used either in large halls or out of doors.

Train announcements can be easily made with this power amplifier, together with a small microphone as shown in the accompanying illustration

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Monthly and Other Financial Reports

Table I—Monthly and Other Reports of Electric Railways

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Market Street Railway, San Francisco, Cal.					
12 mo. end. Aug., 1929.	9,578,190	8,181,573	.....	1,421,452	.....
12 mo. end. Aug., 1928.	9,854,150	8,357,010	.....	1,522,128	.....
Market Street Railway, San Francisco, Cal.					
September, 1929.....	787,449	651,158*a*	.....	136,291	77,378*e*
September, 1928.....	794,792	668,546*a*	.....	126,246	64,815*e*
12 mo. end. Sept., 1929.	9,570,846	8,139,777*a*	.....	1,431,069	710,375*e*
12 mo. end. Sept., 1928.	9,838,300	8,319,077*a*	.....	1,519,223	764,122*e*
Jacksonville Traction Co., Jacksonville, Fla.					
August, 1929.....	88,098	81,387	9,332	*2,622b*	.....
August, 1928.....	92,230	80,491	8,920	*2,816b*	.....
8 mo. end. Aug., 1929....	1,162,859	947,560	107,034	108,262*b*	*56,867*
8 mo. end. Aug., 1928....	1,233,285	992,507	107,500	133,276*b*	*89,127*
Chicago Surface Lines, Chicago, Ill.					
September, 1929.....	5,048,055	4,001,031*a*	.....	1,036,924	.....
September, 1928.....	5,001,685	3,907,287*a*	.....	1,094,398	.....
Boston, Worcester & New York Street Railway, Framingham, Mass.					
August, 1929.....	76,697	55,841	1,625	19,513	18,043
August, 1928.....	63,396	47,666	1,614	14,313	12,843
8 mo. end. Aug., 1929..	498,084	415,844	13,000	79,550	67,790
8 mo. end. Aug., 1928..	467,812	436,234	12,918	62,032	50,123
Department of Street Railways, Detroit, Mich.					
September, 1929.....	2,049,235	1,580,632	62,327	415,660	270,798
September, 1928.....	1,974,594	1,512,173	63,435	419,276	258,138
12 mo. end. Sept., 1929.	26,715,667	21,169,937	750,968	4,947,077	3,253,351
12 mo. end. Sept., 1928.	23,929,592	18,655,592	784,492	4,725,135	2,821,290
Kansas City Public Service Co., Kansas City, Mo.					
September, 1929.....	722,167	.....	.....	50,936	.....
September, 1928.....	722,574	.....	.....	50,046	.....
9 mo. end. Sept., 1929..	6,672,155	.....	.....	547,415	.....
9 mo. end. Sept., 1928..	6,758,057	.....	.....	535,539	.....
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
August, 1929.....	79,251	60,217	7,840	21,701	*9,300*
August, 1928.....	79,363	60,851	7,840	23,327	*7,842*
8 mo. end. Aug., 1929..	672,907	511,706	62,720	188,891	*67,809*
8 mo. end. Aug., 1928..	698,301	503,211	62,720	193,284	*61,745*
Brooklyn-Manhattan Transit System, New York, N. Y.					
September, 1929.....	4,957,833	3,265,942	350,716	1,407,024	628,452
September, 1928.....	4,745,754	3,309,396	325,004	1,201,140	457,128
3 mo. end. Sept., 1929.	15,053,386	10,286,538	982,859	3,990,989	1,640,610
3 mo. end. Sept., 1928.	14,587,776	10,276,623	983,845	3,597,372	1,419,188
Brooklyn & Queens Transit System, New York, N. Y.					
September, 1929.....	1,979,804	1,533,161	125,085	343,167	219,589
3 mo. end. Sept., 1929.	5,975,977	4,757,859	344,138	937,908	564,099
Hudson & Manhattan Railroad, New York, N. Y.					
September, 1929.....	1,002,525	505,112*a*	.....	497,413	162,732
September, 1928.....	978,936	528,473*a*	.....	450,463	115,041
9 mo. end. Sept., 1929.	9,264,632	4,698,250*a*	.....	4,566,382	1,544,005
9 mo. end. Sept., 1928.	9,179,240	4,794,152*a*	.....	4,385,088	1,365,640
Long Island Railroad, New York, N. Y.					
August, 1929.....	4,186,924	2,316,651	512,291	1,357,032*b*	1,181,014
August, 1928.....	3,927,529	2,411,117	453,875	1,061,900*b*	968,520
8 mo. end. Aug., 1929..	27,769,055	18,180,164	2,043,095	7,530,977*b*	6,270,719
8 mo. end. Aug., 1928..	26,812,487	18,980,983	1,810,124	6,014,890*b*	4,841,191
Staten Island Rapid Transit Co., New York, N. Y.					
July, 1929.....	22,256	118,903	17,000	*113,647b*	63,102
July, 1928.....	289,991	177,119	20,000	92,771*b*	57,186
7 mo. end. July, 1929...	1,477,942	1,165,422	123,000	189,503*b*	146,685
7 mo. end. July, 1928...	1,807,111	1,262,373	142,850	401,095*b*	143,380
Staten Island Rapid Transit Co., New York, N. Y.					
August, 1929.....	271,165	171,506	17,800	81,859*b*	74,894
August, 1928.....	284,100	169,848	20,000	94,132*b*	58,007
8 mo. end. Aug., 1929..	1,749,107	1,336,928	140,800	271,362*b*	221,579
8 mo. end. Aug., 1928..	2,091,211	1,432,221	162,850	495,227*b*	201,387
Philadelphia Rapid Transit System, Philadelphia, Pa.					
3 mo. end. Sept., 1929.	12,733,299	9,671,473*a*	.....	3,380,867	*439,588d*
9 mo. end. Sept., 1928.	41,174,435	31,217,949*a*	.....	10,917,049	*648,881d*
Galveston-Houston Electric Ry., Houston, Tex.					
August, 1929.....	53,563	28,322	2,588	22,652*b*	.....
August, 1928.....	53,326	29,623	2,508	21,193*b*	.....
8 mo. end. Aug., 1929..	605,660	336,470	31,849	237,340*b*	*33,360*
8 mo. end. Aug., 1928..	670,748	393,456	30,489	246,802*b*	*82,184*
Houston Electric Company, Houston, Texas					
August, 1929.....	278,581	172,479	26,681	79,420	.....
August, 1928.....	269,015	169,545	25,061	74,407	.....
12 mo. end. Aug., 1929.	3,384,034	2,095,336	288,724	1,002,838	598,891
12 mo. end. Aug., 1928.	3,294,279	2,007,218	298,907	988,150	585,028
Pacific Northwest Traction Co., Seattle, Wash.					
August, 1929.....	102,389	63,202	4,418	34,767	.....
August, 1928.....	87,301	68,113	4,188	14,998	.....
12 mo. end. Aug., 1929.	914,138	745,859	54,325	113,953	*3,877*
12 mo. end. Aug., 1928.	885,970	721,169	49,965	114,833	*61,981*
Calgary Municipal Railway, Calgary, Alta.					
August, 1929.....	86,167	53,462	.....	32,705	2,381
August, 1928.....	73,393	44,440	.....	28,953	5,928
8 mo. end. Aug., 1929..	696,105	402,542	.....	293,563	50,574
8 mo. end. Aug., 1928..	622,090	378,584	.....	243,506	42,166
Lethbridge Municipal Railway, Lethbridge, Alta.					
July, 1929.....	5,663	4,750	.....	913	*1,672*
July, 1928.....	4,577	4,167	.....	409	*2,175*
7 mo. end. July, 1929..	36,002	28,848	.....	7,154	*10,944*
7 mo. end. July, 1928..	34,234	32,170	.....	2,064	*16,080*
British Columbia Electric Railway, Vancouver, B. C.					
July, 1929.....	1,156,720	786,085	.....	370,635	.....
July, 1928.....	1,061,498	738,272	.....	323,226	.....
Guelph Radial Railway, Guelph, Ont.					
July, 1929.....	6,987	7,828	100	*940*	*3,985*
July, 1928.....	.....	.....	.....	.....	*2,609*
9 mo. end. July, 1929...	68,120	62,316	1,677	4,126	*23,309*
9 mo. end. July, 1928...	.....	.....	.....	.....	*17,995*
London & Port Stanley Railway, London, Ont.					
July, 1929.....	103,249	62,679	.....	40,560	.....
July, 1928.....	88,022	56,821	.....	31,201	.....
Ontario Hydro-Electric Railways, Essex District					
July, 1929.....	98,666	81,694	400	16,571	*13,418*
July, 1928.....	.....	.....	.....	.....	*7,384*
9 mo. end. July, 1929...	592,316	706,473	3,546	242,296	*23,858*
9 mo. end. July, 1928...	.....	.....	.....	.....	*16,673*
Regina Municipal Railway, Regina, Sask.					
August, 1929.....	30,879	19,562	.....	11,317	*695*
August, 1928.....	29,167	19,106	.....	10,061	*471*
8 mo. end Aug., 1929..	280,669	171,749	.....	108,920	13,616
8 mo. end. Aug., 1928..	238,828	160,007	.....	78,821	*2,150*
Saskatoon Municipal Railway, Saskatoon, Sask.					
August, 1929.....	24,829	19,330	974	4,525	*4,859*
August, 1928.....	21,917	17,521	876	3,520	*4,786*
8 mo. end. Aug., 1929..	259,478	170,295	10,226	78,957	9,902
8 mo. end. Aug., 1928..	224,798	151,523	8,991	64,284	5,566
Havana Electric Railway, Havana, Cuba					
3 mo. end. Sept., 1929.	1,388,840	.....	.....	.....	78,771
3 mo. end. Sept., 1928.	1,338,247	.....	.....	.....	81,113
9 mo. end. Sept., 1929.	4,253,421	.....	.....	.....	350,444
9 mo. end. Sept., 1928.	4,064,240	.....	.....	.....	234,360

Italic figures indicate deficit. *a* Includes taxes. *b* Net operating revenue *c* Freight debit of $171,594 in July, 1929. *d* After dividends. *e* Before depreciation and federal taxes.

Table II—Condensed Annual Reports of Electric Railway Properties

	Tramways Dept., Aberdeen, Scotland—Tramways		Tramways Dept., Aberdeen, Scotland—Motor Buses		Toronto Transportation Commission—All Services		Toronto Transportation Commission—Gray Coach Lines	
	1929*b*	1928*b*	1929*b*	1928*b*	1928	1927	1928	1927
Railway operating revenue	£161,964	£153,267	£76,399	£ 65,754	£13,269,718	£12,635,320	£840,044	£570,994
Railway operating expenses	131,542	125,263	61,151	49,251	8,172,306*a*	7,606,080*a*	587,951*a*	418,653*a*
Net revenue, railway oper.	30,422	28,004	15,247	16,233	.....	.....	.....	.....
Net revenue, auxiliary oper.	.....	.....	.....	.....	.....	.....	.....	.....
Taxes	.....	.....	.....	.....	.....	.....	.....	.....
Operating income	.....	.....	.....	.....	5,097,411	5,029,239	.....	.....
Non-operating income	.....	.....	.....	.....	.....	.....	.....	.....
Gross income	30,422	28,004	15,247	16,233	5,097,411	5,029,239	252,093	152,340
Deductions from gross income	24,045	21,820	5,630	5,205	4,929,081	4,912,583	247,772	148,608
Net income	6,377	6,184	9,617	11,028	168,330	116,655	4,321	3,732
Operating ratio, per cent	.....	.....	.....	.....	.....	.....	.....	.....

a Includes taxes. *b* Year ending May 31.

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NEWS *of the Industry*

Baltimore Pact Removes Bar to Pennsylvania Electrification

Announcement was made on Oct. 21 by the Pennsylvania Railroad that negotiations which have just been concluded by the company with the city of Baltimore now open the way for complete electrification of the Pennsylvania Railroad from New York to Washington.

The new agreement has been in negotiation for several years. It covers extensive station platform and track improvements in and through Baltimore and the construction of two new double-track tunnels in the city limits, which will enable the company to extend the electrification of its lines from New York to Wilmington, Del., to Washington and the Washington Terminal area for both passengers and freight. Actual work on the Baltimore improvements will be undertaken by the company immediately.

Between five and six years are allowed in the agreement for completion of the tunnel work, new station, freight warehouses, grade crossings and electrification. It is anticipated, the company says, that before the expiration of that period the electrification from New York to Wilmington will have been completed.

Hearing on Intrastate Rates on Nov. 12

An investigation to determine whether the intrastate rates of the Wheeling Traction Company in Ohio discriminate against interstate traffic was ordered by the Interstate Commerce Commission on Oct. 22. The commission's action was taken on a petition filed by the company representing that, because of franchise ordinances and regulations imposed by the state and several municipalities, it is unable to increase its rates on intrastate traffic to the basis in effect on interstate traffic, as published in the tariff I.C.C. No. 21. This proceeding has been assigned by the commission for hearing on Nov. 12, at Steubenville, Ohio, before Examiner Maidens. The commission's order instituting the investigation has been served upon the Ohio Public Utilities Commission, the Mayors of Martin's Ferry, Bridgeport, Bellaire, the village of Shadyside, and the Board of County Commissioners of Belmont County, Ohio.

The order provides that an investigation be instituted "to determine the reasonableness of petitioner's interstate rates, fares and charges as published in said tariff I.C.C. No. 21 and whether the rates, fares and charges required by authority of the state of Ohio to be maintained by said petitioner cause or will cause any undue or unreasonable advantage, preference or prejudice as between persons or localities in intrastate commerce on the one hand and interstate or foreign commerce on the other hand, or any undue, unreasonable or unjust discrimination against interstate or foreign commerce; and to determine what rates, fares and charges, if any, or what maximum or minimum rates, fares or charges shall be prescribed to be charged by the petitioner on its lines in order to remove such advantage, preference, prejudice or discrimination, if any, as may be found to exist."

Action on School Fare for Minneapolis Postponed

The city of Minneapolis, Minn., may not press the matter of a special 5-cent fare rate for school children, such as is effective in Duluth, Minn., under a compromise arrangement. The attorney general has ruled that the Railroad & Warehouse Commission may grant such a fare legally under the Brooks-Coleman act, which placed rate-making powers in the hands of the commission. However, at a Council committee meeting on Oct. 18 consideration of the matter was postponed until the return of the Mayor, who asked the special rate. T. J. McGill, general manager of the Twin City Rapid Transit Company, believes the special rate would be useful to a comparatively few students. In Duluth, he says, only 1,500 out of 26,000 pupils use the privilege, and a partial check of one high school indicated that 100 out of 1,500 rode the street cars. The reduced fare for school children in Duluth was the result of negotiations in which the company there secured other concessions in return for granting this privilege.

New Agreement in Des Moines

Wage Contract Revised So As to Permit Use of One-Man Cars. Other Changes Made

AFTER successfully waging a five-year battle against the institution of one-man car service in Des Moines, Iowa, members of Local 441, Amalgamated Association, on Oct. 18 accepted a new working agreement which permits the Des Moines Railway to operate one-man cars whenever such a move is deemed advisable. Concessions from the company include recognition of the union until 1940, a wage increase, old age pensions, group life insurance and other favorable features.

The new contract contains the following major provisions:

1. All union employees of the company are to receive an increase of 1 cent an hour each year for the next three years. The first increase is effective on Nov. 1, this year. The total of 3 cents will boost the maximum for trainmen from 59 to 62 cents an hour.

2. The union agrees to accept a flat increase of 5 cents an hour additional if and when the company institutes one-man cars. It was this clause which aroused the ire of the union members against the two former proposals made by the present owners.

3. The company agrees to recognize the union until Nov. 1, 1940, and to treat with union representatives in all matters affecting the company and members of the union.

4. The company agrees to set aside $1,500 a month or $18,000 a year for a pension fund for employees. Any union employee who has served twenty years continuously and has reached the age of 65 years is eligible for a pension of $58 a month.

5. The company agrees to pay $58 a month to any union employee totally disabled in service, payments to continue during period of disability.

6. The company agrees to carry group life insurance which will pay beneficiaries of each employee $1,000 at his death.

7. Employees are to receive time and a half for all time over nine hours. Men on tripper runs are to receive a minimum of four hours pay every time they take out a car.

8. The company agrees to check off all dues, fees and assessments payable to the union. This was one of the "bones of contention" between the old company and the union.

9. Employees called to the claim department to report on accidents, etc., are to receive pay for time actually spent and one hour additional if called from their homes.

10. Both sides agree to arbitrate at the expiration of the wage agreement in 1932 in case they cannot arrive at terms for a new wage contract.

The new contract, proposed by Walter J. Cummings, president of the company, takes the place of the famous two-man car contract signed in 1915 by the Des Moines City Railway and the union. The 1915 agreement stipulated that there should be a motorman and a conductor on each car and was to be in force until 1940.

This agreement became legally void when Mr. Cummings and his associates purchased the Des Moines railway at the receivership sale on June 22, this year. At that time Mr. Cummings elected to buy the assets of the company "without the contract" as permitted in the order signed by Federal

Supreme Court to Test Ruling on 5-Cent Rate

THE Supreme Court of the United States on Oct. 21 granted a writ of certiorari in the case of Georgia Power Company vs. City of Decatur, No. 363, and will review the decree of the Supreme Court of Georgia, affirming the decree of the Superior Court of Dekalb County, Ga., adjudging that the company be perpetually compelled to operate its railway within the city at a 5-cent fare. The case involves an attempt on the part of the Georgia Power Company to surrender its franchise to the city after it had been denied permission to increase its existing rate of fare, which it contended was confiscatory.

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Judge Martin J. Wade. Members of the union, however, refused to concede that the contract was not binding on the purchaser of the property and they turned down the first and second agreements proposed by President Cummings because of the clause which would have let down the bars to one-man car operation.

It should be pointed out that none of the three proposals, the last of which was accepted by the union, provided directly for one-man cars, but merely stated that the company would pay a flat increase of 5 cents an hour if the change were made.

The acceptance of the new agreement writes finis to a contest begun in 1925 when the Des Moines City Railway asked the Polk County District Court to set aside the two-man car contract. The company contended that under a service-at-cost franchise any contract which prevented it from instituting more economical operation was against public policy. The company told the court that a saving of nearly $200,000 annually in trainmen's wages could be effected by the institution of one-man cars, and that the saving would probably result in reduced fares. The court held that one party to a contract cannot plead public policy in an attempt to break that contract. The Iowa Supreme Court held likewise in a ruling on the appeal taken by the company.

Periodical strike votes followed the legal battle and the union and the company were at swords' points until the property was acquired by the present owners.

Negotiations which began between President Cummings and union officials shortly after Mr. Cummings acquired the property were marked by good will on both sides, and the peaceable settlement of the trouble was good news to Des Moines.

The $1.25 weekly pass, which has proved so popular, will be continued and all rolling stock except the ten new cars put into operation recently will be replaced by faster and more modern cars.

Committee Reports Against Omaha Bridge Purchase

Interest in the "free bridge" question has been aroused anew in Omaha, Neb., and Council Bluffs, Iowa, by the presentation of the report of the joint Omaha and Council Bluffs bridge committee. In brief, the report rejected the price of $4,155,296 placed upon the bridge by the Omaha & Council Bluffs Street Railway, the present owners of the bridge; recommended the construction of two new bridges unless terms considered more reasonable can be obtained from the railway; recommended the submission of revenue bond issues totaling $4,150,000 for the building of the two new bridges to the electors, and the securing of proper federal legislation preliminary to construction of the new bridges.

The recommendations of the committee will be submitted to the City Councils of the two cities, and the entire matter may then be submitted to the voters of the two cities.

The report of the committee stated: "If the existing bridge at Douglas Street (the one now owned by the railway and operated as a toll bridge) can be acquired at a price reasonably near the estimated cost of a new bridge of the arch span type, we submit that this is the most desirable method of obtaining a free bridge at the earliest possible date."

J. N. Shannahan, president of the railway, insists upon a price of $4,155,296, an amount which represents a sacrifice of more than $1,000,000 on the part of the company. The report of the committee prohibits a purchase price above $2,750,000, the estimated cost of a new bridge.

The only possibility of a compromise seems to lie in the direction of the adoption of the plan submitted by an Omaha City Commissioner, whereby the company would collect the tolls for a period of five years after which the city would secure title to the bridge. In order for this plan to be at all satisfactory to the company, however, the length of time for the collecting of tolls would have to be lengthened to 6½ years.

Attractive Program of Papers for Iowa Meeting

Announcement has been made of the program of papers to be presented at the annual convention of the operators' section of the Iowa Electric Railway Association at Waterloo, Iowa, on Nov. 7 and 8. Convention headquarters will be at the President Hotel. Following the address of welcome by the Mayor and the response by John Sutherland, Davenport, past chairman of the association, the morning of Nov. 7 will be devoted to the following order of business:

"The Car Builder's Contribution to Economic and Safe Electric Railway Operation," by F. L. Markham, sales manager American Car Company, St. Louis, Mo.

"Rehabilitation Problems of Omaha & Council Bluffs Street Railway," by C. D. Porter, vice-president and general manager Omaha & Council Bluffs Street Railway, Omaha, Neb.

"Practices in Maintaining Power Distribution System," by S. J. Fairbanks, electrical engineer Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa.

Discussion.

Announcements and appointments of committees.

In the afternoon the paper, "Electrification and Operation of Illinois Central Terminals in Chicago," will be presented by W. M. Vandersluis, electrical engineer Illinois Central Railroad, Chicago, Ill.

Another paper of the afternoon will be:

"Salient Features of Operation and Maintenance of Motor Coaches of Chicago Motor Coach Company," by E. Watton, superintendent of equipment Chicago Motor Coach Company, Chicago, Ill.

John Sutherland, master mechanic Tri-City Railway, Rock Island, Ill., will then present "A Talk with Our Foremen."

On the morning of Nov. 8 there will be two papers:

"Urban Transportation by Street Car and Bus—Experience in Maintenance and Operation of Both," by A. H. Smith, superintendent transportation Interstate Power Company, Dubuque, Iowa, and "Substitution of Buses for Street Cars," by Charles Munson, manager Iowa Railway & Light Corporation, Marshalltown, Iowa.

In the afternoon there will be a trip over the Waterloo terminals of the Waterloo, Cedar Falls & Northern Railway.

The convention banquet will be held on the evening of Nov. 7 at the Hotel President at 6 o'clock.

A Strong Arraignment of New Orleans Strikers

"The senseless animosity of a few communists prolonged the fight between the New Orleans Public Service and the union and resulted in defeat of the cause of unionism in New Orleans," Rev. Father Peter M. H. Wynhoven, head of Catholic charities in that city, told members of the Federation of Catholic Societies of Louisiana at their meeting there.

Father Wynhoven was at one time mentioned as a possible arbitrator between the company and the men and was a member of the Commission Council's committee of seven prominent citizens who sought to end the strike two months ago. He said:

"Communism is the fire by which the carmen 'cooked their own goose.' Property was destroyed, arson committed, people wounded, men killed—by whom and for what? Not by the rank and file of the carmen, for most of them are good, law-abiding citizens. It was by their so-called 'leaders' who were so filled with the violent, unreasonable, brainless spirit of communism that they brought about the carmen's defeat.

"Can you imagine for a minute that the vast majority of these conductors and motormen, as you know them, would place bombs under our street cars? It was the communists who wished to destroy capital, but who also are equally against the cause of the laboring man.

"It would be well for the heads of the American Federation of Labor to climb into the watchtower and keep vigil night and day for these symptoms. If they do not, this unreasoning spirit will eat into the very foundation beams of our national structure. There is nothing more unnatural and unreasonable than the hostility sought to be engendered between labor and capital.

"If ever harmony, a spirit of co-operation and unity of purpose should exist, they are certainly called for by the relations of these two classes. Employees cannot flourish unless the company for which they work is making money, and the employer cannot exist unless his workers are satisfied and happy.

"No material laws can correct the difficulties set up between capital and labor: Morality is needed—a morality that cannot be instilled by the materialism with which the atmosphere is charged in these modern times. Catholic men and women have a mission, a sacred obligation—to exert an influence for settling difficulties such as the present one in New Orleans."

90,707 Miles to the Accident in Portland, Ore.

The transportation division of the Portland Electric Power Company, Portland, Ore., has made the best record in its history on its street cars and buses in reducing preventible accidents. The total number of miles operated during August was 1,288,143, with only nineteen accidents classed as "preventible."

The new mark is nearly 35 per cent above the July record, which was the highest up to that time. The company has now advanced its "bogie" for its campaign to 65,000 miles. The star performance in August of the five transportation divisions indicated an average of 90,707 miles to an accident.

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No Parking Being Enforced in Chicago Loop

Although the Illinois Supreme Court has held the original ordinance prohibiting parking in the Chicago Loop area invalid, city officials are promising that the no-parking rule will continue in force.

The ordinance declared void by the court was superseded last March by another which cured the defect found by the court in the original act. It is contended that because of this fact the court's decision is of no effect, but the city corporation counsel has not yet ruled on this point. In the meantime the ordinance is being enforced without interruption and steps are being taken to ask for a rehearing.

Public sentiment is outspokenly against a return to the chaos of Loop streets prior to the adoption of the parking prohibition.

The decision of the court was based on the fact that the original ordinance, attacked by Arthur Haggenjos, a Chicago attorney, did not allow a reasonable use of automobiles in the Loop, since it prohibited "standing" for any purpose.

The new ordinance, enacted in March, permits private automobiles to stop for not to exceed three minutes for loading and unloading and allows service vehicles half an hour for the transaction of necessary business. This is the ordinance which has been enforced since that time and it is believed that its terms are not in conflict with the court's decision.

City's Expert Recommends Fare Increase

Harry R. Allensworth, who has been inspecting the books of the Columbus Railway, Power & Light Company, Columbus, Ohio, for the city, says in his report that the company should be granted an increase in fares. The company now gets 5 cents for ticket fares and 6 cents for cash fares. When the company sometime ago opened negotiations with the City Council for a new franchise it asked a 7-cent ticket rate, with 10 cents for cash fares.

Mr. Allensworth favors the sale of four tickets for 25 cents with the cash fare at 8 cents if the railway service is to be continued as at present. He would, however, allow the company to sell five tickets for 35 cents, with an 8-cent cash fare if the service is to be improved by extensions, rerouting, better equipment and if a higher wage is paid car crews. The report has been turned over to Fred P. Zimpfer, chairman of the public utilities committee of the Council.

Benjamin W. Marr, president and general manager of the Columbus Railway, Power & Light Company, declined to comment on the report other than to say that it appeared to be fair and satisfactory.

Parking in Memphis

The question of parking in Memphis, Tenn., remains open to solution by engineers and the City Commission, it was learned, when visits of two consulting engineers to the city brought Memphis traffic problems into widespread discussion. The Mayor said:

"The city has no intention to divert street cars from Main Street. Merchants have built their stores around the present car system, and have a right to expect it to remain. We are considering the rerouting of some car lines, especially the Lamar line, but we have not gone so far as to prepare any definite plans."

It has been suggested that all parking on Main Street be prohibited during business hours.

The two visiting engineers are Harland Bartholomew, St. Louis, consulting engineer of the planning commission, and Ross W. Harris of Madison, Wis., who has been retained by the city to make traffic recommendations.

$8,632,000 Grade Elimination at Chicago

Depression of the South Chicago suburban branch of the Illinois Central Railroad tracks would cost approximately $8,632,000, according to estimates presented by the railroad officials to the track elevation committee of the Chicago City Council.

The South Shore Chamber of Commerce, of Chicago, last year started a campaign to obtain track depression. Morgan L. Fitch, chairman of the track depression committee of that organization has stated that he believes the railroad favors it as much as do South Shore residents. Public hearings will soon be held to permit these residents to express opinions on the proposed ordinance.

The railroad officials suggested that the payment should be apportioned as follows: $2,173,000 by South Shore property owners, $1,075,000 by the city of Chicago, and $4,584,000 by the railroad.

Los Angeles Case Argued

City and Company Have Inning Before U. S. Supreme Court in Proceeding Involving 5-Cent Fare

THE plea of the city of Los Angeles for a straight 5-cent fare on the street cars of that city was presented to the Supreme Court of the United States on Oct. 22, when were heard oral arguments in the case of Railroad Commission of the State of California and city of Los Angeles vs. the Los Angeles Railway.

Arthur T. George, for the commission, opened the argument. He said the case was on a direct appeal from the decree of the District Court for the Southern District of California, which held invalid an order entered by the commission refusing to allow the railway to raise its fare from a straight 5-cent fare to a rate of 7 cents with four tokens for 25 cents.

The commission set the rate base at $42,000,000, and thereafter declared that the rate of return for the five years ended Dec. 31, 1926, had been 7.1 per cent, but that the rate of return for the past year had only been 4.9 per cent. The lower rate, Mr. George declared, the commission found to be due to failure to take advantage of numerous economies.

The railway appealed from the commission's order to the district court asking for an injunction to prevent the enforcement of the commission's order. At this time the city was allowed to intervene. Answers were filed to the railway's bill declaring that the corporation was operating under franchises granted by the city and county of Los Angeles calling for a fixed fare of 5 cents. Mr. George said:

"It is our contention that these franchises constituted contracts binding upon the railway and that the federal court was without jurisdiction to grant the relief sought."

The three-judge court issued the permanent injunction on the ground that the order of the commission deprived the railway of its property without due process of law.

Frederick Von Schrader took up the argument at this point for the commission and declared that the commission's argument is based on the ground that the franchises mentioned were binding contracts. He said:

"If any of our franchises are held to be contracts as we contend, then the lower court was without jurisdiction to change the rates by judicial action. Our adversaries will contend that the city did not have the power to contract with respect to the regulation of rates, but under the constitution and laws of California it has been held that the city did have that power. By decided cases of this and other courts, it has been held that where a valid contract fixing rates has been entered into between a city and a public utility there is no confiscation."

A total of 102 franchises has been granted to the railway, Mr. Von Schrader continued, 73 of which provide in substance that the grantee of the franchise shall have the right to charge 5 cents and no more as fare for any distance over the road, while eighteen of them provide that the carrier shall not exact a fare in excess of 5 cents except upon a showing before a competent authority having jurisdiction over rates of fare, that such greater fare is justified. He said:

"It is conceded by all the parties involved in this litigation that the commission is vested with power to change the rates fixed in the various franchises and we contend that until the commission issues an order changing the rates, the rate named in the franchises must continue in force."

The railway can seek no relief in the courts, Mr. Von Schrader pointed out, unless it secures a change of the franchise rates by order of the state commission.

Woodward M. Taylor for the railway, after reciting the facts of the case, told the court that the corporation's chief argument was that the franchises did not amount to contracts. Mr. Taylor then took up the various franchises issued by the city and county and added that the city has never passessed the power to fix public utility rates by contract. He said:

"The grant of authority to contract away the police power must be in definite terms, and there is no such grant in either the civil code of California or the franchise acts or the city charters."

Under the constitution of the state the legislature cannot fix public utility rates by contract, Mr. Taylor added, nor delegate the power to a city so to do. Therefore, Mr. Taylor continued, where conditions are inserted in a franchise which a city has no right to impose, they are negatory.

Not one single witness for any party to the proceedings before the commission testified other than the fact that under the 5-cent fare the company's system was earning a return of less than 5 per cent on any theory of valuation. Mr. Taylor said:

"In conclusion, we reiterate that under the decisions of neither the Supreme Court of California nor of this court nor the pertinent provisions of the California code, franchise acts or the city charters, is there a grant of the right to the city to contract regarding the regulation of rates, either expressly or impliedly."

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Fare Hearings Resumed in Milwaukee

The Wisconsin Railroad Commission reopened on Oct. 15 and 16 fare hearings postponed in March to enable the interested parties to gather data desired by the commission and to permit the Milwaukee Electric Railway & Light Company to offer a definite fare plan. While there seems little disposition to deny that the company is entitled to an increase that will make the transportation department self-sustaining, there is discord among the municipalities involved.

The matter was brought to a head by the action of North Milwaukee in declaring for annexation to the city of Milwaukee in 1928. A strong factor in favor of this action by the electors was the expectation that they would automatically receive the city fares—now 7 cents cash and 6¼ cents by ticket (eight for 50 cents). The fares to North Milwaukee residents, however, include two zones at 3 cents each cash or 2 cents by ticket. It is the declared policy of the city to seek "one fare for one city" regardless of the extent of future annexations.

Certain of the wealthier suburbs opposed to annexation fear that if the annexed districts should receive a fare uniform with that of the city, the independent communities would have to bear an undue share of the metropolitan transportation cost.

The company is not taking sides in this matter, but is concerned solely with securing revenues that will produce the allowed rate of return on its transportation investment. In fact, it has offered to rebate in lower kilowatt-hour power rates any increases it may obtain from transportation.

The hearings opened with presentation of the city's case by Clifton Williams, special counsel. Various witnesses, including Mayor Hoan, contended that any fares adopted should be uniform for all of the city as a political unit, and that suburbs which refused to be annexed should be made to share a greater part of the expense of conducting transportation.

Among the witnesses for the company were: Ralph E. Moody, executive assistant, who presented the proposed schedule of 10 cents cash, six tickets for 50 cents and $1 weekly pass; Walter Jackson, fare specialist, who discussed the merits of the plan and the bases for the revenue and riding estimates; and R. H. Pinkley, assistant general manager, who, with Mr. Moody, discussed the rate base, allocations of revenues and expenses, etc.

On the plea of the non-annexationist suburbs that they needed more time to prepare, the commission granted a postponement to Nov. 11.

Promising Business Ahead for Evansville Lines

The Evansville & Ohio Valley Railway and the Evansville, Suburban & Newburgh Railway, Evansville, Ind., report that many of the large coal mines along their lines are getting ready to start on a better schedule. The Evansville & Ohio Valley Railway, as well as the Evansville, Suburban & Newburgh Railway, both own a large number of coal cars and other equipment, especially designed for handling business of this kind. At times these companies deliver as high as 40 and 50 cars of coal a day into the yards at Evansville.

During the past summer the Evansville & Ohio Valley Railway has greatly increased its passenger business by offering week-end excursion rates. This has enabled people in Evansville to spend the week-ends with relatives and friends at points along the line, and at a nominal charge. In addition to operating the railway from Evansville to Grandview, Ind., the company maintains a regular bus service between Evansville and Mount Vernon, Ind., and Henderson, Ky. The company also operates buses from Grandview to Cannelton, Ind., and to Owensboro, Ky.

COMING MEETINGS

Nov. 1—Metropolitan Section, American Electric Railway Association, New York.

Nov. 4—Transportation Group, American Institute Electrical Engineers, New York.

Nov. 6-7—Association of Electric Railway Equipment Men, Middle Atlantic States, Richmond, Va.

Nov. 7-8—Iowa Electric Railway Association, Operators Section, annual convention, President Hotel, Waterloo, Iowa.

Nov. 21-22—Public Utilities Association of Virginia, annual meeting, Chamberlain-Vanderbilt Hotel, Old Point Comfort, Va.

Dec. 2-7—National Exposition of Power and Mechanical Engineering (National Power Show), Grand Central Palace, New York City.

Jan. 23-24, 1930—Central Electric Railway Association, Statler Hotel, Cleveland, Ohio.

Jan. 27-29—Electric Railway Association of Equipment Men, Southern Properties, Birmingham, Ala.

Late News Briefs

Columbus, Ohio—In a speech for the Republican candidates for the Council, Dr. Howard Miller said he favors two crosstown railway lines, connecting North High Street and Cleveland Avenue. Benjamin W. Marr, president of the Columbus Railway, Power & Light Company, stated his company had considered only one of the two routes.

Baltimore, Md.—Sixty-four thousand words of argument for and against a 10-cent fare on the lines of the United Railways & Electric Company have been laid before the United States Supreme Court as the last step before the court hears the fare case later this month.

Richmond, Va.—A gold-colored street car of the one-man type, placed in service on its different routes by the Virginia Electric & Power Company in connection with the golden jubilee of light, attracted wide attention as it passed through the streets. The car, which took no passengers, carried a display of posters and replicas of the original Edison incandescent lamp. In addition to the illumination of Broad Street in gold from Twelfth to Jefferson Streets, arrangements were completed for a similar illumination on Hull Street during the period of Light's Golden Jubilee.

Chicago, Ill.—Twenty-five railway grade crossings along the Chicago & Northwestern steam railway and the Chicago, North Shore & Milwaukee electric railway in villages north of Chicago are to be eliminated immediately. The financing of the project will probably be undertaken jointly by the villages and the railroads. A bill passed by the last Legislature permits cities, towns and villages under 15,000 population to float bonds for grade separations. Several of these crossings are used daily by school children, a number of them carry much of the north and south traffic to and from Chicago, and virtually all of them are heavily traveled.

Lynchburg, Va.—Plans for a new carhouse, to be located at Thirteenth and Kemper Streets, will be submitted to the City Council on Oct. 28 for approval, following which the Lynchburg Traction & Light Company will erect modern buildings. The present carhouse site in Main Street has been sold for a theater. Removal of the carhouse from Main Street will mean the removal of a number of special tracks from Main Street and the substitution of a double track in that street from Sixth to Fifth Streets.

Boston, Mass.—James M. Curley, speaking in Dorchester, urged the removal of members of the Utilities Commission and said that if elected Mayor, he would work for making the commission an elective body. Rival candidate Mansfield said Curley's monuments are garages and gas stations in residential districts and declared he thought Mr. Curley is spending $500,000 in the campaign.

Richmond, Va.—Consideration of an appeal filed by the Piedmont & Northern Railway against the government, involving the company's proposal for extension of its lines in North and South Carolina, in all probability will not be given by the United States Supreme Court until December. The court first will consider the jurisdictional statements filed in other cases by parties seeking a hearing of an appeal similar to that of the Piedmont & Northern Railway. If the court approves these jurisdiction statements, which do not involve the merits of the contentions of opposing parties, it will then in all probability follow its customary procedure and set a tentative date for a hearing. On the final outcome depends the expenditure of between $15,000,000 and $20,000,000.

Indianapolis, Ind.—A new schedule for the livestock trains operated twice weekly between Indianapolis and Scottsburg, Ind., by the Interstate Public Service Company has started. The new schedule does not change the days of the week upon which the trips occur, but

Mule Car in Texas Round Up

OLD No. 1 mule car, which provided a de luxe mode of travel between El Paso, Tex., and Juarez, Mexico, in the early eighties, was featured in a pioneer parade which opened the Southwest Range Stock Show and Round Up held in El Paso during the last week of September. J. E. Lawless, master mechanic, El Paso Electric Company, was instrumental in having the old car entered in the parade. Mr. Lawless said that, like the covered wagon and the Concord coach, the old mule car is inseparably connected with El Paso's early history, a history typical of the spirit of the Old West.

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later loading hours benefit the shippers. Under the new schedule trains depart from Scottsburg for Indianapolis at 1 p.m. on Mondays and Thursdays. They arrive at Indianapolis in time to allow a feeding for the stock and a rest before selling. The trains carry livestock shipments in less than carload lots. Indiana farmers are loud in their praises of the company for this arrangement.

Sandusky, Ohio — The Ohio State Public Utilities Commission has directed the Lake Shore Electric Railway to erect automatic flasher signals at all grade crossings in Huron, Sandusky, Ottawa and Erie Counties within a year.

Louisville, Ky.—Judge Dawson's decision in the Louisville Railway fare case was incorrectly reported in ELECTRIC RAILWAY JOURNAL NEWS for Oct. 12, page 168, under the caption "Ten-Cent Fare Allowed in Louisville." The court stated its belief that an 8 per cent return was fair and reasonable. The misquotation in the JOURNAL was to the effect that Judge Dawson "believed an 8-cent fare was fair." A typographical error led to the critical misquotation.

Cleveland, Ohio — Peter Witt, independent in politics and former street railway commissioner, at the annual town meeting in the public hall, laid all land graft at City Manager William R. Hopkins' door, accused Van Sweringen of controlling the Cleveland Railway in the interests of the rapid transit system and real estate developments, and criticized President Hoover for the military parade with which he greeted Ramsay MacDonald, the "world's greatest pacifist."

Richmond, Va.—Installation of one-man safety cars by the Lynchburg Traction & Light Company will mean a new rule prohibiting smoking in the front vestibule of the cars. Passengers have been allowed to smoke on the pay-as-you-enter type of cars, in use for about two decades. The entire system is expected to be equipped with the new cars within a month.

Detroit, Mich.—The Department of Street Railways prepared fitting ceremonies to attend the opening of railway service between Detroit and the western section of Dearborn. An elaborate program in which all civic and official organizations participated was staged at Michigan Avenue and Mason Street, the western terminal of the new line. Scheduled service to this section of Dearborn, which is served only by the Detroit Motor Bus Company at present has now been fully started. Cars will operate on a twenty-minute schedule. The cars will use the rails formerly employed by the Detroit, Jackson & Chicago Railway, which discontinued service to Ann Arbor and Jackson a month ago. The municipal railway has been using these rails for the past year as far west as Schaefer Road in the eastern section of Dearborn, which was formerly Fordson, to serve employees of the River Rouge plant of the Ford Motor Company.

Denver, Col.—Valverde, a subdivision in the southwestern part of the city, has suggested to President Robertson of the Denver Tramway that he place buses in operation to connect with the Broadway tram cars at Alameda Avenue and the Barnum line at West Bayard and Hazel Court. Mr. Robertson is believed to regard the suggestion as one which has real merit.

Montreal, Que.—Problems regarding the needs of the South Shore communities in the matter of transportation were discussed at a recent conference at which the Montreal Tramways, the Provincial Transport Company, and the South Shore Transportation Commission, were represented. The entire question of the feasibility and advisability of bus or combined bus and electric rail transportation for the communities concerned was discussed, and it was decided that there should be a further conference of the same representatives, together with the Montreal Harbor Commission, and the Canadian National Railways.

Evansville, Ind. — The Evansville & Ohio Valley Railway has awarded a contract for the erection of a modern frame garage on company property on East Fourth Street, Mount Vernon, site of the present carhouse. The new structure will be on the alley south of the present building.

Foreign News

Traffic on Paris Subway Bus and Street Car Lines Increases

During the last fiscal year the surface transportation lines of Paris carried 1,073,562,531 passengers, averaging 2,933,230 per day. The total number carried showed an excess over the previous year of 56,102,231, or a daily increase of 153,285 passengers.

Buses carried 342,868,520 passengers per year, the street cars 725,563,463, and the river boats on the Seine 5,130,348 passengers.

Total receipts reached the figure of 661,574,950 francs, or 38,608,142 francs more than the previous year.

Merger of Paris Underground Railway

The two individual operating companies of the Paris underground system, the Compagnie Métropolitaine and the Compagnie Nord-Sud, which have heretofore operated as separate units with transfer facilities, have been merged into a single company.

The Nord-Sud Company receives 106,877 fully paid Métropolitaine shares of 250 francs each, to be apportioned to its shareholders at the rate of two shares for five Nord-Sud shares.

The fusion of the two companies is to become effective on Jan. 1, 1930. The Nord-Sud produced a net profit of 5,672,536 francs last year.

Piccadilly Circus Old Station Closed—Midland Gets New Cars

Traffic at the new Piccadilly Circus Station of the London Underground, which opened in December last, is now at the rate of 33,000,000 passengers annually and is still growing. The figures for the first six months show an increase of over 2,000,000 passengers and 5,000,000 have used the slot ticket machines, of which there are 35. Meanwhile, the old Piccadilly Circus Station has closed to traffic. This was on July 26. In consequence the new station now supports the full load of traffic at this busy interchange point. The old station with its eight lifts has been in service since December, 1907.

An order for 30 40-ton (long ton) side-discharging freight cars has been placed by the London, Midland & Scottish Railway for use in connection with its electrified line. The cars have been designed for the experimental conveyance of coal in bulk between certain collieries and the railway's power station at Stonebridge Park, which supplies current for the Watford electrified lines. A train of twelve of these cars, which have a capacity of 1,794 cu.ft., and are self-discharging, can be emptied and cleared in about 30 minutes. The cars will be 32 ft. long, 8 ft. 11 in. wide, and 10 ft. 9 in. high. When they are empty they will weigh more than 22 tons.

Electrification of Great Britain's Trunk System Ahead

That the government plans to electrify the whole trunk railway system throughout Great Britain as a means of relieving unemployment is suggested by an announcement on Sept. 7 that a committee, of which Lord Weir of Eastwood is chairman, has been appointed to report on the possibilities of the scheme. Lord Weir presided over the committee whose report led to the establishment of the British Central Electricity Board. He will be associated in the present inquiries with Sir Ralph Wedgewood and Sir William McLintock, who has advised the government in many matters connected with electrical undertakings. In London it is said that Mr. Thomas wants Sir Henry Thornton to come to England as railway adviser of the government. Sir Henry is now president of the Canadian National Railways.

Simplon Work Satisfactory

The Simplon Tunnel probably will be fully electrified by next May. The Swiss are working on this project on their side of the border and are said to be making satisfactory progress. The present line had to be lowered as much as 40 cm. in some places to permit running the load wire overhead. To prevent the danger of induction, all telegraph and telephone lines were encased in a cable and run along the track underground. The completion of this electrification will provide for quicker service over the line and the elimination of the stop at Iselle to change locomotives.

Bombay, India — The American & Foreign Power Company is understood to have paid about $1,400,000 for its 50 per cent interest in Tata & Sons, Ltd., which manages the Tata hydro-electric power companies that supply the bulk of power to the Bombay Lighting & Tramways Company and to the Great India Peninsula Railroad and the Bombay Baroda Central India Railroad.

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Recent Bus Developments

Fifteen New Buses for Richmond

Fifteen new Twin Coaches are now being placed in operation in Richmond, Va., by the Virginia Electric & Power Company. Concurrent with their installation a new system of transfers for use of passengers transferring from street cars to buses has been devised for immediate use. Passengers on street cars who also desire to take a bus will ask for a bus transfer in the future, and pay an extra cent on boarding the bus, as at present. The terms under which transfers will be issued from street car to street car will remain the same.

The new Twin Coaches will increase the number of vehicles of this kind in Richmond to twenty. They will arrive one or two a day until the full complement has been received.

In addition to the fleet of fifteen for Richmond, ten buses of the same type have been purchased for use in Norfolk by the Virginia Electric & Power Company. Delivery of this lot has already commenced.

Five Additional Buses in Service in Knoxville

The five new 23-passenger buses purchased by the Knoxville Power & Light Company, Knoxville, Tenn., have been placed in service over four routes supplementary to the present street car service. The extra machines will be used in case of emergency and during the rush hours. Work on streets over which the North Lonsdale route was to operate delayed beginning of service in that section. This route connects with the Lincoln Park car line and continues out Central and thence out Texas Avenue, a round trip of 3.8 miles.

The Beaumont bus route connects with the Lonsdale street car at both ends of the bus line, Alexander Park and Clinton Pike. The bus takes the shorter and more direct route.

The other two lines operate on Sevierville Pike from the intersection of the Island Home and Sevierville Pikes to the city limits, and on Washington Pike.

No additional fare is charged for travel in the buses. Weekly passes, car tokens costing 30 cents for five, or the cash fare of 10 cents, may be paid. Transfers from street cars to buses or from buses to street cars are honored.

Co-Operation of Interstate Operators Sought in Washington

In an effort to relieve congestion in the business section, the District of Columbia Public Utilities Commission sounded out representatives of the interstate bus lines operating out of Washington, at an informal conference last week, on the degree of co-operation which they are willing to extend in changing their present routes through the city, so as to minimize interference with the city's traffic.

The bus operators and their representatives were also asked to consider the establishment of one or two central bus terminals in place of the many small waiting rooms now maintained. The commission's purpose was to acquaint the bus lines with the situation as it exists in the hope that by co-operation, steps to bring about an improvement can be worked out. There was no reference to the commission's power, or intention if it has the power, to compel rerouting.

California's Regulatory Bus Requirements Under Review

Of interest to the operators of stage lines, and particularly so to railway operators with bus lines, is the preparation by the California Railroad Commission of a proposed set of rules and regulations governing the operation of automobile equipment by all certificated carriers.

Under the Auto Stage and Transportation Act the commission has had jurisdiction over stage lines since May 10, 1917, but it was not until 1927 that, through amendments to the Public Utilities Act, stage and bus operations were made full-fledged public utilities in California. It at once became apparent that previous regulations of stage operations under the auto stage and transportation act were in need of revision, particularly with regard to urban bus operations of the electric railways.

The matter has been set for hearing some time after Sept. 16, 1929, and a general order will be issued by the commission making the regulations formally effective.

Several items in the proposed regulations cause concern among railway operators. Among these is the proposed regulation prohibiting the collection of fares, making of change, etc., by operators of buses while the vehicle is in motion. It is feared that this will tend to slow up schedules on urban lines. No standees are permitted except in vehicles with head room in excess of 6 ft. 4 in., which is greater than all standard equipment at this time. Hours of labor by bus operators are limited to ten hours in any 24-hour period, with a twelve-hour spread. This would require the adjustment of many street railway schedules. Many mechanical requirements also are contemplated, such as heating of buses in cold weather, specified types of mechanical brakes, etc.

Rochester, N. Y.—In the wholesale changes made by the New York State Railways recently in its bus lines here, interurban bus lines to Hornell, Holcomb and Sodus Bay remain the same, except that Sodus Bay buses now operate from the bus terminal at South and Broad out South Avenue to Monroe Avenue, Chestnut, East Avenue to Culver Road, Empire Boulevard and thence to Float Bridge and on to Sodus, paralleling the route of the abandoned Rochester and Sodus Bay electric line. Sodus Bay buses, instead of turning north at Wallington, as the street cars did, go on through to Alton, thence to Sodus Point by way of the new concrete highway.

Springfield, Mass.—That the Springfield Street Railway is fully alert to the opportunities for merchandising its service is instanced by a plea to its employees, in part as follows: "Now that the World's Series for 1929 is a thing of the past, reminding you that the summer months are about gone, churches, societies and lodges have started fall and winter activities. It is to your advantage to endeavor to secure whatever special party business you can either by speaking to the chairman of the committee in charge of such activities if you are personally acquainted with him or her, or through some friend of yours. Football trips are now in order and soon basketball trips and hockey trips will be. There is a big field to work on, boys, and we are sure you can help us bolster up our special motor coach business."

Baltimore, Md. — Coincident with another bus accident on Washington Boulevard, in which two persons were injured when the vehicle hit a telegraph pole, the Public Service Commission announced that inspection of buses operated by nine companies throughout Maryland revealed that they are in faulty operating condition and did not comply with commission rules.

Greensboro, N. C.—The proposal to substitute buses for the present railway service on North Elm Street, between Church Street and Irving Park, took definite form at a conference of a special committee from the City Council, officials of the North Carolina Public Service Company, City Manager P. C. Painter and other interested parties. A route for the buses has been worked out which will be submitted in a written report of the committee to the Council.

Atlanta, Ga.—To meet the increasing need of reliable transportation in the fast-growing northeast section of the city and to furnish transportation to the new Morningside school, the Georgia Power Company has extended both the Virginia Avenue and the Morningside coach routes and increased the service on both lines.

North Adams, Mass.—The Berkshire Street Railway has petitioned for two new bus lines in North Adams. One line is to operate over Marshall and Houghton Streets to the Clarksburg line and the other over Eagle and North Eagle Streets with a trip to the North Adams Hospital. The company plans to maintain the trolley terminal at the Boston Store on Main Street. A single bus could be used for either run on a fifteen-minute headway. At the time time the City Taxi Service, Inc., has petitioned for authority to operate bus lines on East Quincy Street, Park Avenue and through the eastern section with a route covering Veazie Street and also streets in the northern section.

Richmond, Va.—An ordinance permitting removal by the Virginia Electric & Power Company of its street car tracks from portions of Laburnum and Chamberlayne Avenues and Hermitage Road, and the substitution of bus service has been approved by Mayor Bright, following its passage by both branches of the City Council.

Summit, N. J.—It is expected that the new Summit garage of Public Service Co-ordinated Transport will be ready about Nov. 1. The structure will be of cement block, with stucco veneer, steel trusses and concrete floor. It will house about sixty buses. There will also be an up-to-date repair shop and boiler room. Offices for executives of the Morris division and a room for operators will be located in the building.

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Financial and Corporate

Debt Scaled Down

Fixed Interest Payments of Indiana Interurban to Be Cut $118,526 a Year Under Reorganization

A PLAN for the reorganization of the Chicago, South Bend & Northern Indiana Railway has been prepared and adopted by the bondholders' protective committee, constituted under the deposit agreement dated July 21, 1927, for the first mortgage 5 per cent 30-year gold bonds of the Chicago, South Bend & Northern Indiana Railway, the La Porte & Michigan City Traction Company 5 per cent 25-year first mortgage gold bonds and the Northern Indiana Railway first consolidated mortgage 5 per cent gold bonds. It is intended by the reorganization to accomplish:

1. Termination of the receivership as soon as the reorganization can be consummated.
2. Recapitalization of the railway system on a conservative basis as between bonds and stocks.
3. Reduction of funded debts from $4,415,000 to $1,959,000 and adjustment of $598,000 arrears of interest, a total reduction of debt in the amount of $3,054,000.
4. Reduction of annual interest charges from $220,750 to $102,214 on the funded debt outstanding on consummation of the reorganization.
5. Creation of a new mortgage, subject only to $426,000 of underlying bonds outstanding, to provide, among other things, for refunding such underlying bonds, at their extended maturity, and for new capital requirements from time to time.
6. Provision of approximately $100,000 of new money by bondholders or underwriters for the purpose of the new company and of effecting the reorganization.

The following underlying bonds, now outstanding, on which interest is not in default, are to be extended in the reorganization for six years at 6 per cent per annum on payment to the respective holders thereof of $10 with respect to each $1,000 bond:

Indiana Railway's first mortgage 5's due 1930, to be extended to 1936	$588,000
La Porte & Michigan City Traction Company 5's	$312,000
Chicago, South Bend & Northern Indiana Railway first mortgage 5's	$3,089,000

The plan contemplates the foreclosure only of certain mortgages.

The properties of the Chicago, South Bend & Northern Indiana Railway have been in the hands of Raymond R. Smith as receiver since July 9, 1927. The properties of the Southern Michigan Railway have been in the hands of Raymond R. Smith and L. V. Bower as receivers since April 25, 1928.

The Chicago, South Bend & Northern Indiana Railway owns and operates lines of interurban railway extending from South Bend to Mishawaka, Elkhart, Goshen, La Porte and Michigan City, and railway lines in the cities of South Bend, Mishawaka, Elkhart and Michigan City, a total of 125 miles. The company was incorporated Feb. 1, 1907, acquiring by purchase all of the railway properties and franchises of the Northern Indiana Railway, successor of the Indiana Railway, with which the La Porte & Michigan City Traction Company had previously been consolidated, and assuming the funded debt of these companies. The Southern Michigan Railway owns and operates an interurban line between South Bend, Ind., and St. Joseph, Mich., with 35 miles of track. The lines of the Southern Michigan Railway prior to receivership were operated by the Chicago, South Bend & Northern Indiana Railway pursuant to trackage agreement.

Albany-Hudson Line Would Liquidate

Abandonment by the Eastern New York Utilities Corporation of its street and interurban line between Hudson and Rensselaer, N. Y., is sought in an application filed on Oct. 18 with the Interstate Commerce Commission. The line is approximately 35 miles long between terminals and carries both passengers and freight. The company operates passenger service into Albany over the tracks of the United Traction Company.

The company proposes to liquidate. The line is not in receivership but it sustained a deficit in operating income of $51,173 in the first eight months of 1929 and of $62,098 in 1928. Continued operation would subject the line to heavy expense for improvements. The reduction in traffic is ascribed to private automobile and bus competition and to improvement of the state highway which parallels the line.

The corporate predecessors of the present company were the Albany Southern Railroad, the Albany & Hudson Railroad, and the Albany & Hudson Railway & Power Company. Service over the road was begun in 1900. A hearing is desired on the application to abandon operation of the line, in the event that the commission decides that it has jurisdiction.

Westerville, Ohio—The Village Council has approved the discontinuance of railway service between Westerville and Columbus. The Columbus Railway, Power & Light Company, which furnished the service, asked the Public Utility Commission for a discontinuance several weeks ago. The request of the company for control of bus service between the village and Columbus was rejected. The Buckeye Stages proposes to furnish hourly service during the day, and 30-minute service in the mornings and evenings.

Philadelphia, Pa. — The Philadelphia Rapid Transit Company spent $322,829 in a futile fight for control of the Philadelphia Electric Company, in battle against the Conowingo Dam project and in other power activities, and then charged the expenditures to "road and equipment," Dr. Milo R. Maltbie declares in a report submitted to City Comptroller Hadley.

Springfield, Ohio — The property of the Indiana, Columbus & Eastern Traction Company is to be offered at a receiver's sale in Springfield on Nov. 12, according to an announcement by the law firm of Martin & Corry on Oct. 23. J. Harvey McClure, Dayton, is receiver. A bid already made on the property by the Cincinnati, Hamilton & Dayton Railway of Dayton is expected to be accepted. The sale is a technical move to complete the transfer of the lines to the Cincinnati, Hamilton & Dayton Railway, now operating through service from Cincinnati to Columbus and Toledo.

Conspectus of Indexes for October, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

ALBERT S. RICHEY
Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	Oct. 1929 **7.76**	Sept. 1929 **7.76**	Oct. 1928 **7.66**	June 1929 **7.76**	Oct. 1924 **7.22**
Electric Railway Materials* 1913 = 100	Oct. 1929 **145.6**	Sept. 1929 **145.2**	Oct. 1928 **144.9**	Dec. 1926 **159.2**	Feb. 1928 **139.5**
Electric Railway Wages* 1913 = 100	Oct. 1929 **231.1**	Sept. 1929 **231.0**	Oct. 1928 **229.9**	Oct. 1929 **231.1**	Oct. 1924 **220.6**
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Oct. 1929 **203.0**	Sept. 1929 **203.4**	Oct. 1928 **205.5**	Nov. 1928 **205.7**	July 1929 **199.0**
Eng. News-Record Construction Cost (General) 1913 = 100	Oct. 1929 **206.3**	Sept. 1929 **207.6**	Oct. 1928 **207.7**	Jan. 1927 **211.5**	Nov. 1927 **202.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	Sept. 1929 **97.5**	Aug. 1929 **97.7**	Sept. 1928 **100.1**	Nov. 1925 **104.5**	April 1927 **93.7**
Bradstreet Wholesale Commodities 1913 = 9.21	Oct. 1929 **12.70**	Sept. 1929 **12.67**	Oct. 1928 **13.13**	Dec. 1925 **14.41**	July 1927 **12.38**
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	Sept. 1929 **160.8**	Aug. 1929 **160.2**	Sept. 1928 **157.8**	Nov. 1925 **167.1**	Oct. 1924 **148.7**
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	Sept. 1929 **163.2**	Aug. 1929 **162.9**	Sept. 1928 **163.4**	Nov. 1925 **171.8**	April 1929 **159.3**
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	Sept. 1929 **135.8**	Aug. 1929 **128.2**	Sept. 1928 **134.5**	Feb. 1929 **140.4**	Oct. 1924 **92.3**
Bank Clearings Outside N. Y. City 1926 = 100	Sept. 1929 **109.8**	Aug. 1929 **111.7**	Sept. 1928 **105.7**	Aug. 1929 **111.7**	Oct. 1924 **87.7**
Business Failures Number	Sept. 1929 1326	Aug. 1929 1350	Sept. 1928 1348	July 1929 1591	Sept. 1928 1348
Liabilities (Millions)	**26.04**	**35.63**	**23.13**	**102.09**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 136 of the largest street and interurban railways operated in the United States, weighted according to the number of such men empioyed on these roads.

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Book Reviews

Oxy-Acetylene Welder's Handbook

By M. S. Hendricks. Published by the Acetylene Journal Publishing Company, Chicago, Ill. 208 pages, 4½x6½, 102 illustrations, flexible binding. Price $3.

Here is a working manual of instructions for oxy-acetylene welders which covers the fundamentals of oxy-acetylene welding in a clear and helpful manner. The important operating factors involved in welding are discussed principally from the standpoint of welding on steel. However, the book has complete information regarding the correct technique for welding other ordinary metals, such as cast iron, aluminum, copper, brass, bronze, nickel, monel metal and alloy steels. The subject of the design of welds is discussed in detail and well-illustrated. The conclusion of the chapter on testing welds is a discussion of the factors involved in a complete welding operation, included as a guide to the welder or supervisor in setting up a standard of good practice or in checking up a welding operation to make sure that no detail of good procedure or organization of the work has been neglected.

The Financial Post Year Book of Canadian Business

Published by Canadian *Financial Post*, Toronto, Ont.,—200 pages—price $2.

Here is a well-chosen array of Canadian business facts and figures which will serve as a ready reference guide to Canadian business. There are chapters on insurance, trust and loan company, taxation in Canada, trading with foreign countries and surveys of industries.

Universal Directory of Railway Officials. Published by the Directory Publishing Company, Ltd., London. 8⅝ in. x 5½ in. x 1 in. Price 20s. net.

The 35th annual edition of the Universal Directory of Railway Officials has now been issued. It has been compiled chiefly from official sources, under the direction of the editor of *The Railway Gazette*.

The Directory is divided into eleven sections arranged as follows: Official, Great Britain, Ireland, Europe, Asia, Africa, Australasia, North America, Central America, Mexico and West Indies, South America, and Personal Index of Railway Officials.

Many engineering firms doing business with railways use the Universal Directory of Railway Officials in connection with correspondence as a ready means of finding the right railway and the right officer at the right moment.

Capital Stock Without Par Value

By John R. Wildman, of Haskins & Sells and Welden Powel; published by A. W. Shaw Company, Chicago; 546 pages; price, net $5.

Writing from wide study of the actual application and practical operation of the varying statutes in some 40 states, the authors of this work have aimed throughout to clarify the conflicting concepts of no-par shares and to square them up with the accepted principles of accounting and sound business management. They describe specifically and definitely the pivotal points to consider in originally issuing no-par stock; determination of capital value, effect on capital account, marketing no-par shares, and so on, to mention but a few. How to handle stock subscriptions, donated stock, the results of acquiring own stock and the relation of no-par stock to surplus are plainly told.

Frontiers of Trade

By Dr. Julius Klein, now Assistant Secretary of Commerce, with a foreword by Herbert Hoover—The Century Company; 328 pages; price $2.50.

In this book on the development of American trade and commerce Dr. Klein points out the revolutionary changes which have taken place during the present decade—"practices, methods and ideals, all of which were once 'normal,' but which today are the most useless relics of antiquity," the result of "advancing machine technique, of superorganization and management, engineering and equipment efficiency." Dr. Klein expresses the feeling that while the European international cartels have not been so successful as had been hoped, yet "there can be no question that the cartel is at least a moderate improvement over its possible alternative, ruthless competition, especially with reference to intra-European trade."

Economic changes since the war are set forth and conclusions drawn that a "return to pre-war normalcy is but idle chatter." "Entirely new methods, new conditions and new results" have been attained which make "utterly impossible any reversion to the industrial medievalism of pre-war years."

The author then turns to a contemplation of the prevailing obstacles to international trade and the efforts being made to remove them. He discusses trade barriers with their vexations and oftentimes irritating classifications; raw material control by foreign nations; the outlook for agricultural products in Europe; and American investments abroad.

Methods of Compiling Statistics of Railway Accidents

Published by the World Peace Foundation, 40 Mount Vernon Street, Boston, Mass. Price 50 cents.

In an effort to establish identical criteria to be applied in compiling uniform and comparable railway accident statistics throughout the world, the International Labor Office has just published a report based on existing systems in 21 countries. Underlying principles of classification, the experts find, are much the same in most countries, but specific groups do not coincide sufficiently to allow a satisfactory comparison. After a thorough analysis of methods used, the authors of the report have embodied their main criteria in a comprehensive classification scheme, based on fundamental principles already employed in the countries studied. The report as a whole is confined to the industrial risks of railway employees only, and deals specifically with the problem of eliminating incomparability. The main sources of variations appear to lie in the methods of defining reportable accidents and casualties, of demarcating industrial railway risk, of calculating exposure, and of making classifications by causes.

Music in Industry

By Kenneth S. Clark; 384 pages; published by the National Bureau for the Advancement of Music; price, $3.

Testimony is included in Mr. Clark's volume which presents a study of the type and extent of various uses of music in industry—the results of a survey made by the National Bureau for the Advancement of Music. Statistics presented in the book explain that musical activities are carried on in 679 industrial or commercial establishments in the United States. From the plants represented there are recorded a total of 267 bands, 182 orchestras, and 176 choruses—besides 133 plants where there is group singing and 273 which provide musical instruments for their employees.

Railroads lead the procession as to the number of operations from which musical activities are reported with a total of 115. Electric companies report 38, and street railways 15.

In discussing the benefits of music in industry, the author presents testimony from employers declaring that it has been found to increase production, provide a common meeting ground for executives and the working force, improve the morale of workers, cut down labor turnover, counteract the monotony and fatigue of the job and act as good-will advertising.

In the chapter entitled, "What Experience Has Taught," the author presents an interesting discussion of the power of music to lessen fatigue.

German Railroad Calendar

Published by the Publicity Department of the German Railway System, Berlin.

This calendar, in which three pages are devoted to each week, is issued primarily to advertise the service given by the German railways. There are one or more illustrations on each page, principally views of picturesque points along the lines, but considerable technical data are also included.

Several pictures are published showing views along electrically-equipped lines. These are supplemented with statistics of the length of lines equipped. Thus, at the end of 1928, of the 5,300 km. of railway lines in Germany, 1,554 km. or 2.92 per cent, had been equipped with electric power. Of this mileage, 1,287 km. were long-distance lines and 267 km. were city and suburban lines. The latter included the suburban system of Berlin. This percentage of electrically-equipped lines compared with 2.06 per cent in England, 2.29 per cent in France, 6.60 per cent in Italy, 8.66 per cent in Austria, 7.52 per cent in Sweden, and 0.71 per cent in the United States. The views also include a series of maps of different portions of the railway system, showing by the width of lines the daily traffic carried over each route.

A view is given of the first train over the Berlin Suburban System, which was put in operation on June 9 of last year. The electrical trains on this system are made up of one, two, three or four units, each unit consisting of a motor car with four motors and a trailer. At the end of 1928 the equipment consisted of 345 such units. The material used in car body construction is silicon steel, making the car, it is said, the lightest rapid transit car in the world for its carrying capacity.

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Personal Items

World Honors Thomas A. Edison

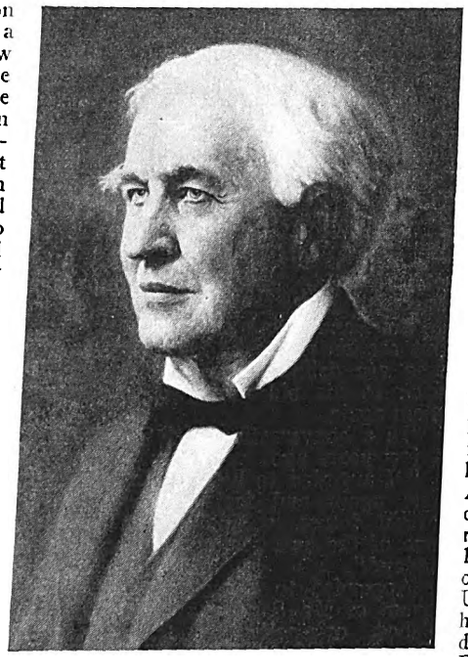
Wizard of Menlo Park Re-enacts Birth of Incandescent Lamp Amidst Surrounding of 1879 Re-created by Henry Ford While President Hoover and Leaders of Industry Stand By

THE hands of time were set back on Oct. 21 in Dearborn, Mich., that a venerable old gentleman might renew the scenes of his youth and receive the homage of mankind. It was the dramatic climax of Light's Golden Jubilee, when, in the presence of a distinguished gathering of men prominent in all walks of life, Thomas Alva Edison returned to his shop, his laboratory and his boarding house of 1879 in Menlo Park, New Jersey, now transplanted and restored as the shrine of his genius by his friend Henry Ford.

In this little village, now called Greenfield, which will become part of the laboratory of the Edison Institute of Technology, there gathered that day 500 guests of Mr. Ford, come to pay tribute to the grand old man of electricity on this the 50th anniversary of the invention of the first commercially practical electric incandescent lamp. In addition to the leaders of the electrical industry there were men eminent in science, art and education—a brilliant gathering of notable Americans.

Mr. Ford's house guests, including Mr. Edison, puffed in on the old Grand Trunk train. They were met and driven about the village in old-time horse-drawn carriages in the manner of 1879. The day of tribute to the giver of the light closed with a ceremony that will never be forgotten by any who were privileged to be present. On the lower floor of "Independence Hall" (an enlarged reproduction of Independence Hall in Philadelphia), which is to form the central museum of the Edison Institute, the guests of Mr. Ford sat down to dinner. At 7:30 p.m., Mr. Edison, President Hoover, Mr. Ford, Owen D. Young and a small party left the hall and drove to the laboratory building and there re-enacted the lighting of the lamp. At the conclusion of the re-enactment of the historic scene the party returned to Independence Hall, where Owen D. Young, acting as toastmaster, introduced W. S. Barstow, president of the Edison Pioneers; Mr. Ford, Mr. Edison and Albert Einstein (over the radio from Germany) for short addresses.

Next in importance to the celebration at Dearborn was that at Menlo Park, N. J., birthplace of the incandescent lamp and hence of the electrical industry. Here assembled about fourteen of the Edison Pioneers who had been unable to make the trip to Dearborn, as well as two sons and a daughter of Mr. Edison. The main event was the illumination of a cluster of 800 individual lamps mounted on a 100-ft. tower so as to form a lighting unit 18 ft. high, with a smaller lamp at the foot of the tower—a reproduction of the original Edison lamp—which is to burn perpetually.



Thomas A. Edison

This installation was made by the Edison Lamp Works. The lights came on when Mr. Edison touched a button at Dearborn. Former Governor George Silzer made an address, and the Dearborn program came through the loud speakers.

J. B. Hayes Returns to Nova Scotia

J. B. Hayes has resigned as manager of the Norfolk division of the Virginia Electric & Power Company, to become connected with the Nova Scotia Light & Power Company, Halifax, Nova Scotia. Thus it is back to the old home town for "Bert" J. Hayes, who has been seeing America first with Stone & Webster, Inc. In that noted organization Mr. Hayes had progressed rapidly to the job of superintendent of transportation at Norfolk, Va. Undoubtedly, greater things were in store for him, but the pull of home overcame the lure of years of pleasant association and future promotions.

Mr. Hayes is returning to Halifax as "the boy who made good"—so good, in fact, that he goes back to his own people as general manager of the Nova Scotia Light & Power Company. To this position he brings much more than the advantages of nativity in conducting a public service. Mr. Hayes' mind is essentially that of the student and analyst.

On taking over a given job, he has never been content to accept the old routine for granted. "Why?" is the favorite word in his lexicon. Whether he was checking up a budget for every department of a large organization or analyzing the travel habits of street railway and bus patrons, the spirit of thoroughness was always there. In his new work, Mr. Hayes will have greater opportunities to put this faculty to work.

Mr. Hayes formerly was assistant to the president of the company in Virginia, and during his occupancy of that office was located at Richmond.

Wendell W. Willkie Joins New York Law Firm

Wendell W. Willkie, connected with the Northern Ohio Power & Light Company, Akron, Ohio, as general counsel, has become associated with John C. Weadock and Bernard F. Weadock under the name of Weadock & Willkie, with offices in the Chase National Bank Building, New York City. Mr. Willkie was one of the speakers before the American Electric Railway Association at the session at Atlantic City, on the morning of Sept. 30.

Mr. Willkie was born in Elwood, Ind., on Feb. 18, 1891. His boyhood was spent there, and he was graduated from the Elwood High School in 1909. His father, Judge H. F. Willkie, practiced law in Elwood for more than 40 years, and early in life the son began the study of law in his father's office. After finishing high school he spent one year at Culver Military Academy. He then took the arts and law courses in the State University of Indiana, receiving his A.B. in 1912 and LL.B. in 1915. Between these two courses he spent one year in the arts course at Oberlin. Upon being graduated from the law course he was admitted to the bar in Ohio, Indiana and New York. He is a member of Beta Theta Pi, Phi Delta Phi fraternities. He continued as his father's law partner in Elwood until April, 1917, when he enlisted in the World War service. He was commissioned an officer in the field artillery and saw service in France. He was mustered out of Camp Sherman on March 1, 1919. He went to Akron a month later and became a member of the staff of the legal department of the Firestone Tire & Rubber Company. On Jan. 1, 1921, he became a member of the firm of Mather, Nesbitt & Willkie.

Mr. Willkie has specialized in corporation law, representing among others the Northern Ohio Power & Light Company and the Erie Railroad. His association with John C. and Bernard F. Weadock, under the name of Weadock & Willkie in New York City dates from Oct. 1.

C. W. Reeve Managing Director of A.E.C.

C. W. Reeve, who has been acting as assistant to the chairman of the Associated Equipment Company, London, England, has been elected to the board and appointed managing director of the company.

Mr. Reeve joined A.E.C. as works accountant in March, 1915. The following year he became accountant and two years later, joint manager. His next appointment was that of chief purchasing and stores superintendent for the underground group of companies. This position he held from 1924 to 1928.

Mr. Reeve was a member of the coun-

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cil of the Motor Transport Association from 1920 to 1923, and was president of that body in 1922 and 1923. He was on the council of the Society of Motor Manufacturers and Traders from 1920 to 1924.

In his earlier business life, he saw service with the Premier Gas Engine Company at Sandiacre, Derbyshire, and was for three years with the British Westinghouse Company at Trafford Park, Manchester. In 1913 he joined John Wright & Eagle Range, Ltd., of Aston, Birmingham, and remained there until 1915, when he joined the A.E.C., then at Walthamstow.

F. C. Chambers With Cedar Rapids Property

F. C. Chambers, president of the Des Moines City Railway, Des Moines, Iowa, from 1921 until the receivership sale of the property in June of this year, has been appointed general manager of the Iowa Railway & Light Corporation with headquarters at Cedar Rapids, Iowa.

As noted in the JOURNAL NEWS of Oct. 12, Mr. Chambers will have charge of the

F. C. Chambers

operation of all of the properties of the corporation, which serves approximately 200 cities and towns of Iowa. It supplies electricity, gas and steam heat. The organization also operates more than 800 miles of bus lines in eastern Iowa, and 43 miles of interurban railway. It serves a constituency of about 300,000 people.

In the rehabilitation of the physical property of the Des Moines City Railway following the granting of the 1915 franchise, Mr. Chambers's efforts played an important part. It was the reputation that he made here and in his later work that led to his advancement to the post of operating head in 1922. Mr. Chambers has ever been alert to keep abreast of the latest engineering practices. He was one of the very first, for instance, to see the possibilities of the automatic substation. It was largely the early record of performance of the Des Moines installation that helped the quick spread of the automatic substation idea.

Mr. Chambers entered the electric railway field in 1896, in power house work for the Adrian Light, Heat & Power Company, Adrian, Mich. In 1901 he went to Rome, N. Y., as chief engineer for the Rome Gas & Electric Company. He left Rome in 1905 to become electrical engineer for the East St. Louis & Suburban Railway. From 1908 to 1911 his position was superintendent of power for the Springfield (Ill.) Consolidated Railway. In 1911 Mr. Chambers went to Chicago, where he became superintendent for the County Traction Company, now known as the Chicago & West Towns Railway. He remained with the company until 1913, when he went to Des Moines.

H. L. Sanders Honored in His Home Community

Henry L. Sanders, former president of the Cincinnati Car Company, was the subject of the following item in the Beaufort, S. C., *Gazette*, of Oct. 10:

"Henry L. Sanders, who spent his boyhood days in Beaufort, resigned his position as president of the Cincinnati Car Corporation on Sept. 25, after being in active service for the past 25 years, and returned to his old home where he will spend the rest of his life on his large plantation at Chisolm.

"Mr. Sanders began his career as pay clerk at the Naval Station at Parris Island, and after going to Cincinnati he rose to the top in bounds and leaps. He was considered one of the outstanding financial heads in the country, and was held in the highest esteem by all who knew him in a business and social way.

"Mr. Sanders is a large land owner in this section where he has many friends who are delighted to have him come back to his old home to live among them again.

"In a conversation Mr. Sanders said a few years ago:

" 'I am glad to be back in old Beaufort again and feel that we have a bright future in this section, as it is one of the best sections of the country today.' "

Appended to the story was the account of Mr. Sanders's retirement published originally in the Cincinnati *Enquirer* of Sept. 26.

M. B. Bracken Claim Agent in St. Louis

M. B. Bracken has been appointed claim agent of the St. Louis Public Service Company, St. Louis, Mo., to succeed Charles B. Hardin, resigned. Mr. Bracken has been connected with the claim department of the St. Louis company and its predecessors since 1897, in which year he was graduated from St. Louis University. Thus he has seen service in all branches of claims work with the St. Louis Transit Company, the United Railways and the St. Louis Public Service Company. When Mr. Hardin was made general claim agent, Mr. Bracken was made assistant general claim agent. He was admitted to the bar in St. Louis in 1905.

Ross F. Hayes, who during the past five years has been engaged as manufacturers' agent, railroad supplies, at New York, has become connected with the Adams & Westlake Company as representative in charge of eastern sales of Rex car specialties. Mr. Hayes was formerly for many years with the Curtain Supply Company as eastern manager at New York, and later as general sales manager at Chicago. The Curtain Supply Company was consolidated about two years ago with the Adams & Westlake Company at its eastern office, 50 Church Street, New York.

C. H. Forsgard a Factor in Toledo Rehabilitation

Charles H. Forsgard, who was made acting general manager of the Community Traction Company, Toledo, Ohio, following the recent resignation of J. Frank Johnson as vice-president and general manager, came to Toledo two years ago as general superintendent. In that post he has played an increasingly important part in the work of rehabilitating the company, following the revision of the terms of the Milner service-at-cost grant under which the company operates.

Mr. Forsgard's experience has been wide. He joined the Houston Light & Power Company, Houston, Tex., in 1915 and later had charge of ice and power plant operations for an operating company. In 1918 he became associated with Westinghouse, Church, Kerr & Company, in the operation of electric and railway services in Colorado. The company in Colorado subsequently was taken over by Henry L. Doherty & Company in 1921 and for the last eight years Mr. Forsgard has been associated with Doherty enterprises. He was in railway work at Durham, N. C., before he went to Toledo two years ago.

Mr. Johnson plans to enter another field

C. H. Forsgard

of utility work in the Southwest. He has been with the Doherty organization ever since he came to Toledo from the University of Wisconsin as junior engineer in 1916. He was transferred to Durham, N. C., and also served as superintendent of railways on Doherty properties at Bartlesville, Okla. In 1920 he returned to Toledo as general manager of the Toledo & Western Railway, resigning as a co-receiver of the road to become vice-president and general superintendent of the Community Traction Company in 1923. Two years later when B. C. Adams, who had been vice-president and general manager of the Toledo Edison Company, left Toledo, Mr. Johnson was made manager.

George H. Clifford Heads Stone & Webster Service Corporation

George H. Clifford has been elected to succeed Harry H. Hunt as president of the Stone & Webster Service Corporation, Boston, Mass. Mr. Clifford is well fitted by experience and natural ability for the responsibilities of his new position. He has been with the Stone & Webster organization 28 years, having initially been employed by the Northern Texas Traction

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Company at Fort Worth, Tex., in 1901. In less than ten years he worked up through the ranks to the position of manager of that company. Further recognition of his ability came some five years later when he was appointed district manager of the Stone & Webster properties in the Southwest. In 1927 he was brought into the Boston office to take over the duties of division manager of that district and of the Virginia Electric & Power Company properties, a position he has held up to the present time.

F. Carter Womack at Norfolk

F. Carter Womack, engineer of maintenance of way of the Virginia Electric & Power Company, Richmond division, has been promoted to the position of manager of railways, Norfolk division, succeeding J. B. Hayes, who has accepted a position with the Nova Scotia Light & Power Company, Halifax, Nova Scotia, Canada.

Mr. Womack entered the service of the company at Richmond as a water boy in 1910. He won rapid promotion in the engineering department and when the Stone & Webster interests formed the Virginia Electric & Power Company he was appointed to the position from which he has just been promoted.

F. Carter Womack

R. W. Woodruff White Head

Robert W. Woodruff, president of the Coca Cola Company, has been elected president of the White Motor Company to succeed the late Walter C. White. Mr. Woodruff has been a director of the White Company and a member of its executive committee for several years. His connection with the company really dates back seventeen years to the beginning of his business career. Prior to his accession to the presidency of the Coca Cola Company he devoted his entire time to White affairs, serving successively as a salesman, manager of the Atlanta branch, vice-president of the eastern region and vice-president and general manager in charge of sales.

Mr. Woodruff was the author of the regional organization plan under which sales activities of the White Company now are conducted and, in his various capacities, has acquired a thorough knowledge of every phase of the truck and bus industry. Although he has just reached his fortieth year, his business acumen has won him world-wide recognition. Mr. Woodruff will continue as president of the Coca Cola Company. In assuming his new office, Mr. Woodruff said:

Robert W. Woodruff

"At this time the White Motor Company, as a result of Mr. White's able leadership, is enjoying prosperity. Its latest financial statement, covering the first six months of the current year, showed that current assets were in the ratio of more than eight to one to its current liabilities. The situation, as we enter the final quarter of the year, is pre-eminently satisfactory. Our production and sales for the first nine months of this year considerably exceeded those of the corresponding period of 1928. The trend has been constantly upward."

The board of directors also elected the following vice-presidents: Saunders Jones, vice-president and assistant to the president; George H. Kelly, vice-president and treasurer; H. D. Church, vice-president in charge of engineering; George W. Smith, Jr., vice-president in charge of production. T. R. Dahl remains as secretary.

Charles B. Hardin Leaves St. Louis Public Service

Charles B. Hardin, who, as noted in the ELECTRIC RAILWAY JOURNAL NEWS for Sept. 28, resigned as general claim agent for the St. Louis Public Service Company, St. Louis, Mo., occupied that position with the present company and its predecessors since 1905. He became connected with St. Louis street railways in 1901 as assistant general claim agent under W. P. Palmer, whom he succeeded when the latter resigned in 1905. During his administration he disbursed more than $20,000,000 in claims entered against the present and previous companies. Mr. Hardin has also been active in safety work in St. Louis. He served as president of the St. Louis Safety Council for one term in 1919 and 1920. He has served the claim agent's division of both the American Electric Railway Association and the Midwest Electric Railway Association as president.

Mr. Hardin was born in Renick, Mo., in 1869. He was graduated from the Moberly, Mo., High School in 1886, and shortly thereafter went into the railway postal service on the Missouri, Kansas & Texas Railroad. He left the postal service in 1889 and entered the employ of the Wabash Railroad as timekeeper. He held this place until 1891, when he was made assistant claim agent for the Western division of that road. He was with the Wabash in this capacity until 1901, when he resigned to accept the appointment as assistant general claim agent for the United Railways.

J. R. Stauffer on Journal Staff

West Point Man With Background of Practical Railway and Bus Experience Becomes Assistant Editor

Joseph R. Stauffer, Montclair, N. J., has joined the editorial staff of the ELECTRIC RAILWAY JOURNAL. He assumes his editorial work after three years with Public Service Co-ordinated Transport in New Jersey, the service of which he entered in 1926 as a cadet. He was at first assigned to the Essex division and as part of his duties in the manager's office spent approximately six months in directing the operation of special and chartered car and bus service.

He was next transferred to the general operating department. There he went through the various departments of instruction, including car and bus operation, maintenance, time tables and road operation. Upon the completion of this period of apprenticeship he was made a supervisor and placed in charge of the Montclair district, having under his direct supervision all trolley car and bus operations between Paterson, Montclair and Newark, together with an interstate line between Montclair and New York City.

Here, indeed, was an important assignment for a man so young, but Mr. Stauffer brought to the work not only the knowledge he had gained in his period of apprenticeship, but a keen realization of the needs of the territory served as a result of his personal familiarity with it. In addition, he had the background of dealing with others that is a part of the training given by the United States Military Academy at West Point, from which he was graduated in 1920. His work with Public Service, however, does not represent the sum total of his business experience, for before joining the New Jersey organization he had been assistant general manager of the United States Ozone Company in Scottsdale, Pa., manufacturers of water-purifying and air-conditioning equipment. Later he had charge of that company's sales office in Philadelphia. He left the army to accept the assistant managership of this company.

Supplementing his formal scholastic training at the West Point Acadamy, Mr. Stauffer attended the army cavalry school at Fort Riley, Kan. West Point is nothing if not meticulous about implanting in its men due regard for detail, training highly helpful in the posts Mr. Stauffer has filled previously in the transportation and business world and an important asset to the editor engaged in technical journalism.

J. R. Stauffer

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Obituary

Bert W. Arnold

Assistant to Vice-President of North Shore Dead Following Protracted Illness —An Able Executive

Bert W. Arnold, assistant to the vice-president of the Chicago, North Shore & Milwaukee Railroad, died on Oct. 20 following an illness of several months.

Bert Arnold was called to the post of manager of the motor coach department of the Chicago, North Shore & Milwaukee Railroad on Jan. 1, 1924. In that post he had headquarters at Milwaukee and reported to C. E. Thompson, assistant to the president. He had charge of the operation of the motor coach lines of the company and of the expansion of this service, but three years later he was made assistant general manager, a post in which the scope of his work was broadened greatly. His

Bert W. Arnold

appointment as assistant to the vice-president in charge of the transportation activities of the company dated from October, 1925.

To the railway men in the Wisconsin territory Bert Arnold was familiarly known as the wizard of Oshkosh. He was formerly manager of railways of the Eastern Wisconsin Electric Company, with jurisdiction over the local properties in Oshkosh, Fond du Lac and Sheboygan and the interurban line between Neenah and Oshkosh. It may sound like overdoing the thing to say that Mr. Arnold knew everybody and everything in the territory in which that company operated, but the statement is substantially true.

It was in 1917 that Mr. Arnold went to Oshkosh. At that time public relations were anything but good and the physical property of the company was somewhat below par. All this Mr. Arnold corrected. As for co-operation—even the independent bus men used the railway station as a terminal at his suggestion. He demanded a square deal at the hands of the local papers and he got it. It was Bert Arnold who in 1922 put across in magnificent shape the first separate convention of electric railway men in Wisconsin.

Mr. Arnold brought to the positions at Oshkosh and Milwaukee a background of wide experience in railway work. He entered the field in 1899 with the Wheeling & Lake Erie Railway. Next he was dispatcher of the Lake Shore Electric Railway, Cleveland, Ohio, and chief dispatcher of the Muncie, Hartford & Fort Wayne Railway, Muncie, Ind. In 1907 he became superintendent of the southern division of the Illinois Traction System. From his headquarters with that company at Springfield he was transferred to Decatur as superintendent of all lines entering that city and later was made chief clerk to the general superintendent of the system. In 1910 he was made superintendent of transportation of the Chicago, Ottawa & Peoria Railway. In 1917 he joined the Eastern Wisconsin Electric Company.

L. C. Lemon

L. C. Lemon, president and manager of the Muscatine Coach Lines, Muscatine, Iowa, is dead. With Dr. A. R. Menary, Cedar Rapids, a close friend of his since they were roommates while in college, he incorporated the Muscatine Coach Lines, which received a city franchise for operation in Muscatine early this year, and started operations March 18, following the expiration of the railway franchise held by the United Light & Power Company. Most of the preliminary arrangements for the start of the local coach service were handled by Mr. Lemon, and it was under his direction that the routes were outlined and all preliminary surveys made, before the Council was asked for the franchise.

Following his discharge from the army he became associated with the United Light & Power Company at Davenport, where for nine years preceding his work at Muscatine he was assistant general manager of the Tri-City Railway and of the Clinton, Davenport & Muscatine Railway. He also handled transportation matters for the company in an engineering capacity on other properties. He resigned from the property at Davenport following the incorporation of the Muscatine Coach Lines, and with his family he moved to Muscatine early this spring.

M. L. Harry

Merrill L. Harry, general manager of the Central Illinois properties of the Illinois Power & Light Corporation with headquarters at Decatur, Ill., was fatally injured in an auto accident on Oct. 11. He was 51 years old. For a quarter of a century he had been identified with utility interests in the Decatur district, having supervision of more than 200 miles of electric railway between Decatur and Springfield in the years the utilities in that area were controlled by the McKinley interests.

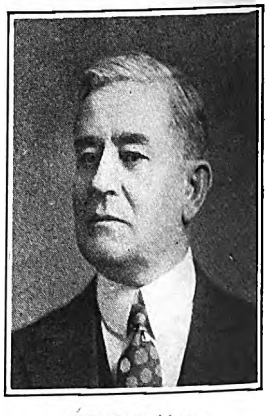
Mr. Harry was born in Bay City, Mich. His father established an electric light plant there and later a railway system. Here the son obtained his first experience in utility management. He became associated later with the McKinley interests at Danville. When the McKinley interests expanded into the railway field he was made manager of the Decatur lines. This was on Jan. 1, 1904. He had since been prominently identified with utilities in the central section of the state. As power and light development assumed growing importance he directed those properties, and six years ago when the Illinois Power & Light Corporation took over the McKinley interests, he was made Decatur division manager. Subsequently he became general manager in charge of the properties in Peoria, Champaign-Urbana, Decatur, Bloomington and Danville as well as those in the smaller communities in the territory.

Walter E. Robinson

Walter E. Robinson, claim agent of the Cincinnati Street Railway, Cincinnati, Ohio, died on Sept. 14, as the result of complications arising from a severe case of la grippe contracted several weeks before.

Possessed of a legal mind of unusual ability, Mr. Robinson was regarded as one of the best authorities in the country on the handling of railway claims. In conducting the affairs of his department he established for himself an enviable reputation for square dealing that commanded the respect of all his colleagues and the members of the Cincinnati bar.

Mr. Robinson was a pioneer in the electric railway industry in Ohio and secured many of the rights-of-way of the "Appleyard Lines," the first of the interurban electric railways in the state. At one time he was Mayor of New Carlisle, Ohio, following which he went to Cincinnati in



W. E. Robinson

1908 to take up duties as claim agent for the Cincinnati Traction Company. When the Cincinnati Street Railway took over the property in 1925 Mr. Robinson continued with the same duties.

He was first vice-president of the American Electric Railway Claim Association, a position which he held until about ten days before his death when he resigned on account of ill health. Mr. Robinson was born in Atglen, Pa., on March 4, 1870.

F. M. Mills

F. M. Mills, head of the local transportation system at Sioux Falls, S. D., died there on Oct. 20. He was a newspaper publisher for many years, and at the age of 77 organized the Sioux City lines. He was 91 years old when he made up his mind to supplement his railway system with bus service.

Mr. Mills was born at Ladoga, Ind., April 4, 1831, and was graduated from Wabash College. He established a printing plant at Des Moines in 1854, and later started the *State Register* and *Iowa Homestead,* still in existence. He was state printer for years, and helped establish the Northwestern Associated Press. He was also the author of two books. He later published a newspaper at Springfield, Ill., and subsequently helped to establish railway systems at Benton Harbor and St. Joseph, Mich., before going to Sioux Falls.

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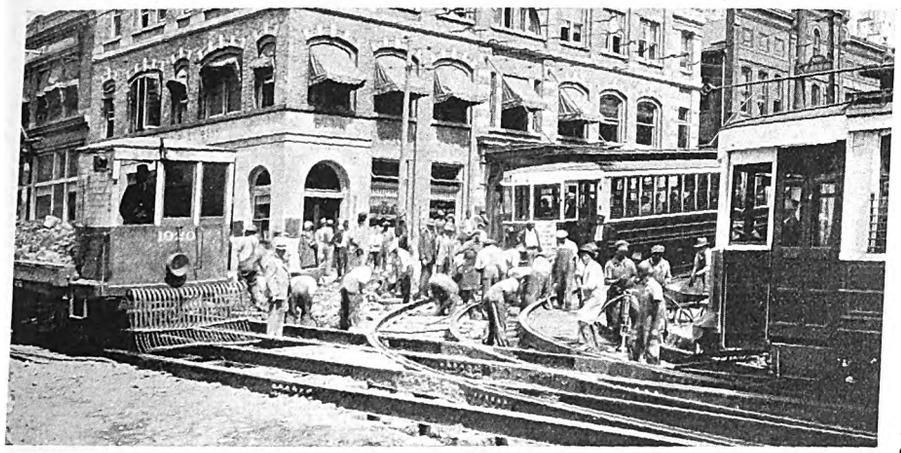
Industry Market and Trade News

Extensive Repaving in Richmond, Va.

Paving Main Street, one of the heavy traffic arteries of Richmond, has been keeping the maintenance of way department of the Virginia Electric & Power Company busy with an extensive project of track reconstruction which includes the installation of 4,800 ft. of new 122-4 A.E.R.E.A. rail, in addition to tie renewals, surfacing, and realignment of double track.



Major track repairs in progress at Eighth and Main Streets, Richmond, Va. Curves are being redesigned so as to permit double truck equipment to pass

The Main Street project, which will be completed late in the fall months, involves one of the busiest streets of the financial and wholesale districts. In order to avoid any delay in schedules and to keep vehicular traffic moving, the company is working night and day shifts. At present only one track and the dummy have been opened up, thus allowing free passage for a one-way traffic load. High-power lights have been strung from Fifth to Fifteenth Streets in order to facilitate night work. The portion of Main street under rehabilitation is for the most part on grades of from 4 to 6 per cent, which complicates the work to a considerable degree. So far there has been no delay to schedules nor serious interference with vehicular traffic.

Contracts Let for New York's Subway Equipment

Final contracts necessary for the completion of the Eighth Avenue line of New York City's new subway system were awarded recently by the Board of Transportation. The total sum involved is $20,146,024, covering cars, motors and control equipment, installation and equipment of six substations and the installation of a block signal and switching system on the portion of the route between Fulton Street and 215th Street.

The 300 cars will be built by the American Car & Foundry Company at a cost of $9,145,000. Six hundred and ten motors, together with necessary control equipment, will be supplied by the Westinghouse Electric & Manufacturing Company on a bid of $2,659,100, and substation equipment will be provided by the General Electric Company for $2,743,174. The contract for the switching and signal equipment, including installation, is divided equally between the Union Switch & Signal Company and the General Railway Signal Company, the total cost being $5,598,750. The first named company is to handle the five sections from 103rd Street to the Harlem River, including the shops and yards at 207th Street, while the General Railway Signal Company will do the necessary work between Fulton Street and 103rd Street. While no definite date has been set for the completion of the work it is expected that the line can be opened for service at some time during the latter part of 1931.

Record Order for Car Heaters

Consolidated Car Heating Company heaters have been ordered by the Delaware, Lackawanna & Western Railroad for its 282 new cars. Each car will be equipped with 40 heaters, operating on 3,000 volts. The total number of units required, 11,280, is said to be the largest order ever placed for car heaters.

General Electric Sales Increase

General Electric Company sales billed during the first nine months of 1929, announced by President Gerard Swope, amounted to $301,812,808.55, compared with $242,676,762.07 for the corresponding period last year, an increase of 24 per cent. Profit available for dividends on common stock for the first nine months of 1929 was $47,965,831.71.

Twenty Cars for Lynchburg, Va.

Twenty master unit motor cars of the one-man, double end, double truck type, seating 41 passengers, have been ordered for city service by the Lynchburg Traction & Light Company, Lynchburg, Va. The cars will be built by the J. G. Brill Company, Philadelphia, and are to be delivered in November.

Bus Exhibit at Convention Productive of Inquiries

Although it may be a number of months before the effect of the Atlantic City convention will become manifest in orders of any considerable proportions, bus manufacturers already report renewed interest accompanied by many inquiries. Meanwhile normal flow of orders continues.

The United Railways & Electric Company, of Baltimore, has ordered seven White model 65 19-passenger buses, while the United Electric Railways recently received five model 54 six-cylinder buses from the same manufacturer. Other White deliveries to electric railways include five buses of the 50B type to the Middlesex & Boston Street Railway, and one 54A type to the Boston Elevated.

Ten coaches seating 41 passengers each have been ordered by the Pacific Electric Company, Los Angeles, for service on its Huntington Park-Long Beach and Girard-Ventura suburban lines. The buses, which are of the "twin coach" type, will be supplied by the Fageol Motors Company of California. A substantial order was that of the Virginia Electric & Power Company, Richmond, which has added to its already extensive fleet 25 urban type coaches seating 40 passengers each, of which fifteen will go into service in Richmond and ten in Norfolk. The buses are supplied by the Twin Coach Corporation, of Kent, Ohio. Other recent Twin Coach deliveries of this general type include ten to the Youngstown Municipal Railway, ten to the Peoples Transport Company, Muskegon, Mich., three to the Aronomink Transportation Company, Philadelphia, and five to the New Haven & Shore Line Railway, New London, Conn. The United Electric Railways of Providence has taken six Twin Coaches of the suburban express type, while the Groton & Stonington Traction Company has taken one parlor coach.

Other recent deliveries of large-capacity buses include eight 40-passenger metropolitan type coaches to the Eastern Massachusetts Street Railway, one 33-passenger street car type coach to the Brooklyn & Queens Transit Corporation, and five 33-passenger coaches to the Citizens' Transit Company, of Oil City, Pa., all supplied by the American Car & Foundry Motor Company. This same company has delivered four 29-passenger parlor coaches to the Eastern Michigan Motor buses.

The Mack International Motor Truck Corporation reports the delivery of nine model AB 25-passenger city type buses to the Connecticut Company, of New Haven, and two buses of similar type to the Interstate Power Company, of Dubuque, Iowa. The Hamburg Railway Company, of Hamburg, N. Y., and the Union Transportation Company, of Tulsa, Okla., have also recently accepted delivery of two model BK Mack buses of the city type. The Twin City Rapid Transit Company, Minneapolis, Minn., has ordered four buses from the Wills Motor Company, two Whites, two Macks, and three buses with gas-electric drive from General Motors.

The following deliveries are reported by the General Motors Truck Company: Four type W observation buses to the Berkshire Street Railway, Pittsfield, Mass.; three type W city service buses to the Capital Traction Company, Washington,

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D. C.; four type W city service buses to the St. Joseph Railway, Light, Heat & Power Company; three type W buses to the Illinois Power & Light Corporation for city service in Galesburg, Ill.; a type W parlor coach to the Oklahoma Railway Company, of Oklahoma City; two type W parlor coaches to the Fifth Avenue Coach Company, New York; five type W city service buses to the Interstate Transit Lines, Omaha, Neb.; one type W city service bus to the Mississippi Valley Electric Company of Iowa City, Iowa; five type W city service buses to the Knoxville Power & Light Company; and one type Y parlor coach to the Washington Rapid Transit Company of Washington, D. C.

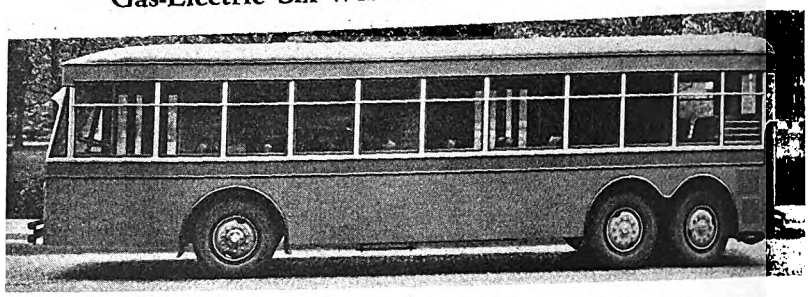
Four 20-passenger Reo buses, which are mounted with Fitzjohn bodies, have recently been delivered to the Georgia Power Company, of Atlanta.

Westinghouse Receives Street Railway Orders Totaling $3,500,000

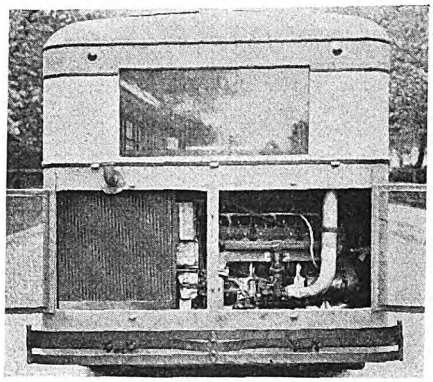
Improving conditions in the electric street railway industry are indicated by the fact that the Westinghouse Electric & Manufacturing Company has received orders for street car motors and controls totaling $3,500,000 during the past few weeks.

These orders include equipment for 100 cars for the Cleveland (Ohio) Railway; 100 for the Brooklyn (N. Y.) & Queens Transit Corporation; 60 for the Chicago (Ill.) Surface Lines; 50 for Montreal (Quebec) Tramways; 25 for the Chicago (Ill.), North Shore & Milwaukee Railroad; 10 for the Cincinnati (Ohio), Hamilton & Dayton Railroad; 12 for the Allegheny (Pa.) Valley Street Railway; 13 for the Youngstown (Ohio) Municipal Railway; 20 for the Lynchburg (Va.) Traction & Light Company; 15 for the Scranton (Pa.) Railway; 10 for the Lake Shore (Ohio) Electric Railway.

Gas-Electric Six-Wheel Bus Announced by St. Louis



This six-wheel gas-electric bus of the St. Louis Car Company is now in production. It seats 40 passengers and has its power plant mounted under the rear seat



The protecting screen is opened to show the method of housing the power plant at rear of the bus

Electric service braking, individual drive from electric motor to each of the four rear wheels, and discharge of exhaust gases at roof, are some of the features of the 40-passenger gas-electric coach recently produced by the St. Louis Car Company, St. Louis, Mo. As indicated in the accompanying illustrations, the vehicle has a street car type body, with entrance at right of the driver and exit at the center. Both doors are air-controlled, and the one at the center is equipped with a treadle-opening device. The vehicle is 32 ft. 4¾ in. over the bumpers, 8 ft. wide over the aluminum side panels and has 6 ft. 10 in. headroom at the front. This headroom is reduced to 6 ft. 2 in. back of the exit door where the floor is on a higher level. The wheelbase is 210 in. from front axle to center of rear truck.

The power unit, consisting of Waukesha six-cylinder 4¾x5½ engine coupled to General Electric No. DT-1132 generator, is mounted under the full-width rear seat. The engine exhausts through a stack in the right-hand corner of the body to the roof. Air for carburetion is drawn in from the roof through a passage in the other rear corner.

Ease of control is provided for by an arrangement consisting of a pedal connected to the engine throttle with two other pedals for braking. One of these works a controller which changes the motors into an electric brake, generating energy dissipated in grids mounted under the body. By its use the vehicle is slowed up to about 3 m.p.h., and is then brought to a full stop by the application of the other brake pedal, which through an equalizing lever actuates a pair of disk brakes located in each of the rear axles, between the armatures of the GE-1131 electric motors. A hand lever is also connected to the disk brakes, for use in parking. Starter button, ignition and lighting switches and door control buttons, are all mounted on a small board on the side of the body.

The drive unit is literally built into the rear axles, since the cases of the motors form part of the two axle housings. That is, there are two electric motors in each of the two rear axles. From each motor a 12 to 1 gear reduction, made up of one set of helical and one set of spur gears, carries the power to the four wheels of the rear truck. All six tires are 36x8 high-pressure pneumatic. The complete rear truck, including the four electric motors, springs and torque system, may be detached by loosening four bolts and then rolled out from under the frame. Similarly, it is possible to disconnect any one of the electric motors, electrically and mechanically, so the vehicle can complete its run without danger to the other motors.

Chassis and body are of the integral type with side sills continuous from front to rear except at door openings. The pressed steel posts are riveted to side sills and top plates. Cross sills and outriggers are also of pressed steel.

Westinghouse Electric & Manufacturing Company recently purchased in Newark, N. J., a 22-acre site for a new warehouse, shop and station to serve the entire northern New Jersey industrial area.

ELECTRIC RAILWAY MATERIAL PRICES—OCTOBER 26, 1929

Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.00
Lead, cents per lb.	6.9
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	7.05
Tin, Straits, cents per lb.	41.875
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	43.00
General service	31.50

Bituminous Coal

Smokeless Mine Run, f.o.b. vessel, Hampton Roads, gross tons	$4.80
Somerset mine run, f.o.b. mines, net ton	1.90
Pittsburgh mine run, Pittsburgh, net ton	1.80
Franklin, Ill., screenings, Chicago	3.40
Central, Ill., screenings, Chicago	2.30
Kansas crushed mine run	2.50

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive ⅝ in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.95
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.50
Sheet iron (24 gage), cents per lb.	2.75
Sheet iron, galvanized (24 gage), cents per lb.	3.55
Galvanized barbed wire, cents per lb.	3.15
Galvanized wire, ordinary, cents per lb.	3.10

Waste—New York

Waste, wool, cents per lb.	13.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	12.5
Colored	9.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	16.1
White lead in oil (100 lb. keg), cents per lb.	13.2
Turpentine (bbl. lots), per gal.	$0.61
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.85
Weatherproof wire base, cents per lb.	20.875

Paving Materials

Paving stone, granite, 5 in., f.o.b.: New York—Grade 1, per thousand	$150.
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.25
Cement, Chicago, in carload lots, without bags, f.o.b.	1.85
Gravel, ¾-in., cu.yd., delivered	3.25
Sand, cu.yd., delivered	2.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	14.5
Light copper, cents per lb.	12.5
Heavy yellow brass, cents per lb.	8.125
Zinc, old scrap, cents per lb.	3.15
Lead, cents per lb. (heavy)	4.75
Steel car axles, Chicago, net ton	$17.25
Cast iron car wheels, Chicago, gross ton	14.25
Rails (short), Chicago, gross ton	18.00
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.25

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review
A McGraw-Hill Publication—Established 1884

JOHN A. MILLER, JR., *Managing Editor*

Volume 73 New York, December, 1929 *Number 22*

Economic Readjustment Unlikely to Affect Electric Railways Seriously

EXPERIENCE, it has been said, is the name by which men call their mistakes. Of late the American public has been listening to a lot of modern ballyhoo artists who carried people off their feet with false economic doctrines which ignored history. "Bigger and better business" is sound doctrine when applied with reason, but it is unsound when its proponents deplete their savings, borrow on their life insurance and mortgage their building and loan accounts to gamble on future security values. This lesson has been learned as a result of the recent stock market crash, but the experience has been costly.

The future will be what we ourselves make it. The great gamble in securities bore no relation to production and consumption, nor to the earning power of industry. Fundamentally, business conditions are sound. No physical values were destroyed in the collapse of security values. Industry is not seriously over-expanded. The general credit situation is good. Short-term money is plentiful at low rates, but long-term loans may be expected to ease only in proportion to the extent that saving replaces speculation. All this is distinctly favorable to business progress.

In the White House sits a man familiar with crises. He is not emotional. He has had his ear to the ground. Apparently he is prepared. He knows that construction work by government is a stabilizing factor and he has a program ready which will take up part of any slack. Already he has undertaken conferences with business leaders looking toward the stimulation of industrial activity. This is of vital importance, because public works can have only a limited effect upon the situation.

Responsibility for maintaining prosperity rests ultimately on private business. If common sense is used, business and industry will escape a recession such as the stock market experienced. From high Washington authority it is learned that there has been no note of pessimism. Legitimate projects are going forward, and those who have attended the President's conferences entertain no fear for the economic stability of the country.

So far as the electric railway industry itself is concerned no reason exists for apprehension. Such economic readjustment as may be in prospect is not likely to affect it seriously. In general the transportation business is a necessity business. It is, of course, not immune to economic change, but it is less harmfully affected than many others. Even in the pronounced business recession of 1921 riding declined only 4 to 5 per cent. There is no reason to believe that any such recession will occur now. Curtailed purchasing power may be expected to be concentrated in the comparatively small section of business that concerns itself with the production of luxuries. The electric railways can look forward to the coming year with unshaken confidence. For the great mass of the people public transportation will continue to be a vital necessity.

Vital Factors Ignored in New York Substitution Proposal

REAL hope of improving transportation in New York City lies only in wise co-operation of facilities. Advocates of wholesale substitution of buses in place of street cars delude themselves in thinking that this will solve the problem of surface transportation. More buses are urgently needed. Of that there can be no doubt. On certain routes the replacement of rail service by bus service would be advantageous. On many routes, however, the most efficient and economical means of providing transportation service is by electric rail cars.

Recommendations recently made by the Merchants Association favor the gradual substitution of buses operated by the existing companies on all street railway routes in Manhattan when existing equipment requires replacement. While these recommendations are moderate compared with many other recent utterances on this subject, they evade certain fundamental facts. These facts merit far more consideration than they have ever received.

No justification exists for the theory that wholesale substitution of buses in place of cars will relieve street traffic congestion. To carry the same number of passengers many more buses than cars would be required. The operation of these hundreds of additional vehicles on the streets would tend to increase rather than decrease congestion. Moreover, no improvement in speed could be expected, as speed in congested districts is determined by traffic conditions rather than by the type of vehicle. Relief of congestion can be obtained only by the establishment of an efficient system of traffic regulation and control—now sadly lacking in New York.

The underlying difficulty in the present transportation situation in New York City is financial. Up-to-date service cannot be furnished today for the same fare that sufficed twenty years ago. Elsewhere throughout the country this fact has been recognized, and the transportation agencies have been granted increased fares to meet their increased costs. So long as New York clings tenaciously to its 5-cent flat fare it cannot expect high-grade, modern transportation, either by car or bus. Operating costs for buses certainly would be no less than for street cars, and a starved bus system would be no improvement over a starved electric railway system. Only with an adequate fare can the country's largest

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city expect to have adequate transportation. Until this basic economic fact is squarely faced, no real solution of the problem is possible.

Safety Work Begins at Home

MENTION of the word "safety" to the average electric railway operator brings to mind thoughts of boarding and alighting accidents, automobile collisions, falls in cars, and other similar mishaps which are likely to result in claims being made by passengers or drivers of other vehicles against the company for personal injuries or property damage. Thanks to intensive study of this matter, greater care in the selection of trainmen, better methods of construction, and improvements in equipment, gratifying progress has been made by the industry in recent years in reducing the number of such accidents.

Sometimes it appears, however, that in the effort to prevent accidents in which the public is involved, the need is overlooked for preventing accidents to the company's own employees. A considerable number of instances could be cited where safety placards are prominently displayed in the cars of an electric railway, while serious accident hazards existing in the company's carhouses and shops go apparently unheeded. This is the more regrettable because it is entirely unnecessary. Compared with the unavoidable hazards which exist in many industrial plants, those in electric railway carhouses and shops are of a minor nature. Most of them could be eliminated easily and at small cost.

Probably the most frequent hazard is that resulting from the common practice of leaving heavy objects where passing workmen are likely to stumble over them. Unguarded belts, driving shafts and cutting tools constitute another hazard frequently encountered. Holes of one sort or another into which an unobservant person might easily fall are still another source of danger. Many other minor mechanical hazards of this nature might be mentioned. Because they are potentially far more serious, electrical hazards, as a rule, have been reduced to a minimum. The cost of similar elimination of the mechanical hazards would be comparatively slight and would undoubtedly prove to be a profitable investment.

On the Trail of the Parking Rule Violator

INCREASING sentiment for the restriction of parking is evident in activity all over the country directed toward the more rigid enforcement of existing ordinances and further limitation of the storage of vehicles on the street. More and more it is being recognized that those who persist in parking for long intervals on busy streets cause inestimable delay to the many, while themselves enjoying only a negligible benefit. It is being realized, too, that limiting parking, particularly during rush hours, is absolutely essential to assure the smooth flow of traffic through important arteries.

Handicapped by the necessity of overcoming the inertia which attends any long-established custom, the advocates of limited parking until recently made slow progress in convincing city officials and the public of the economic soundness of restricting street storage of vehicles. Now, however, it is generally agreed that stringent regulation is essential to the welfare of the community. Many cities within the past two years have investigated their traffic problems and sought to find means of securing relief. Recommendations were included in the report of practically every investigation that the abuse of parking privileges should be curbed and stricter regulations enacted. From this have come more effective ordinances and more rigid enforcement.

One of the most successful recent drives against illegal parking was made in Detroit. In 1927 a traffic survey revealed that many automobile users were parking for excessive periods on limited streets while others were parking regularly on streets where all parking was forbidden. Requests by several merchants' associations prompted the City Council to undertake a 30-day trial of rigid enforcement of the existing parking regulations. So pleased were these associations with the results of the experiment that the drive was extended for an additional 30 days. Elsewhere in this issue is a detailed account of the experiment and its results.

As was expected, some of the victims of the tow cars employed by the police in the Detroit campaign protested against the removal of their automobiles from the streets. The general public, however, voiced its emphatic approval. It is of particular significance that a group similar to those which most violently opposed restricted parking in New York and other cities—the merchants—requested the enforcement in Detroit and commended the work of the Police Department in conducting the drive. But all concerned with the movement of traffic, the electric railway, drivers of private automobiles, taxicab companies, trucking interests, industrial plants and store owners, were benefited through the ability of all types of vehicles to travel faster and more safely through the formerly congested areas.

Large Buses Increasing in Popularity

STUDY of the new buses developed in the past year indicates several distinct trends in design. Perhaps the most outstanding is the increase in the number of large capacity, single-deck types. A number of large buses have been on the market for more than two years, but the past year saw the addition of others. That this trend is likely to continue is indicated by the recent announcement of a 50-passenger bus and a 72-passenger vehicle. Only slightly less pronounced is the trend toward buses ranging in capacity from 12 to 21 passengers. This size seems to be well suited for de luxe suburban and feeder service and is being widely accepted. In going to these two extremes, the medium-sized bus has been somewhat neglected. Less activity was shown in this field in the past year than in former years. Operators seem to be of the opinion that the medium-sized bus is too small for mass transportation and too large for feeder and suburban service.

Manufacturers are bending their efforts in body design toward securing greater strength with less weight. Aluminum and its alloys are being used more extensively with the result that substantial reductions in weight have been effected. For example, in the design of a double seat using aluminum the total weight has been reduced 50 lb. Manufacturers also are attempting to secure more room in the newer designs. Full headroom over the aisles is allowed in almost all buses, and baggage racks over the seats are being designed to cause less interference with rising passengers. More knee room is being provided in the spacing and design of seats, and one company is offsetting the seat backs to give more hip-room

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in the aisles while retaining the full seat width. Better ventilation and heating are being secured also in many of the newer buses. More roof ventilators are being added and one manufacturer has developed an ejector ventilation system which seems to be effective. Extensive experimentation with hot water and steam heating systems suggests a trend away from exhaust heater systems in which the pipes pass through the body. Another trend is the more extensive use of bumpers and heavy fenders to protect the bus body better.

No radical changes in chassis design have appeared in the past year, but there seems to be a disposition to strengthen the construction to take care of the heavier engines being adopted. The use of heavier engines also has brought forth more rugged transmissions, drive assemblies and other mechanical parts. Four engines with a rating of 150 hp. or more are now available for use in buses. This trend is paralleling the increasing popularity of the large bus and is the result of a demand for more powerful engines not only to serve the larger vehicles adequately but also to give greater flexibility to the smaller vehicles in present-day traffic. Better cooling is being secured in some of the newer engines by the use of systems which give a more uniform control of jacket temperature.

All of the developments of the year, along with many projected ones for the future, promise to keep the product of the bus manufacturer in step with the demands of the operators for a better vehicle.

Growing Demands of Vehicular Traffic Complicate the Paving Problem

ONLY a generation ago people traveled everywhere in clouds of dust. In those days the horse was the principal source of power for both public and private transportation vehicles. The problem of street paving presented no difficulties. Many streets were not paved at all and others were paved in only the most elementary manner. Since then, the development of the gasoline-propelled automobile and the electric rail car have entirely altered the situation. Elimination of the horse as a source of power for street cars years ago removed the justification for making the railways pay for paving installation. At the same time the growth of automotive transportation has made the paving problem far more complex than it used to be. Despite the unreasonableness of requiring the electric railways to pave the track area, the obligation to do so exists in most communities and the resulting problems must be solved by way engineers. In fact, it is no exaggeration to say that the degree of success attained in this respect has a decided effect upon the public relations of the company.

Vehicular demands have kept steadily ahead of paving construction during these years of development. Many materials have been used and discarded as inadequate. Consequently, re-paving has had to be done at frequent intervals and at great cost. Today it is necessary to provide a pavement having strength sufficient to carry extremely heavy loads and having a surface smooth enough to permit comfortable travel at high speed. Municipalities are more particular now than in the past concerning the type of paving used in the track area. A survey of the situation on some 30 electric railway systems, published elsewhere in this issue, shows a widespread demand by city authorities for a uniform paving surface from curb to curb. Where the material specified differs from that which is deemed most suitable for use in the track area, a filler or surfacing may be employed to give the appearance of this uniformity, and this is likely to add to the cost of track paving. Practically everywhere the railways are being required to put down far more expensive pavement than was contemplated when their franchises originally were granted. Moreover, it requires no prophet to foresee that vehicular demands in the future will require still heavier and more expensive paving. Certainly this situation constitutes one of the strongest possible arguments for placing the burden of paving charges where it belongs—on the general taxpayer rather than on the car rider.

Benefit Assessment Plan Proves Its Value in San Francisco

FINANCING of rapid transit construction in whole or in part by assessments on the benefited property, while frequently suggested, is usually looked on as a rather theoretical proposition. Yet seldom is it realized that there exists in San Francisco a clear-cut example of the effectiveness of this method of paying for such improvements. There a large section of territory in the city, not more than 4 miles from the center of business activity along Market Street, was for years a barren waste through lack of adequate transit facilities. This situation came about through the peculiar topography, a series of hills separating the district from the business section by an almost insurmountable barrier. It was only when this ridge was pierced by a tunnel and street railway service established that development began.

That the opening up of this large tract was undertaken, was due to the foresight of the city engineer and the courage of the owners of the tract in agreeing to an assessment of the property itself in order to build the rapid transit line. A total of $4,000,000 was thus obtained to pay the entire cost of the improvement. Hence it has not become a burden on the city as operator of the railway system, and car service can be furnished at no greater cost than over a normal surface line of equal length. The property owners and the city itself have profited enormously, the one through enhanced values and the other through correspondingly greater tax assessments.

The assessments for construction of the tunnel were by no means small, and represented a proportionally large increment of the value at that time, perhaps a quarter of the total. The increases in value that have come since the tunnel was built, however, have been so large that they dwarf the assessments to virtual nothingness. In the fourteen-year period between the two tax assessments quoted in the article by Mr. O'Shaughnessy in this issue the increase in the value of the land and improvements has averaged fourteen times the cost of the land just before the tunnel project was broached, or an amount equal to the pre-tunnel price has been added each year. The land itself is worth more than five times as much as it was at the earlier period.

While the Twin Peaks Tunnel is but one of many instances where property values have increased enormously through rapid transit, it is perhaps the only one of any magnitude where the property owners affected have paid the cost and then reaped the benefit. As such it is an object lesson worth the attention of city planners who are seeking to add to the productive area through major improvements.

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Westwood Park in 1917. This picture, taken along Miramar Avenue, shows that the entire district was only a thicket of gum trees. The area included appears in the picture in the middle distance. The boulevard was being built in anticipation of transit facilities. This and the companion picture were taken from a point about 8,000 ft. south of the west portal of the Twin Peaks Tunnel

Results Justify Assessment

Construction of the Twin Peaks Tunnel has opened up a large residential area near the business district of San Francisco which could not be reached readily by any other means. The benefited property owners, who paid the entire cost through special assessments, have seen their holdings increase in value up to fourteen times the original price of the land in fourteen years

DUE to the construction of the Twin Peaks Tunnel a new residential area has been added to the city of San Francisco, with homes and beautiful curved streets, and populated with a very desirable class of inhabitants. It has increased the tax assessments of a large section of the city to fourteen times what they were before the tunnel was built, and has increased the market value of the properties still more. Furthermore, it was paid for by the property owners most greatly benefited. This was accomplished through the levying of special assessments, so that the city at large and the car riders have only borne the cost indirectly, if at all.

Construction of the Tunnel Opened Up an Inaccessible Region

The tunnel pierces the high ridge which separates the more densely populated and older settled portions of San Francisco from the large and comparatively level region lying west of this ridge and constituting the watershed of Lake Merced. Without the construction of such a tunnel the inhabitants of these outlying districts could not reach the city by means of street cars except over a circuitous route involving considerable delay. Previous to its opening, access to the city was confined to such detour car lines, and to travel by vehicle and on foot over steep hills. Accordingly the territory was scarcely developed at all, and the property had a value very low for land in such close proximity to the center of San Francisco.

Since the reason for the construction of this tunnel and the operation of street car lines through it was that it provided a ready means of access from a potential residential district to the business section of the city, the resulting benefit to the property affected was plainly apparent. Accordingly, funds for the construction of the tunnel were obtained by an assessment levied by the city covering lands near the two ends of the tunnel.

The Twin Peaks Tunnel was constructed by the city and county of San Francisco under authority granted under Chap. VIII, Art. VI, of the San Francisco charter, and under the procedure provided by an ordinance passed by the Board of Supervisors of San Francisco, pursuant to authority given in the chapter mentioned, on Oct. 20, 1913. The tunnel ordinance was especially drafted for the purpose of carrying through

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Westwood Park in 1927. In the ten years since the opening of the tunnel the entire district has been built up as a high-grade residential section. The development has been a direct result of the transit facilities made available by the tunnel. The older houses in the foreground were partly built before the tunnel was built, but many have been replaced

Method of Transit Financing

By

M. M. O'SHAUGHNESSY

City Engineer
San Francisco, Cal.

the work, and a special counsellor was retained by interested property owners to assist the city officers in its legal consummation. The enabling ordinance empowered the Board of Public Works to acquire for the city, by purchase and condemnation, any and all land or easements therein or any property necessary or convenient for such tunnel, and to raise money for such acquisition by means of an assessment on private property, as well as to adopt ordinances providing the procedure to that end. The ordinance provided for the acquisition of property for the tunnel and for the construction of the tunnel itself, and to allow such consolidation of the two purposes in a single proceeding. The proceedings included the acquisition at a cost of $514,935 of a strip of land about 90 ft. wide and 1,900 ft. long at the easterly end of the tunnel and the end of Market Street, the main business artery of the city.

The tunnel design was based on a previous study of the main transportation problems of San Francisco made in 1911 by Bion J. Arnold of Chicago. The original idea was to extend the tunnel a mile further down toward the business district to the intersection of Valencia and Market Streets, which would have involved the expenditure of $3,000,000 additional to the amount finally decided on, or a total of $7,000,000. The writer, from previous experience with San Francisco assessment problems, knew that it would be impossible to collect this additional amount from the taxpayers. The shorter $4,000,000 tunnel was therefore decided on.

Entire Cost Raised by Assessment

The total area inside the assessment district included 4,981.7 acres. Of this the west portion comprised 4,280.7 acres, with a maximum assessment of 3½ cents per square foot near the tunnel portal, receding to ⅛ cent per square foot 3 miles away. The total was $2,996,250, and the average rate of assessment was $700 per acre. The east portion, in the built-up section of the city, with improvements already made, consisted of 701 acres, on which the total assessment was $998,750, ranging in amount from the densest, at 3½ cents per square foot, to the lightest and most remote, at ⅛ cent per square foot. The average of the assessments at this end was $1,424 per acre. The distribution of the assessments in the areas at the two ends of the tunnel is shown in the assessment map on page 1096.

No assessment of this kind can be conceived of as being made without surmounting obstacles, and the Twin Peaks project had its quota. The several assessments were made by the city engineer's department under the direc-

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Table I—Assessed Values of Property Adjacent to West Portal

Assessments of land and improvements before and after construction of the Twin Peaks Tunnel, by sections

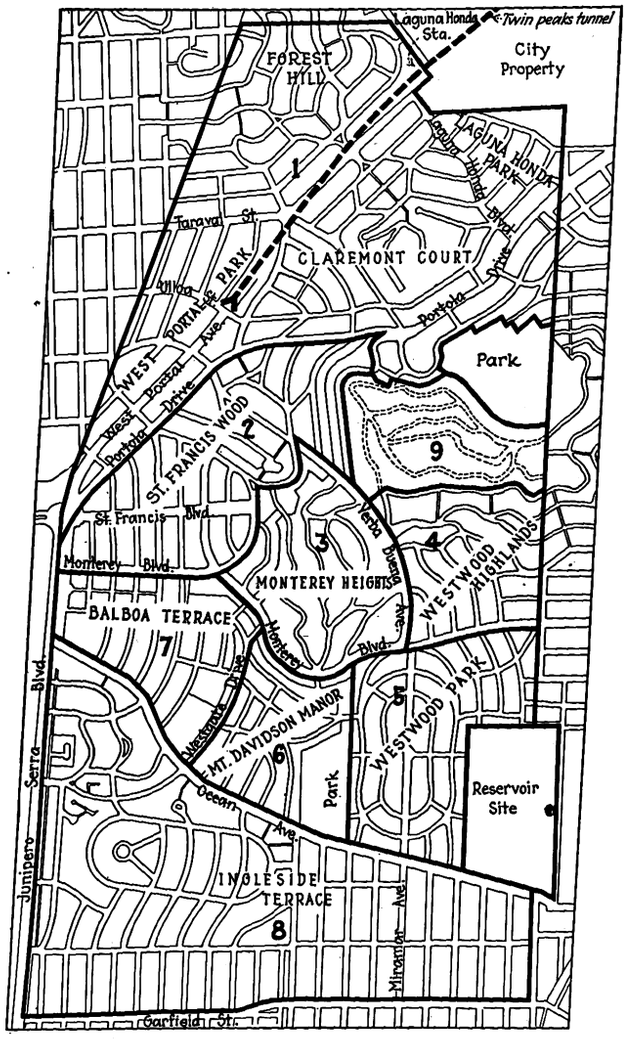
Ref. No.	Section	1928 Assessment Roll Land	1928 Assessment Roll Improvements	1912 Assessment Roll Land	1912 Assessment Roll Improvements
1	Forest Hill, West Portal Park, Claremont Court and Laguna Honda Park	$1,628,920	$3,274,710	$220,000	.....
2	St. Francis Wood	827,550	1,603,680	149,000	.....
3	Monterey Heights	503,430	505,100	53,000	.....
4	Westwood Highlands	263,180	584,900	41,600	.....
5	Westwood Park	638,770	1,206,250	166,500	.....
6	Mount Davidson Manor	432,830	200,910	78,000	.....
7	Balboa Terrace	538,130	586,950	102,000	.....
8	Ingleside Terrace	1,797,810	3,195,150	420,000	$32,500
9	Acreage	210,540	25,400	46,000	.....
		$6,841,160	$11,183,050	$1,276,100	$32,500

increased an average of 436 per cent, or, in other words, it was worth 5.36 times as much as it was in 1912 before the tunnel was begun. The total market value of land and improvements went up from $3,287,750 in 1912 to $50,652,050 in 1928, or it was worth 15.41 times as much as the original unimproved property before it was served with rapid transit.

One significant instance may be cited of the increase in property values due to the changed conditions incident to the provision of first-class transportation by the Municipal Railway lines. The Westwood Park tract was a sand waste with gum trees when the tunnel was built. Its appearance may be seen from the reproduction of a photograph taken in 1917, about the time that the tunnel was completed, but before car service was begun. The parked street in the middle distance is Miramar Avenue, which was in process of construction in anticipation of the development. The few houses in the foreground were not in the district under consideration. They were of comparatively inexpensive construction, and most of them have been replaced. In 1916 the 92 acres of this tract were assessed at $164,150. In 1921 the assessment of real estate had increased to $340,000, showing a growth in value of this one tract of $175,850. The improvements made in the meantime had a valuation of $538,000. The total increase for land and improvements is thus $713,850, or $7,760 per acre. The tunnel assessment on this land was $544.50 per acre.

Pastures Turned Into Residence Lots at a 10 to 1 Increase

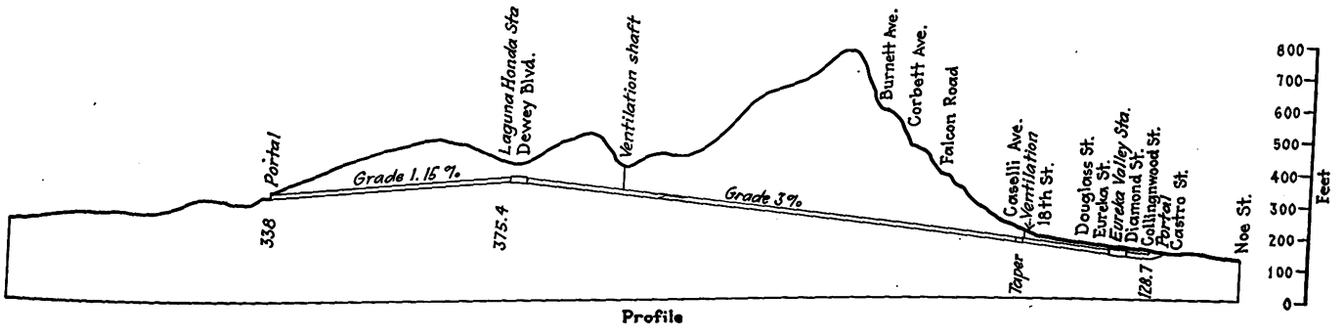
When the tunnel was built there was nothing in the first block south of the west portal but a potato garden and land valued at $10 per front foot. Since then land has enhanced in the first block immediately near the west portal to $500 a front foot, as the place has become a business center. The general level of prices now would measure up to perhaps $11 per front foot, where before the tunnel was built it was not worth more than a tenth of that amount.



A part of the assessment area adjacent to the west portal of the Twin Peaks Tunnel. The assessed values for land and improvements in 1928 are shown in comparison with 1912 in Table I

On Nov. 2, 1914, the city entered into a contract for the construction of the tunnel with R. C. Storrie & Company, at an estimated price of $3,372,000. This was increased by extras and incidentals to $3,947,856.70. The work was completed within schedule time, construction work being begun Nov. 30, 1914, and completed July 14, 1917.

Considerable attention was given to the terminal arrangements, so that future rapid transit lines could be extended therefrom. At the eastern end the tracks are depressed to the grade of a future subway down Market Street. At the westerly terminal an interurban 3 per cent transit grade has been constructed for a distance of



The profile of the Twin Peaks Tunnel shows the character of the barrier between the business district and the residential section that has been pierced

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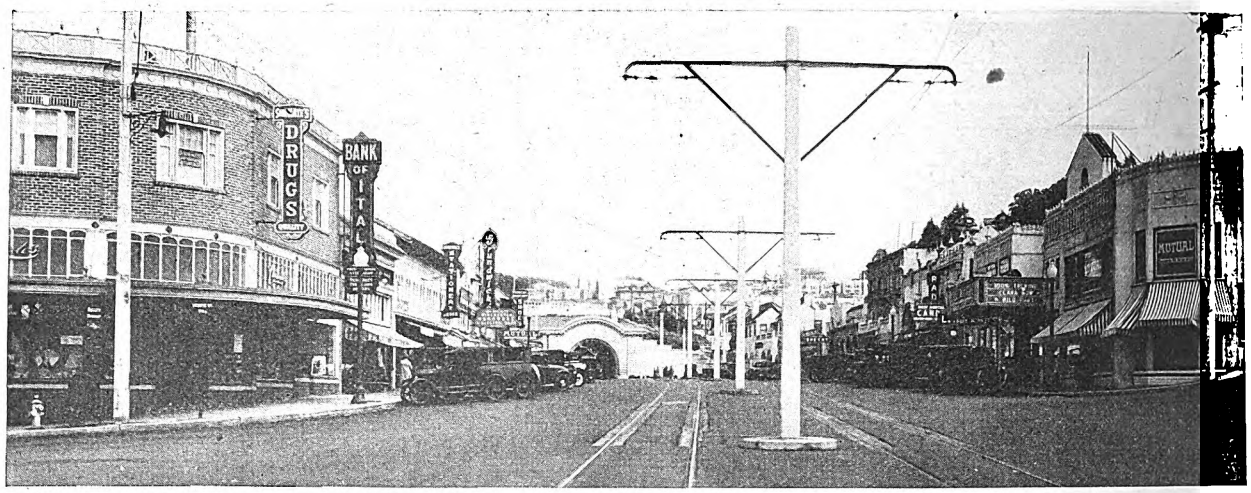

West Portal Avenue, non-existent before the tunnel was built, has become a high-class business district. This picture, taken in September, 1929, is looking toward the tunnel entrance from Vicente Street, about 500 ft. farther away than in the 1927 view

practically 2 miles southerly to the county line of San Mateo County, so that in the future interurban service may be handled through the tunnel. The grades are less than one-half the steepest grades in the New York subways, and the curves of 1,000-ft. radius are about four times their length. So all features of the construction were designed for the highest grade of future rapid transit.

The general plan and profile of the tunnel are shown in the illustrations. The length of the tunnel is 11,750 ft. It lies between an extension of Market Street at the intersection of Seventeenth and Castro Streets and the intersection of West Portal Avenue and Ulloa Street. There are two subway stations in the tunnel, one near the easterly end in Eureka Valley and the other at the Laguna Honda, at the summit of the tunnel and 8,500 ft. from the easterly portal. Each station is 300 ft. long, capable of accommodating an interurban train. The Laguna Honda station is 65 ft. below the surface, and the tracks are reached by stairways and elevator from the station building above. The site of the station is a narrow valley, the foundation for which was excavated by the open cut method, the opening being afterwards filled by spoil from the tunnel.

Table II—Market Values of Land and Improvements by Sections of Twin Peaks Tunnel Assessment District Adjacent to the West Portal, Previous To and After Construction of Tunnel

District	Market Values in 1928, After Construction			Market Values in 1912, Before Construction			Increase in Value, Per Cent	
	Land	Improvements	Total	Land	Improvements	Total	Land	Total
1	$4,072,300	$9,824,130	$13,896,430	$550,000	.....	$550,000	640	2,427
2	2,068,875	4,811,040	6,879,915	372,500	.....	372,500	455	1,747
3	1,258,575	1,515,300	2,773,875	132,500	.....	132,500	850	1,993
4	657,950	1,754,700	2,412,650	104,000	.....	104,000	533	2,219
5	1,596,925	3,618,750	5,215,675	416,250	.....	416,250	284	1,153
6	1,082,075	602,730	1,684,805	195,000	.....	195,000	455	764
7	1,345,325	1,760,850	3,106,175	255,000	.....	255,000	428	1,118
8	4,494,525	9,585,450	14,079,975	1,050,000	$97,500	1,127,500	328	1,149
9	526,350	76,200	602,550	115,000	.....	115,000	358	424
Total	$17,102,900	$33,549,150	$50,652,050	$3,190,250	$97,500	$3,287,750	436	1,441

West Portal Avenue in September, 1929, taken from a point at the tunnel entrance. The intersecting thoroughfare is Ulloa Street

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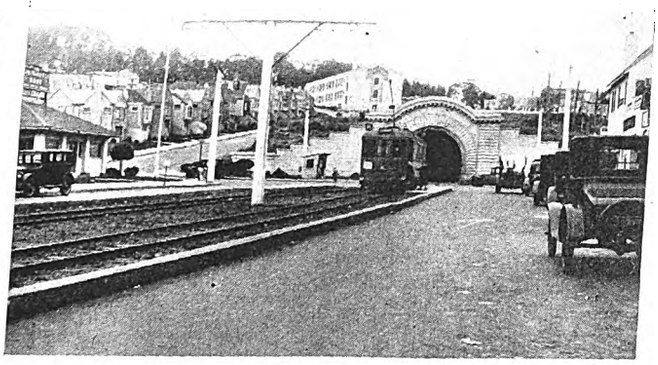
Table III—Materials Used in Constructing Twin Peaks Tunnel

Quantity of excavation, cubic yards	530,000
Cement used, barrels	120,323
Sand used, cubic yards	39,458
Gravel used, cubic yards	94,245
Reinforcing steel, tons	2,850
Timber, thousands of feet	11,000
Hydrated lime, tons	1,534

The tunnel is all lined with concrete of a $1:2\frac{1}{4}:5\frac{1}{2}$ mixture, with the addition of 8 lb. of hydrated lime to every 100 lb. of cement. The center of the mass of the mountain penetrated by the tunnel for a length of nearly 4,000 ft. was found to be of hard crystalline serpentine, which did not require the construction of any invert, did not need timbering, and is known as the hard rock portion of the tunnel. The distance was less than originally determined from the borings, but as the nature of the materials along the remainder of the tunnel was soft and inferior it demanded a concrete invert which exceeded in length the original estimates and hence increased the cost.

Ventilation is obtained by means of a duct chamber in the roof of the tunnel 15 ft. wide and 4 ft. high, with air ports all along its bottom slab, to be used as a ventilating chamber when the volume of business increases to an extent that the gas and foul air make increased ventilation a necessity. Up to the present time the natural draft has been sufficient. There is a shaft 13 ft. in diameter and 110 ft. high near Laguna Honda Valley on the peak of the grade, where ventilating apparatus may be installed in the future.

Some figures on the tunuel give an idea of the magnitude of the work and the quantities of materials involved. These statistics are given in Table III, above.

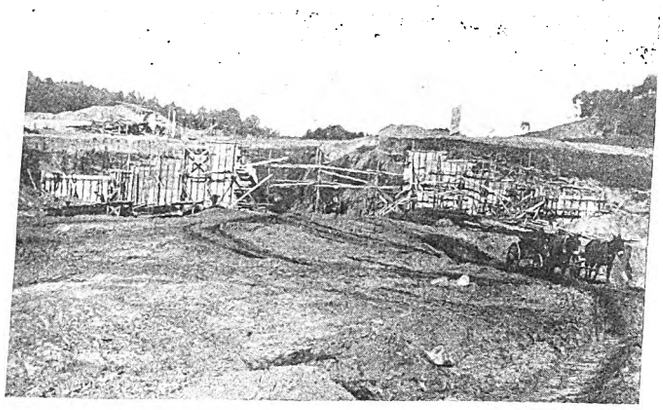


The west portal as it looked in 1927. This view was taken from approximately the same point as the 1915 picture. The intensive real estate development can be seen. The open track area has since been paved

Another view of the hill above the west portal. This also shows how completely the territory has been built up and a new residence district formed

In connection with the construction of the tunnel, parallel tracks of the municipal street railway lines were built along Market Street all the way to the ferries at its foot. The private railroad corporation serving the city contested the latter's right to construct and operate parallel tracks on Market Street, although the thoroughfare is 120 ft. wide. It was only after the case was argued in all the courts, ending by a decision from the Supreme Court of the United States on April 21, 1919, that the city's rights were definitely determined, and it was permanently granted permission to operate cars on the outer tracks.

Cars of the Municipal Railway commenced operating through the Twin Peaks Tunnel on June 1, 1918, from the Ferry along Market Street and to Sloat Boulevard. Extensions were made at both ends, and on April 12, 1919, the Taraval Street line was operated as far as 33rd Avenue. Since that time there has been a steady growth in the district west of Twin Peaks. The Municipal Railway system has been increasing its annual receipts



The site of the west portal of the Twin Peaks Tunnel at the beginning of construction work in 1915. The undeveloped character of the territory is apparent

constantly since its first installation in 1912. The actual returns for the year ending June 30, 1928, amounted to $3,477,665. Of this amount the zone feeding through the Twin Peaks Tunnel provided receipts of $691,024, which means that the yearly travel was 13,820,493 persons. The passenger business has expanded practically 300 per cent in the last ten years, and there is no doubt about its greater expansion in the future, so that as a railroad transportation asset the Twin Peaks Tunnel is of great value to the citizens of San Francisco.

Table IV indicates the growth in annual receipts of lines passing through the tunnel for the past ten years.

Table IV—Receipts of Twin Peaks Tunnel Lines, San Francisco Municipal Railway

Year Ended June 30	"K" Line	"L" Line	"M" Line	Total
1918	$38,994	.....	.....	$38,994
1919	249,239	$1,647	.....	250,886
1920	321,089	8,896	.....	329,986
1921	368,928	10,056	.....	378,984
1922	389,011	11,018	.....	400,030
1923	420,099	13,205	.....	433,304
1924	414,747	92,781	.....	507,528
1925	424,760	141,350	.....	566,110
1926	445,142	176,689	$8,342	630,173
1927	448,865	193,501	9,303	651,670
1928	435,558	227,509	27,957*	691,024

*"M" line temporarily ran to ferry from Oct. 31, 1927, to Feb. 27, 1928.

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The overhead structures for supporting the contact wire on the Lackawanna electrification were completed first at the Montclair station

Instruction Progresses with

By

J. G. MORGAN
Director of Personnel
Delaware, Lackawanna & Western Railroad

WITH rapid progress now being made by the Lackawanna Railroad in the change from steam to electric power, the officials of the company are directing their attention to the proper training of their supervisors and foremen. Under J. G. Morgan, director of personnel, assisted by the vocational division of the State Department of Public Instruction, an educational program consisting of selected group conferences was begun more than a year ago with the supervisory forces in the round houses, terminals and repair shops. The men in these conferences soon recognized the necessity for training in the electrical field if they were to direct intelligently the working forces which in the near future would be placed under their supervision. As a result, they requested special conferences and instruction. Consequently a short course in applied electricity was organized and carried through to a successful conclusion at the Paterson Vocational School, which is affiliated with the State Department of Public Instruction. This course included study of the effects of electricity, methods of generation, Ohm's law, direct current, direct-current motors, direct-current generators and motor control apparatus. Since the electrification of the road involves the utilization of direct current only, the instruction for this group was confined to that field alone.

Following the course just outlined, a more advanced series of conferences is being held during the present term by the state department under the joint supervision of the Paterson Vocational School, Jackson & Moreland, consulting engineers on the electrification, and the Lackawanna engineers, for the purpose of aiding the supervisors in dealing with technical problems of instruction and the specific problem of the Lackawanna electrification. There are also two other courses going on for the rank and file on the Morris & Essex division, and one for the foremen at Scranton is being organized and will be under way before the first of the year. Plans are also being made to outfit properly a class room with equipment parts and to have one of the multiple unit cars arrive as soon as possible so that both may be used for practical demonstration.

On every Tuesday evening, those supervisors who took the preliminary foreman leader conference course last year are meeting at the Paterson Vocational School for the study of the specific problem of electrification of the Lackawanna road. Arthur J. Manson's "Railroad Electrification and the Electric Locomotive" is used by this class as a textbook. The course covers a period of 35 weeks from Oct. 1, 1929, to May 27, 1930, with conferences and assignments as shown opposite.

A second group of supervisors is meeting each Thursday evening in the Terminal Concourse in Hoboken and is taking up the subject of "foreman conferences" under the instruction of John M. Fecher, supervisor of foreman training, State Department of Public Instruction. The outline for this particular course covers the stages through which a foreman's mind should pass in conducting a conference, namely, gathering the facts, selecting the facts, comparing and evaluating them, deciding and carrying out the decision. The supervisor is impressed with the idea that his job is a three-phase one; that besides being a supervisor he is also a manager and an instructor and that the formula for his qualifications should be:

$$E = M + T + I + J + Mo,$$

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What Is Morale in Industry?

1. Honesty
2. Good character
3. Mental attitude
4. Fair judgment
5. Respect
6. Obedience
7. Loyalty
8. Good citizenship

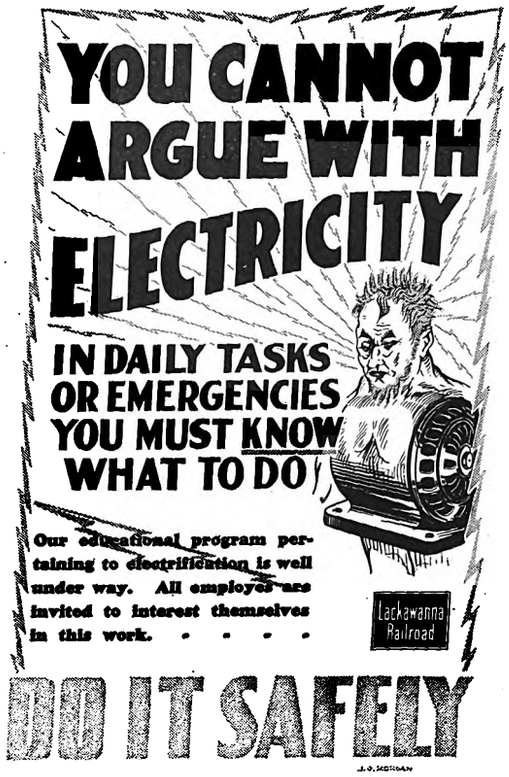
What Causes Poor Morale?

1. Setting a bad example
2. Poor supervision
3. Playing favorites
4. Lack of discipline
5. Improper instruction
6. Wrong attitude
7. Lack of co-operation
8. Lack of materal
9. Misunderstanding
10. Carelessness
11. Poor workmanship
12. Lack of character analysis
13. Bad disposition of foreman
14. Poor material
15. Poor working conditions
16. Unsanitary conditions
17. Poor tools
18. Lack of safety
19. Indifference
20. Home conditions
21. Ignorance
22. Disrespect

How Can You Improve the Morale in Your Department?

1. By setting a good example
2. By giving proper instructions.
3. By sympathizing with workers
4. By observing company rules
5. By co-operation with workers
6. By promotion whenever possible
7. By being fair
8. By a good disposition
9. By social activities on and off the job
10. By being broadminded

or, his equipment equals manipulation plus technical knowledge plus industrial planning plus judgment plus morale. This is known as the Allen Richards formula. Discussion of these subjects is then followed by instruction in the proper methods of teaching. This course covers a period of 35 weeks, after which the supervisors are ready to take up the practical electrification work and instruct the men under them. Mr. Manson's book is used as a reference rather than a text in this course.



This poster has been used to good advantage on the Lackawanna to emphasize to the men that they will be working with a new motive force

Construction

The first four conferences held by this group dealt with the question of morale and the tables shown above resulted from the discussion of that subject.

After summing up the discussion on poor morale, it was decided that the condition could be laid to either one of two reasons: (1) The worker is ignorant and does not know any better; (2) the worker knows better but refuses to carry out the things which would affect morale. It was decided that the latter was a mental condition and could probably be helped by the foreman.

Another interesting discussion in these first conferences dealt with the responsibilities of the foreman and how his job differed from that of the workers. It was

Conferences and Assignments in D. L. & W. Course on Electrical Operation

Oct. 1—Review of last year's work.

Oct. 8—Review of last year's work, continued.

Oct. 15—General discussion of D. L. & W. electrification—maps, tracks, system, features (voltage, combination switching locomotive, tunnel, speeds, substations, signals, etc.). Advantages of electrification (Ref. Chap. 1 of text).

Oct. 22—Review of elementary laws of electricity (Ref. Chap. II and III of text).

Oct. 29—Generators and motors (Ref. Chap. V and VI).

Nov. 5—Systems of control for M-U cars and locomotives. General description of D. L. & W. M-U car electrical equipment (Ref. Chap. XI, XII and XIV).

Nov. 12—Characteristics and features of GE-700 motor for D. L. & W. cars (Ref. Chap. IX, XXII).

Nov. 19—Control and auxiliaries for D. L. & W. M-U cars—general (Ref. Chap. XVIII, XXI).

Nov. 26—Theory of train operation—train resistance, acceleration, coasting and braking, speed-time curves, calculation of energy (Ref. Chap. XIV, XXV, XXVI).

Dec. 3—Theory of train operation—elementary problems encountered in design and application of electric railroad apparatus (Ref. Chap. XXV, XXVI, XXVIII).

Dec. 10—Theory of train operation—elementary problems, continued.

Dec. 17—Mechanical features of M-U cars—electro-pneumatic brakes, trucks, conduit mounting of apparatus, gears, etc.

Jan. 7, 1930—General discussion of power supply and distribution systems, rectifiers, tie stations, high-speed circuit breakers, track bonds, etc. (Ref. Chap. XXIX).

Jan 14—Catenary system and sectionalization.

Jan. 21—Substations and substation apparatus.

Jan. 28—General discussion of electric locomotives (Ref. Chap. XII, XIII).

Feb. 4—Electrification of D. L. & W. tunnel-run service—details of combination locomotives to be used.

Feb. 11—Details of D. L. & W. multiple-unit cars.

Feb. 18—Common operating troubles with M-U cars.

Feb. 25—Testing methods used with M-U car apparatus.

March 4—Resuscitation from electric shock.

March 11—Car shops and maintenance of M-U cars (Ref. Chap. XXIV).

March 18—Inspection trip to B.-M.T. shops.

March 25—Details of D. L. & W. M-U cars—P. O. controller, master controller, reverser, control relays.

April 1—Details of D. L. & W. M-U cars—dynamotor, generator and compressor.

April 8—Details of D. L. & W. M-U cars—pantograph, line breaker, fuses, lightning arrester.

April 15—Details of D. L. & W. M-U cars—G.E. 700 motor and field shunts.

April 22—Deetails of D. L. & W. M-U cars—heaters and auxiliary contactors.

April 29—Details of D. L. & W. M-U cars—control generator, lights, storage battery, regulators, etc.

May 6—Details of combination locomotive—Diesel engine and generator.

May 13—Details of combination locomotive—control and battery.

May 20—Details of D. L. & W. electric shops.

May 27—General wind-up and answers to questions.

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agreed that, in order to obtain production, a foreman must have men, trade knowledge, skill, machines and materials. In fact, while this formula outlined the job of the worker it was found equally applicable to the foreman, who, in addition, must be able to assume responsibility for production. The foreman's responsibilities were then listed in the order of their importance and each man was asked to evaluate the relative degree of supervision required by each item as compared to the degree of thought or worry he gave to it. These valuations were placed on a chart and two graphs constructed which tended to determine for the foreman himself whether or not he was applying his energy and thought to the most important phases of his work.

The third course is for the men of the rank and file and Kingsland shops, Hoboken engine house, Secaucus round-house and car department and the car department in Hoboken. Approximately 100 men are in this class which meets in the Hoboken Terminal each Friday evening under the direction of George Wall, chief electrician of the Lackawanna Railroad. The principles of morale and co-operation are being discussed in detail along the following lines: Morale as a mind builder; morale from the standpoint of the company's policies and of community betterment. Following this the class takes up elementary mathematical problems, how to take orders, how to carry out orders and how to co-operate with other departments. Each man is supplied with a list of parts that will be used in the electric multiple-unit car equipments and he is required to familiarize himself with the names of these parts.

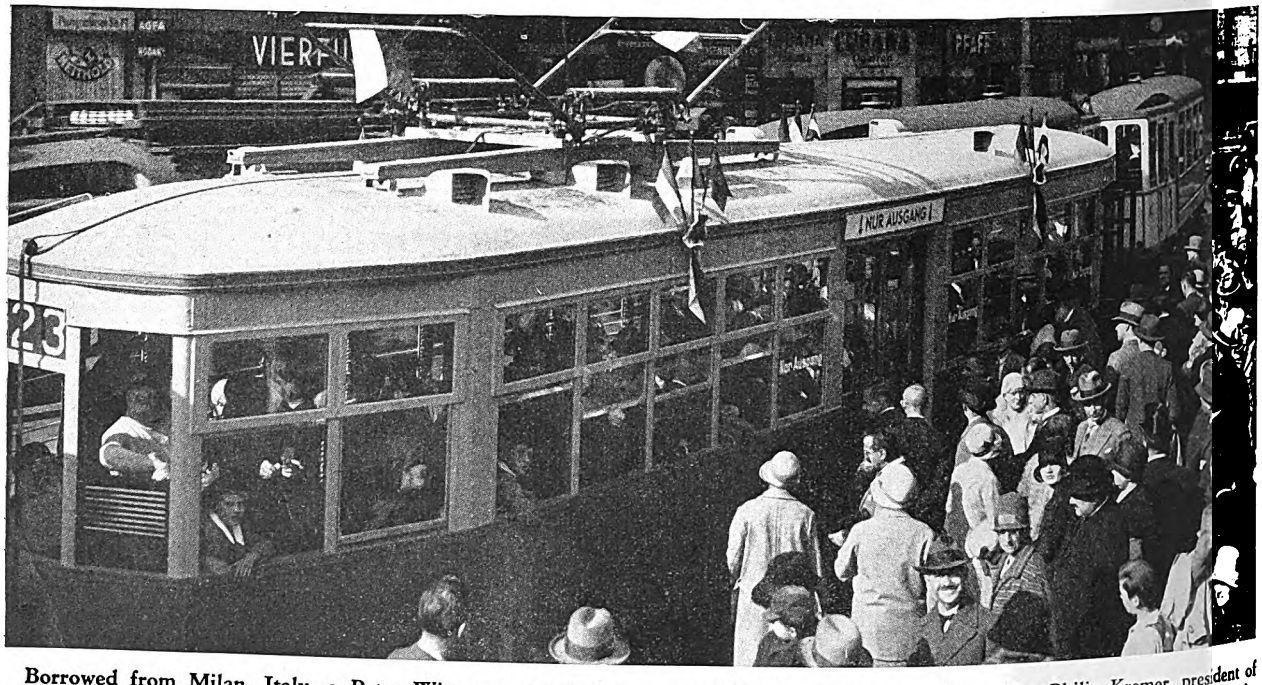
Supplementing the class-room work, this third class also meets at the Paterson Vocational School every Tuesday evening where a laboratory has been outfitted with the various parts of the equipment to be used and practical demonstration and instruction can be given.

In this course as well as in all others, the question of safety is being emphasized to a very great extent. With the new operation by electricity, new accident hazards will be met. One of the most important results of these conferences will be the establishment of proper safety practices. The poster reproduced with this article, emphasizing that "You Cannot Argue with Electricity" and that "in daily tasks or emergencies you must KNOW what to do," has appealed to the personnel of the road and has made them realize that instruction and practical training are necessary for their new work.

In addition to the program of education and instruction now in force, an outline of a new course for apprentice electricians has been proposed. There are 41 units of instruction planned in this course under four general heads: namely, shop assignment, shop mathematics, blueprint reading and general shop information. Under shop assignment, the apprentice who is to become eligible for a standard credit card for any of the nine units in this group must have diligently performed the assignments for approximately the duration of time indicated, and, through the co-operative efforts of the shop instructor, the foreman and the mechanics, must have been trained to a high standard of skill on the work. Similarly, the apprentice, to be granted a standard credit card for the shop mathematics unit of study, must understand the shop practices, including the necessary technical and production information underlying the unit, and be able to solve readily the practical shop calculations.

To qualify for credit in the blueprint unit, the apprentice shall have done a sufficient amount of work to enable him readily to transmit and understand all information given and received by him in the form of blueprints. Under the last heading of general shop information there are 29 units of study pertaining to technical and general practices of operation.

Pay-as-You-Pass Car Introduced in Germany



Borrowed from Milan, Italy, a Peter Witt type car is being tried in Frankfurt, Germany. On account of the multiple zone fare system in effect there, however, it has been found necessary to employ two conductors. Moreover, the dimensions of the car prohibit its use on many lines. Dr. Philip Kremer, president of the Frankfort City Railway, favors the use of large capacity units rather than motor cars and trailers, but believes this object can best be accomplished by means of articulated cars.

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Transportation a Subject Discussed at the World Engineering Congress

WITH representatives of 26 countries in attendance, the World Engineering Congress, held in Tokio, Japan, was opened on Nov. 1 by Prince Chichibu. According to a cable dispatch from the representative of ELECTRIC RAILWAY JOURNAL, speakers from all nations stressed the part played by engineering in the advancement, welfare and economic progress of all countries, the value of the engineering profession being recognized in official circles now as never before. Progress in Japan is demonstrated by the development, in its 50 years as an industrial nation, of engineers whose work is recognized and commands respect in countries much older nationally.

This congress has become the greatest conference yet held for the exchange of engineering information on all phases of modern industry, covering past and future prospects under most varied conditions. Steam from volcanic heat and electric power generation by windmills are possibilities that were touched upon. The advantages of high voltage and superpower interchange were discussed, along with the hope for an international steam table and a standard form of power utilization statistics. Water storage for power, flood mitigation and irrigation were considered carefully in the light of American experience.

Among the papers presented by American delegates were several of special interest to transportation men. These included "Factors Governing the Use and Construction of Motor Trucks," by B. B. Bachman, of the Autocar Company; "Automatic Train Control," by C. E. Ellis, secretary of the committee on automatic train control of the A.R.A.; "Employment of the Less Volatile Fuels for Motor Coach Engines" and "Heavy-Duty Motor Coach Brake Design," both by G. A. Green, vice-president General Motors Truck Corporation; "Application of Motor Transport to the Movement of Freight and Passengers," by F. C. Horner, General Motors Corporation; "Economic and Operating Considerations in Railroad Electrification in the United States," by Prof. D. C. Jackson of the Massachusetts Institute of Technology; "American Developments in Diesel Engines," by L. H. Morrison, associate editor *Power;* "Rapid Transit Subways in New York City," by Robert Ridgway, consulting engineer New York Transit Construction Commission; "Transportation," by Major Mott Sawyer, superintendent Chicago, Milwaukee & St. Paul Railway; "Railway Engineering," by John F. Stevens, consulting engineer, New York; and "Improved Utilization of Railroad Equipment," by Roy V. Wright, managing editor *Railway Age.*

Discussing the subject of motor transport, Mr. Horner traced the use of the motor truck, first for the haulage of the food products necessary for life, and then for local and long-distance general hauling. A section followed on the use of this form of transportation by public utilities and municipalities. The co-ordination of railroad and highway transportation was discussed at some length, the topics covered including store-door delivery, railroad terminal trucking and a comparison of the volume of freight handled by the railroad and the motor truck. The author pointed out that the movement of freight by motor transport is still in its infancy and the biggest problem is the application of this new transportation tool to present-day requirements, intensive and comprehensive use of the motor truck in the short-haul areas of large cities and its co-ordination with the railroads.

On the subject of passenger transportation by motor vehicles, Mr. Horner presented a comprehensive picture of the present status of the motor coach in the United States. The growth of the bus industry was traced from its inception to the present time. The electric railway lines have not been slow in adopting this form of transportation, for more than 300 such companies in the United States and Canada are now operating approximately 10,700 motor coaches covering more than 20,000 route-miles in conjunction with their rail service, while some 50 additional companies have entirely replaced their electric car service, using more than 500 motor coaches for this purpose. The motor coaches operated by all these companies were operated an aggregate of 300,000,000 miles during 1928 and carried more than 1,000,000,000 passengers. The steam and electric railways are making money in two ways by using motor coaches: first, by reducing losses on unprofitable train service and, second, through actual increase of passenger revenue from motor coach lines acting as feeders and supplementary to long-distance rail service. The extent of city motor coach transportation was shown in tables, and examples of operating revenues and costs were given. The latter part of the paper was devoted to considerations of the causes of delays in service, taxation of motor trucks and motor coaches, and restrictions imposed for the protection of highways and their users.

Mr. Green discussed the various types of brakes which have been developed for motor coaches in view of the severe demands imposed on them by modern traffic. He gave the advantages and disadvantages of mechanical brakes, air brakes and hydraulic brakes. Metal-to-metal brakes and propeller shaft brakes also were considered. In conclusion, Mr. Green stated that it is his belief that the future heavy-duty motor coach braking systems will possess the following general characteristics: (1) Hydraulic operation, with either pressure or vacuum-type boosters; (2) a booster and master cylinder as an integral unit; (3) hydraulic brake-operating cylinders of the external type; (4) brake shoe design that provides for 100 per cent drum contact as nearly as possible, with uniform pressure around the entire interior circumference of the brake drum; (5) the molded types of brake linings; (6) propeller shaft brakes; (7) brakes on all wheels.

Speaking on the subject of motor trucks, Mr. Bachman predicted that the future probably will witness further increases in engine sizes and an increasing use of six-cylinder and possibly eight-cylinder engines to meet the need for greater average road speed without such an increase in maximum speed. Improvement in brakes and the use of four-wheel brakes naturally will follow this increase in speed. Greater protection for the operator, more comfortable seats, and easier operation of the steering gear and controls also will be demanded, together with better riding quality and smoother and quieter engines, transmission and rear axles.

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Boston L Tempts Auto-Commuter by Clever Advertising

BEFORE planning its advertising campaign for this year the Boston Elevated Railway carefully studied the advertising of other companies all over the United States. Several cities, it was found, based their advertising copy on an appeal to the pocketbook of the prospect, pointing out how economical it was to use their service. However true that theory was, it opened the road to argument. Other cities took an aggressive point of view in their advertising campaigns, stressing the evils of parking, and claiming that thousands of street car riders were inconvenienced in order that a few people who traveled by motor might enjoy special privileges. Since the persons whom it is desired to influence are these same automobile riders, the result of such tactics may be to arouse antagonism rather than to win people over to the use of public transportation service. Hence, the Boston Elevated decided to base its advertising on suggested co-operation between automobile riders and the railway.

Throughout the campaign emphasis was placed continually upon the importance of keeping out of traffic. The subject matter of the copy was centered upon the many things that happen to a motorist who drives his car into the city. The remedy suggested was to park the auto near some rapid transit station and ride to and from the city in comfort and ease.

Among the many advantages offered the motorist in patronizing the "L," as stated in the advertising, were: Absence of all worry about getting suitable parking space in the city; absence of the risk of having his automobile damaged in a collision; elimination of tedious waiting in traffic jams, and the freedom from being tagged for infringement of one of the many and confusing traffic rules prevalent in the city.

To give the advertising force, specific mention was made of certain parking spaces along the rapid transit lines and the areas that they serve. For example, one read: "Do you live in Reading, Wakefield, Stoneham, Saugus, Melrose, Medford, Everett or Somerville? Leave your car in a convenient garage or parking space at Everett station or Sullivan Square and continue on to Boston via the Elevated."

The campaign included a series of eight advertisements that appeared during the months of July and August. Metropolitan and suburban newspapers were used, as well as one local financial newspaper and several foreign-language newspapers in which the advertiser's message had a local or specialized appeal. The ads were two columns wide and about 9¼ in. high.

In order to make the advertising campaign effective, only the points on the rapid transit lines were recommended for parking where open air parking spaces or garages were in existence. At most of the rapid transit stations recommended there were private parking spaces and garage facilities available. Near two stations the Elevated had leased for parking purposes land of its own to private interests who looked after the business of the auto parks. In these two areas the parking charge is 25 cents per car. In building new stations the company has in mind the necessity of adequate parking facilities even to the extent of providing for them as far as possible in the plans of the new stations themselves.

Tokio Adopts Western Traffic Control

Traffic signal on a busy street in Tokio

STOP and go traffic signals of a type similar to those widely used in this country recently have been introduced in Japan. An accompanying illustration shows a signal at Hibija Park Corner, Tokio. The control is manual. A warning bell tells when the signal is about to be changed from "go" to "stop." Directions are given in English as well as Japanese.

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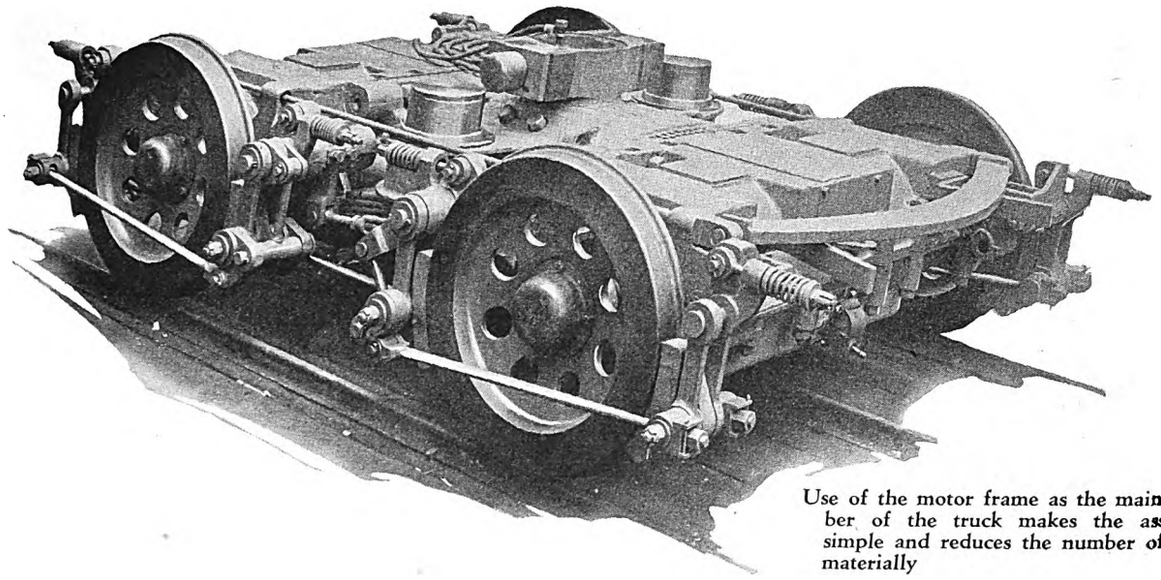

Use of the motor frame as the main member of the truck makes the assembly simple and reduces the number of parts materially

Integral Truck and Motor

Feature New Liverpool Car

In this radical design practically all unsprung weight except wheels and axles has been eliminated. The motor casing itself forms the main member of the truck, and the armature, mounted longitudinally, drives the two axles through spiral bevel gears mounted on quills

NOVEL construction of the trucks features a type of tram car designed by Percy Priestly, general manager of the Liverpool (England) Corporation Tramways. The design was worked out in conjunction with the English Electric Company and the car was built by the latter.

The object in view was to produce a car which would be suitable for present-day and future requirements of city passenger transport. This entailed considerably higher speeds than normal, but other desirable features were considered necessary, such as improved spring suspension, ease of riding, reduction of noise, low wheel loading and reduced cost of maintenance.

As no single truck was considered satisfactory for high speeds, combined with the rapid acceleration and retardation deemed essential, it was decided to develop a double-truck car, having as long a total wheelbase as possible to negotiate the curves encountered in Liverpool. To give the higher speeds the driving equipment employed consists of two DK-120 motors, each rated 60 hp. at 500 volts, an exceptionally high power for British practice. All four axles are drivers, so that the whole weight is available for adhesion, and maximum acceleration can be obtained.

The design of the motor and truck is entirely novel. The two have been developed as a single unit, so that the motor forms an integral part of the truck. The arrangement will be seen in the line drawings which are reproduced. The motor is mounted longitudinally, with its shaft in the same horizontal plane as the driving axles. A bevel pinion on each end of the armature shaft drives a spiral bevel gear mounted on a quill surrounding the axle. The quills are mounted on large roller bearings in cast-steel casings secured to the main frame of the motor, so that the gears always mesh correctly. Also, in order to maintain the correct relation to insure proper meshing of the gears, the motor armature is mounted on roller bearings. Since no wear takes place in the bearings, the correct pitch line will be maintained between pinion and gear, ensuring smooth and quiet operation.

At each end of the quill is a flexible drive for transmitting the power to the driving wheels. This flexible drive allows relative movement in all directions between the quill and the axle without setting up additional strains in the driving gear.

The truck, which really consists of the motor together with the two end casings, is supported on eight coil springs, which are mounted on cast-steel caps containing anti-friction bronze axle bearings. Hence the only unsprung weight in the entire assembly is that of the wheels, axles and axle bearings. This feature is most important when considering track maintenance, as the hammer effect on the rails has been minimized. Similarly, by distributing the weight of the car over four axles, the axle load is considerably less than in normal British practice, so that a track upon which this type of car is operated should have considerably longer life with less upkeep.

Lubrication is simple, as each casing at the end of the

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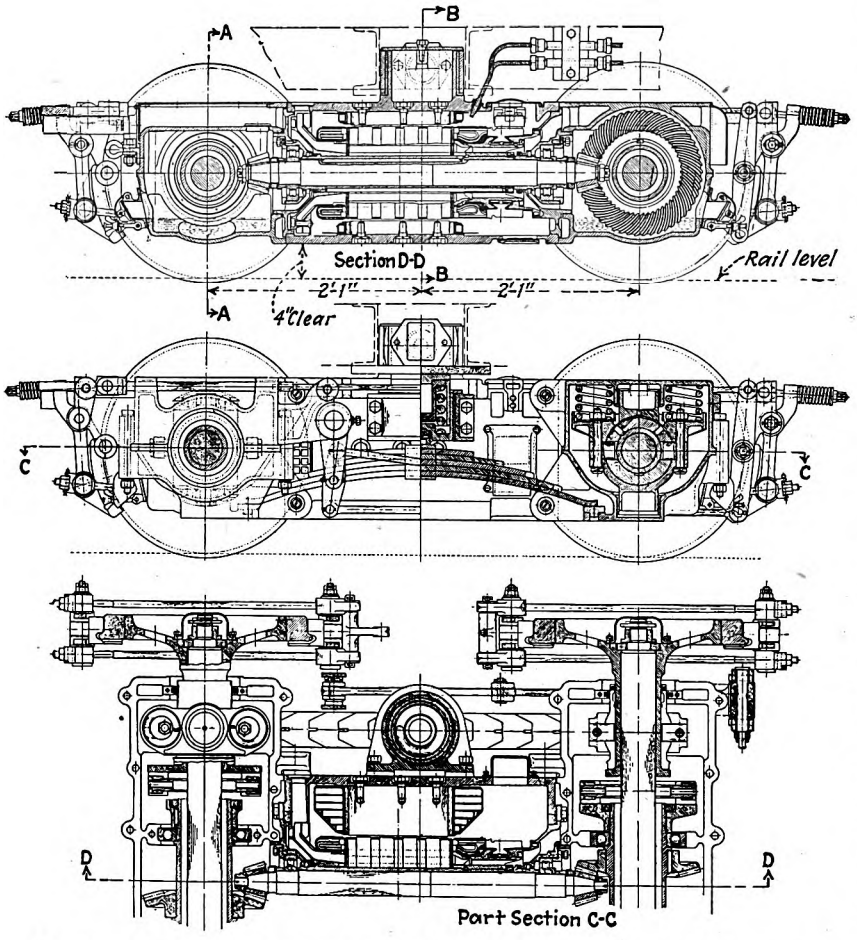


The position of the various parts of the Liverpool Tramway car drive is shown clearly in the sectional drawings of the truck and motor

Principal Dimensions of Experimental Car, Liverpool Corporation Tramways

	Ft.	In.
Length over collision fenders	37	0
Length over body	28	0
End platforms	4	0
Distance between bogie centers	17	6
Bogie wheelbase	4	2
Overall height (rail to top of trolley plank)	10	5
Height, top of floor to under side of veneer ceiling	7	6
Height of doorway	6	0
Width over roof	7	2
Width over monitor roof	4	4½
Width between sills	6	6
Width of transverse seats	2	7½
Depth of transverse seats	1	4½
Distance between seats		11½
Width of aisle	1	2

motor forms an oil reservoir from which all the axle and motor bearings, flexible drive and gears, are lubricated. Thus, on the complete car there are four oiling points, compared with the 28 that would be necessary on a bogie car with four driving axles if built according to the standard design.

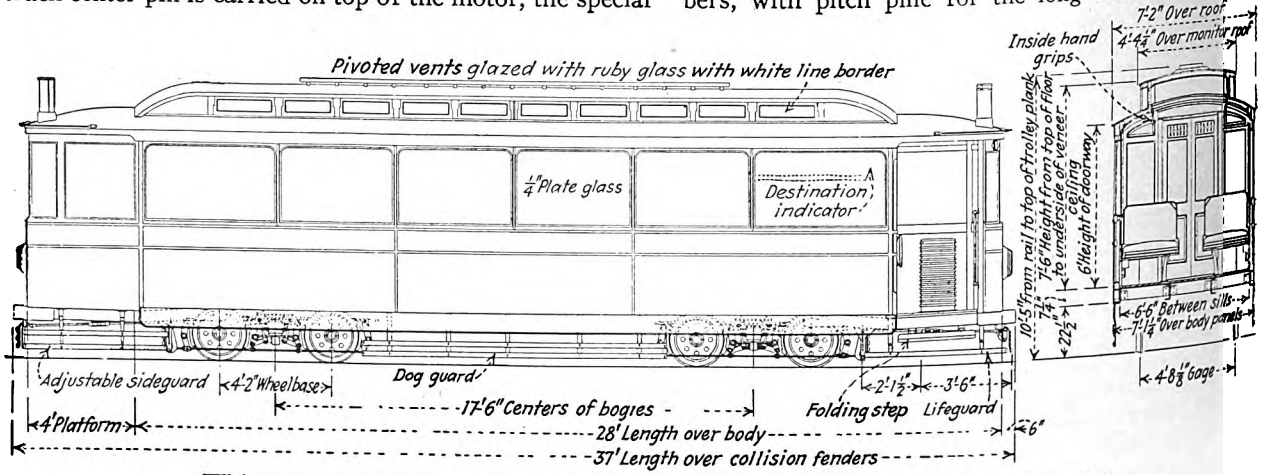
The springing consists of two large semi-elliptic springs placed in series, with two coil springs to carry the car body on the truck, while the truck itself is carried on the axles by eight coil springs. This combination of semi-elliptic and coil springs makes the car very comfortable and easy riding.

The driving wheel diameter is 24 in., and although the truck center pin is carried on top of the motor, the special design of the motor permits the low floor level of 28½ in. without sacrificing road clearance, which is a minimum of 4 in.

The control equipment also is special, being arranged for use with multiple-unit two-car trains. The controllers are of the English Electric Company drum type, so arranged that it is possible to drive each separate car or the two-car unit from either end. The only extra switch gear necessary is the change-over switch on each car, together with a three-way coupler. Line contactors have been incorporated so that when the power is shut off the whole of the break of current is taken on them, reducing considerably the wear and tear on the controller. The electric braking feature has been retained, although, in order to keep the control as simple as possible, the electric brake, which in Liverpool is used essentially for emergencies, is operative on the forward car only. For the same reason, the reverse position of the controller operates the motors on the leading car only.

The auxiliary equipment is of standard English Electric Company type, including D form A circuit breakers and FR resistances. The trolley is made to the special design of the Liverpool Tramways Department.

The car body is designed as a de luxe type with cross seats, except for double side seats at the ends, similar to American practice. The seating capacity is 44. The main body framing consists of teak for all exposed members, with pitch pine for the long rails which are not



With 24-in. wheels it has been possible to obtain a low floor height without the use of ramps

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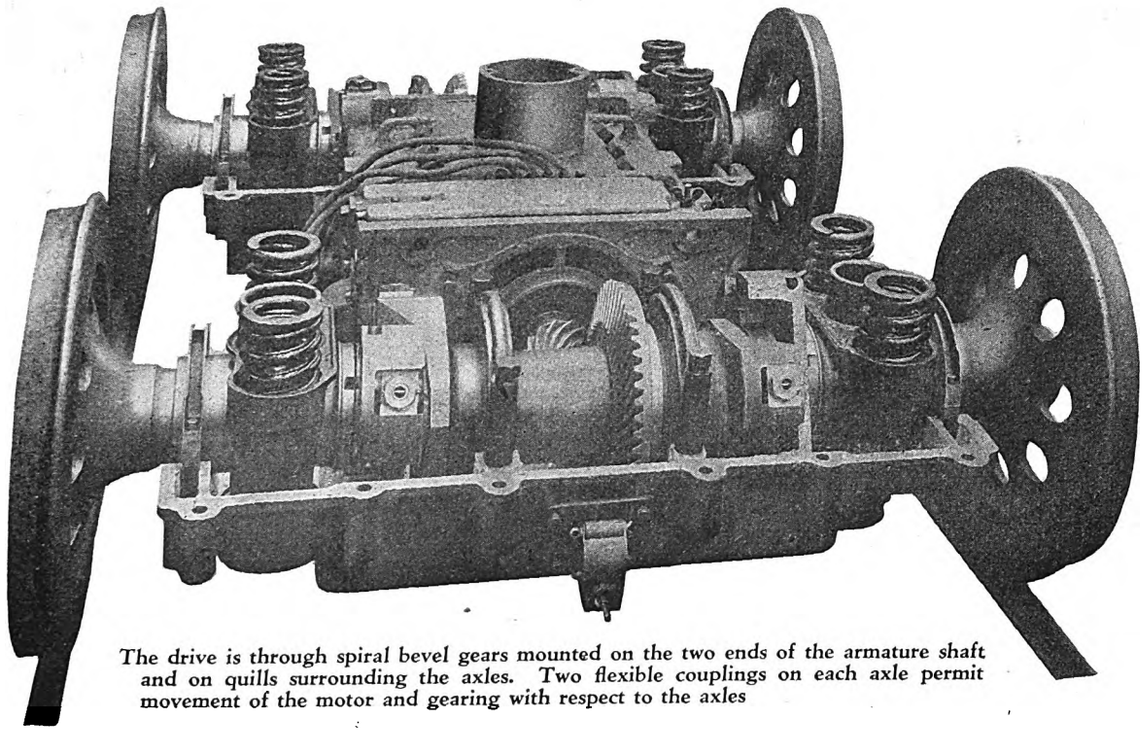

The drive is through spiral bevel gears mounted on the two ends of the armature shaft and on quills surrounding the axles. Two flexible couplings on each axle permit movement of the motor and gearing with respect to the axles

exposed. The underframe is built up of mild steel sections with packings of oak for cross bars and pitch pine for sole bars, the whole being securely framed, together with the necessary knees and gussets. In addition to the substantial sole bar, a special adjustable truss rod attached to the pillars along the body and passing through the headstock has also been fitted.

The roof is of the monitor type, which is standard on the single-deck buses built by the Liverpool Tramways. The inside finish of the car is mahogany-stained and cellulose-lacquered in the natural grain, together with panels of the same material. The seats are special English Electric reversible tilting type, fitted with comfortably-sprung backs and cushions. They are upholstered in blue leather. The grab handles and furniture are covered with doverite, while instead of hand poles separate doverited hand grips are secured to the bottom monitor rail. The ceilings are of three-ply birdseye maple veneer, paneled out with mahogany moldings and ornamented with gilt lines.

Special attention has been paid to the lighting. Inside the saloon are thirteen lamps, four down each side and five down the center under the monitor roof. The fittings consist of large base holders with super-lux white glass shades and silvalux opal gas-filled lamps.

Hudson-Bowring lifeguards, Philipson side-guards, and destination signs of the standard Liverpool pattern are part of the equipment.

The accompanying table gives the principal dimensions.

The car body in the new Liverpool car is quite similar to American practice

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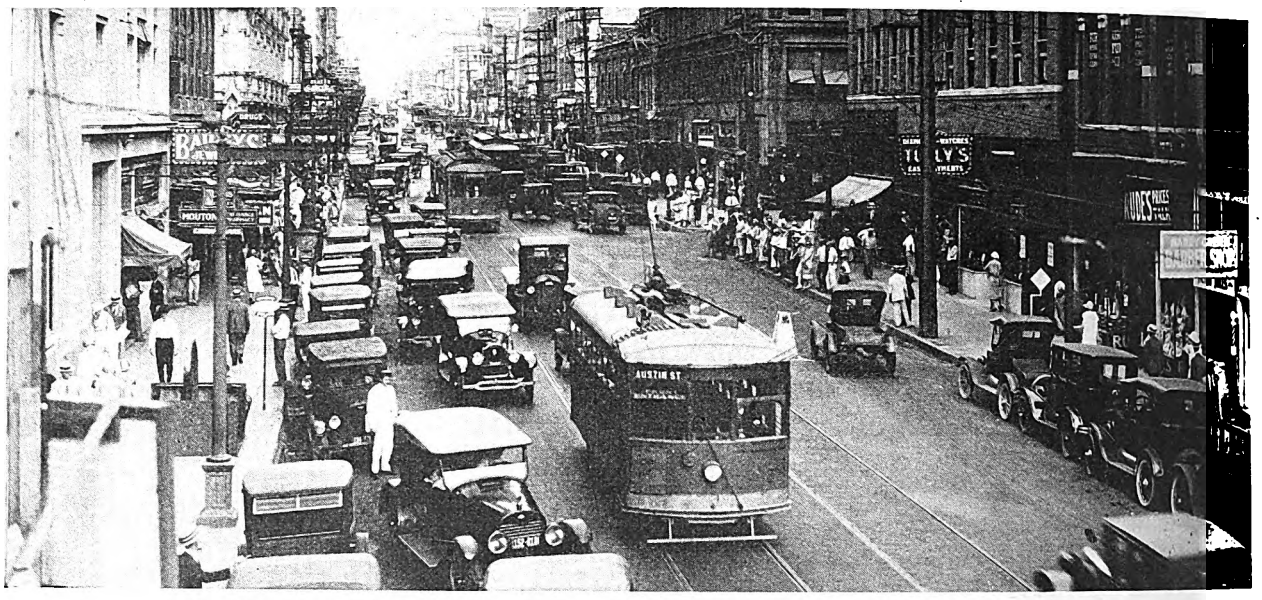

Use of track area by vehicles of all kinds is an important factor in selection of paving materials

How Changing Traffic

Survey of specifications and materials used by more than 30 electric railways for paving in the track area shows trend toward development of certain standard designs

WITH vehicular loads constantly increasing in weight and railway loads decreasing, due to lighter car construction, the selection of the type of paving to be used in the track area cannot be based on the requirements of the railway alone but must be based on careful study of the demands to be made on the whole street surface. Despite the progress which has been made in securing relief from paving burdens, this subject remains a major problem with the electric railways. Standardization of paving materials and structure has occurred in recent years on many individual electric railways, despite some difficulties imposed by municipal ordinances and the wishes of abutting property owners. Practices on railways located in different cities, however, continue to vary widely, as shown by a survey just made by ELECTRIC RAILWAY JOURNAL covering more than 30 leading properties in the United States and Canada.

Few city railways serving heavily congested downtown areas as well as outlying residential districts have been able, or have deemed it advisable, to standardize on one type of paving construction. Numerous companies can boast of past experience with nearly every known paving material and a large number of them still have in use such surfaces as granite block, asphalt, concrete, brick and wood block. This experience has given each material a fair period of trial and permitted detailed observations of its adaptability to local conditions. As a result, most companies have adopted as standard not more than two methods of construction with two surface materials, which meet all their requirements.

Several railways have, for all practical purposes, standardized on one paving specification for the entire system, but the surface materials selected by the different systems vary widely. Way engineers, almost without exception, believe that the factors governing the selection of a paving material are: (1) cost, (2) durability, with due regard for the amount and kind of traffic using the area, (3) the facility with which the material lends itself to repairs by the company's own forces and (4) salvage value when ordinary repair or complete reconstruction becomes necessary. Yet to meet these requirements representative railways are using distinctly different surfaces.

Most companies are approaching a uniform practice by using fewer standard types of paving each year. A sturdy, hard surface construction, such as granite block, is favored on heavy duty streets and a lighter material, as asphalt, for outlying, lightly traveled districts. For example, the Boston Elevated Railway uses granite block for heavy traffic, asphalt or Warrenite for lighter work; the Twin City Rapid Transit Company has 962,000 sq.yd. of granite block, 106,900 sq.yd. of brick and 195,300 sq.yd. of concrete; the Pittsburgh Railways employs block stone, brick and asphalt with block stone stretchers. The Toronto Transportation Commission has some asphalt but attempts to standardize on granite block paving for both tangent and special trackwork.

Franchise obligations, municipal ordinances or gentlemen's agreements between company and city officials are important factors in the selection of paving specifications. In many cases the railway determines the type of paving

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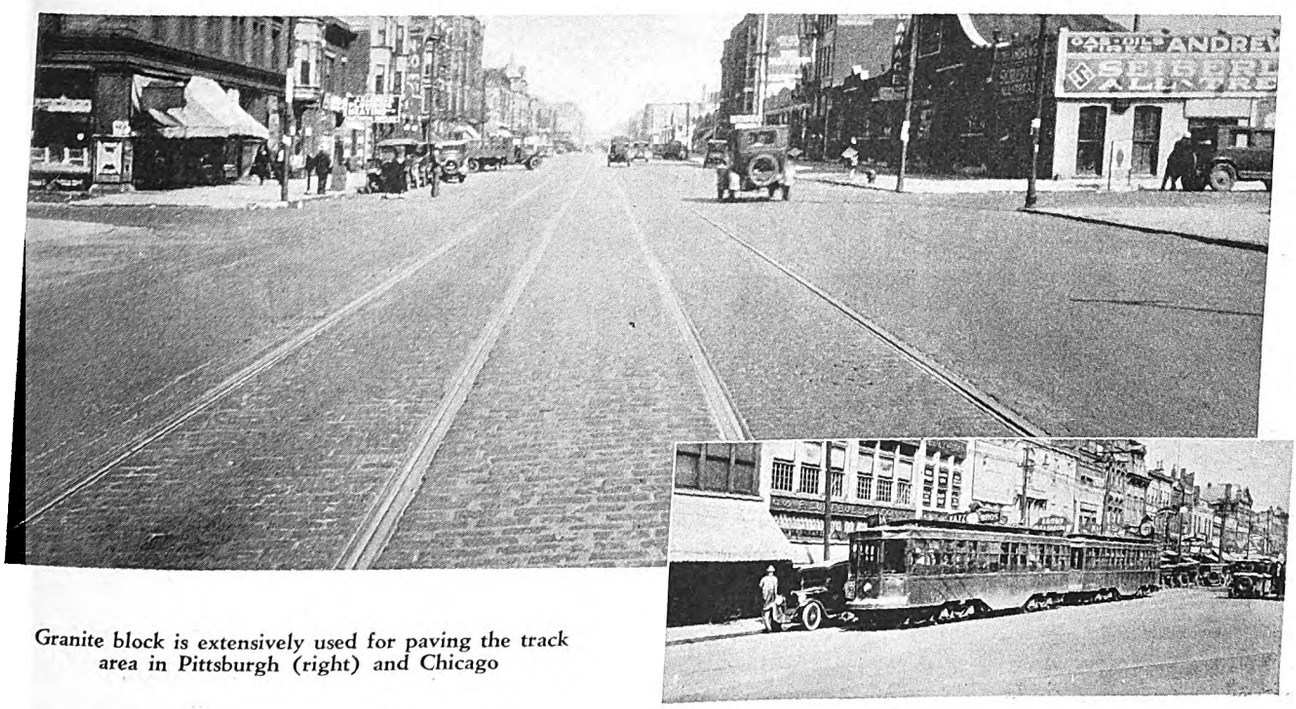
for the track area without following city specifications for the general street surface. In others the city insists on uniformity from curb to curb. Usually, however, as a result of years of co-operation with city officials, the railway and the city plan their construction together. The general tendency, in any event, is toward uniformity throughout a single property.

This does not mean, however, that the street and track areas are necessarily paved alike. In fact, maintenance engineers are almost unanimous in their belief that it is not necessary, and in many cases not desirable, to pave the track area with the same material used on the adjacent street. Ordinarily the railway paves and is solely responsible for the maintenance of the track area, the dimensions of which vary in different municipalities, but which in nearly every instance extends between parallel lines at some distance beyond the outer rails. The Connecticut Company is responsible for a strip 8 in. beyond the outside rail while the Capital Traction Company in Washington maintains to a point 24 in. beyond the rails. The average measurement in this respect is approximately 18 in. There are, however, a number of companies that use special paving between the rails only. In San Francisco, the city paves up to the outer rail but the Market Street Railway is required to maintain the paving between the rails and also 2 ft. on the outside of the outer rails. In Boston, special paving is used between the rails of each track only and in San Antonio the railway paves only between the rails but pays the city for a 2-ft. strip beyond that.

Granite block continues to head the list as the most widely used surface material in track paving. Over 76 per cent of the railways whose practices were surveyed in this study are using granite block in areas that are subjected to hard traffic conditions. Howard H. George, superintendent of way of the Cleveland Railway, summarizes his experiences with various paving materials as follows: "Granite block is by far the most satisfactory paving material for the track area, taking into consideration all of the factors involved. While it is higher in first cost than any of the others, it possesses wearing qualities which no other type of pavement has. It is not slippery in wet weather; it lends itself readily to maintenance repairs, and has a maximum salvage value." His experience with other materials has been that "concrete pavement has shown a tendency to crack badly and has a decided disadvantage in that it does not lend itself readily to economical repairs"; that "'brick does not always run uniform in texture and has but little salvage value"; that "asphalt, besides having no salvage value when repairs become necessary, requires a special plant for its production which the ordinary railway is not

Conditions *Affect* Paving Practices



Granite block is extensively used for paving the track area in Pittsburgh (right) and Chicago

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Underground conduit construction complicates the paving problem in Washington, D. C.

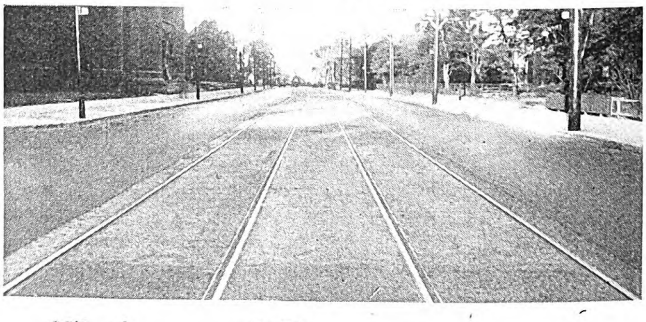
justified in maintaining and, consequently, repair work must be done by outside agencies"; and that "wood block has proved unsatisfactory as it is difficult to keep down and is very slippery in wet weather."

The Toronto Transportation Commission has had past experience with both asphalt and granite block and as a result has adopted the latter material as standard paving for both tangent and special track work. Blocks 4 in. to 4½ in. wide, 7 in. to 10 in. long and 4½ in. to 5 in. deep are grouted in a mixture of one part cement to one part coarse sand, resting on a 1-in. cushion of one part cement to four parts sand. This cushion is laid on a base, approximately 6 in. in depth, of 1:3:6 concrete using a graded gravel for aggregate. W. A. MacRae, engineer of way for this system, believes that although the cost of this granite block construction is approximately twice that of asphalt pavement, the additional cost is justified by the durability of the blocks and their salvage value when rail renewals and repairs are necessary.

Other engineers testifying to the advantages of granite block surface are George T. Wilson of the Twin City Rapid Transit Company and Alfred Sweeney of the Androscoggin & Kennebec Railway, Lewiston, Me., while C. W. Wilson of the Pittsburgh Railways and S. Clay Baker of the East St. Louis & Suburban Railway advocate granite block or brick, the former for high rail and the latter for lower rail construction. In Pittsburgh, the standard practice is to use granite block with 9-in. rail and brick for 7-in. rail, both being laid on a 6-in. concrete base. The old objection of rough pavement where granite blocks were used has been overcome as the result of present skill in dressing the blocks and they can now be laid to a very smooth surface, while experience has proved that such a pavement properly constructed will require no maintenance during the life of the rail.

Equally definite in their views, although not so numerous, are the advocates of asphalt. They claim as factors in the selection of this material for the track area: low first cost, adaptability to all kinds of track construction, ability to withstand demands made upon it by general traffic, and the ease with which it is repaired

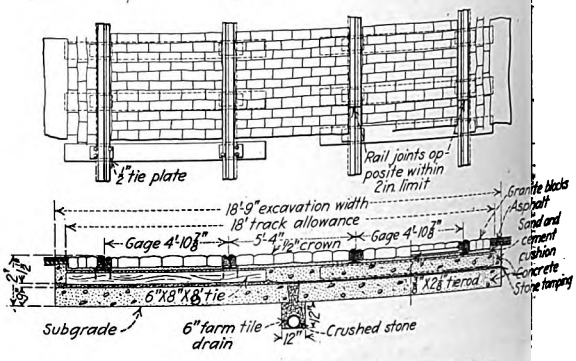
Above — Toronto standardizes on granite block for special track work



At left—A recently completed granite block area shows the excellent appearance of this paving

Below—An advantage of granite block is its adaptability for maintenance repairs

Below—Standard granite block construction of T.T.C.



Paving Practices of the Toronto Transportation Commission

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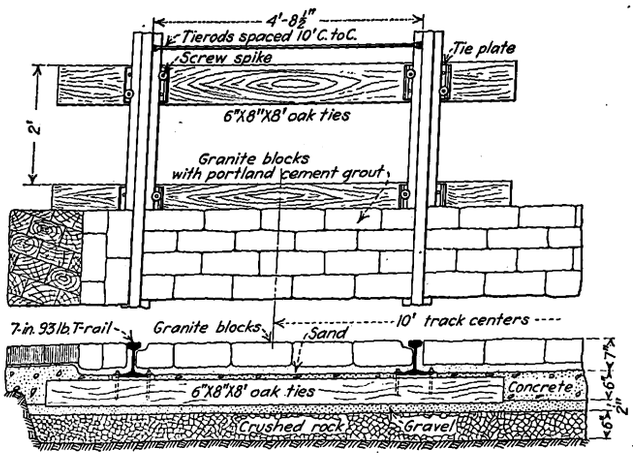
or replaced. Sixty per cent of the railways included in this survey have used, or are now using, some form of asphalt as a surface paving in the track area. It is coming into greater use on the streets in outlying, lightly traveled districts where the appearance of the roadway is a highly important factor and where it is desirable to have a uniform surface from curb to curb. Municipal franchise obligations or preferences and low first cost frequently are responsible for this practice.

Since 1916, the San Antonio Public Service Company has used nothing but cold rolled Uvalde rock asphalt for paving its track area. Mines producing this material are located within a few miles of the city and the supply is practically inexhaustible. This material is ground and prepared for use in quantities of from one ton to any amount needed, for a price $7 to $8 per ton. The cost of laying it varies with the thickness laid and ranges from 4 to 10 cents per square yard. Louis T. Botto, superintendent of maintenance of way for the San Antonio Public Service, states that eighteen years experience has proved the durability of asphalt and emphasizes its adaptability to maintenance repairs and the reconstruction of old surfaces. More than 200,000 sq.yd. of creosoted wood block paving was saved and its useful life prolonged by topping it off with Uvalde rock asphalt five years ago; this pavement now has the appearance of asphalt and requires a close inspection to tell that it really is a wood block pavement. The company applies the same treatment to brick and concrete pavements when they become worn. The salvage value of this particular asphalt is about 20 per cent of its original value, as it can be reground and reused.

Another advocate of an asphalt construction for paving in the track area is K. T. Corey, engineer, Worcester Consolidated Street Railway. Although there are four different types of paving on this property Mr. Corey says, "In my opinion the asphalt paving on a concrete base is the most desirable type. The sheet asphalt acts as a blanket, deadening the sound of passing cars; it is easily and quickly laid, is readily patched when worn and, as compared with other types, is comparatively inexpensive."

Other engineers advocating the use of asphalt are W. W. Wysor, chief engineer United Railways & Electric Company of Baltimore; B. P. Legare, Market Street Railway, San Francisco; H. J. Kolb of the Brooklyn & Queens Transit Corporation; R. H. Dalgleish of the Capital Traction Company, Washington, D. C.; and R. I. D. Ashbridge of the Atlantic City & Shore Railroad.



Granite block construction with tee rail as used by Twin City Lines

One of the strongest advocates of brick paving is A. Taurman, superintendent of equipment, way and structures of the Birmingham Electric Company. The selection of brick for track paving in Birmingham is due largely to the fact that in many places along the lines, property is not fully developed and the gas and water companies and property owners are continually cutting into the paving to install pipe lines, causing many pavement openings to be made. In addition, there are numerous brick plants near Birmingham and the railway gets low freight rates. On this subject Mr. Taurman states: "After careful investigation of experience in Birmingham over a considerable period of years and study of experience elsewhere, we have adopted vitrified brick as the standard type of track paving for all of our work. We have developed a type of construction calculated to overcome so far as is possible the various destructive forces and which has allowed us to speed up track building and reconstruction by doing it under traffic.

"At the outset we prepare a substantial yet readily drained foundation for the track structure. Our ties are creosoted and are laid in a ballast of 8 in. of crushed slag, well-tamped, with at least 6 in. depth under the tie, rising to 8 in. between the ties. This provides substantial ballast for the tracks and yet has sufficient voids to permit water to drain away. Thus we protect our track structure by providing for the disposal of water and preventing its accumulation to intensify churning at the joints. Over this ballast we lay a foundation of 6 in.

In New Haven, Conn., granite block is used along the rail with asphalt paving elsewhere on the street

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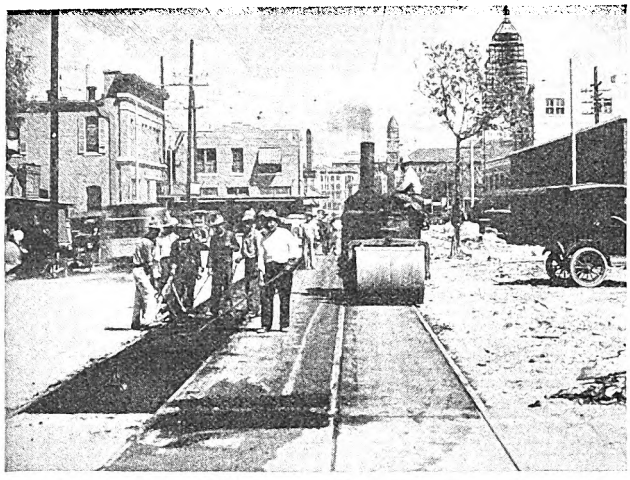
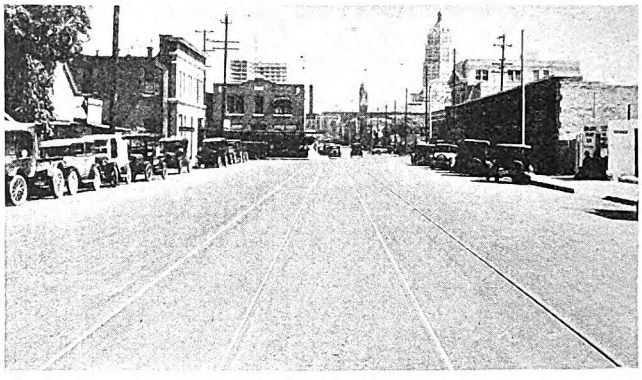


Laying cold Uvalde rock asphalt in the track area, San Antonio, Tex.

At right—Uvalde rock asphalt paving after a year of service



of concrete 1:3:5 mix. We now have a good 14 in. of support for the pavement surface, a support sufficiently stable to enable it to store up energy when

Asphalt is used around curves and special track work in San Antonio

depressed by passing cars and to release this energy when the load is removed, and restore the pavement to its normal position. A bedding of 1 in. of sand is next spread over the concrete foundation, evenly struck off by a template and rolled until it is uniformly compacted. Thus we protect the pavement against shock. The brick are laid on the compacted sand bed."

The Penn-Ohio System in Youngstown, Ohio, uses a 3-in. brick pavement with asphalt filler in the track zone except in a few instances where it has laid concrete. Claude Timblin, engineer of maintenance, prefers this thinner brick to the old-style Bessemer block with ¾- or 1-in. cushion. The reason, he states, is that the concrete base placed higher on the rail helps to hold it more rigid and presents some support when the track structure is beginning to wear. He does not advise the use of any brick thicker than 4 in. unless 9-in. rail section is used.

About 40 per cent of the railways surveyed have some form of brick paving on their properties, usually where traffic conditions do not demand so much of the roadway. Among these are the East St. Louis & Suburban Railway, New York State Railways, Columbus Railway, Power & Light Company, Dallas Railway & Terminal Company and the Terre Haute, Indianapolis & Eastern Traction Company.

Concrete, now used almost exclusively as the supporting base for all track paving regardless of the surface material employed, is finding greater usage as a complete paving structure. It is comparatively cheap, is easily and speedily laid, has a smooth and non-skid surface for vehicle operation and wears well under moderately hard usage. Another claim for concrete is that it supports the track structure more firmly than any other type of pavement; therefore, there is not the tendency for disintegration along the rail with consequent deterioration of the track structure, due to the percolation of surface water.

W. R. Dunham, Jr., of the Department of Street Railways, Detroit, and George L. Wilson, of the Twin City Rapid Transit Company, testify to the satisfactory use of concrete paving in the cities of Detroit and Minneapolis respectively. Ben Rossiter, of the Portland Electric Power Company, Portland, Ore., has used concrete extensively in the track area with excellent results. Within the past two years this company has reconstructed two pieces of track and has used an asphaltic concrete rather than cement concrete. The factors which led them to select this type of paving were the desire to obtain use of the track in the shortest possible time, a hope that it might retard rail corrugation and that it would tend to eliminate operating noises. The first and last expectations were realized; the second is yet to be determined.

Prior to 1923 the Milwaukee Electric Railway & Light Company was subject to an ordinance which required that the track area be paved the same as the adjacent street area. In that year, however, the city passed an ordinance permitting reinforced concrete pavement to be placed anywhere in the track zone regardless of the kind of pavement on the sides of the street. To date over 400,000 sq.yd. of this material has been laid and the results secured have been very satisfactory. E. J. Archambault, engineer of way and structures, states that the cost of this type of pavement runs about $2.25 per

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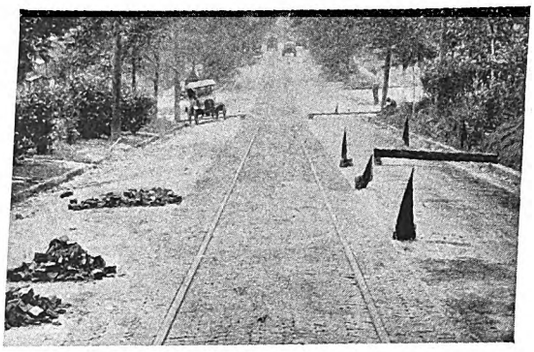
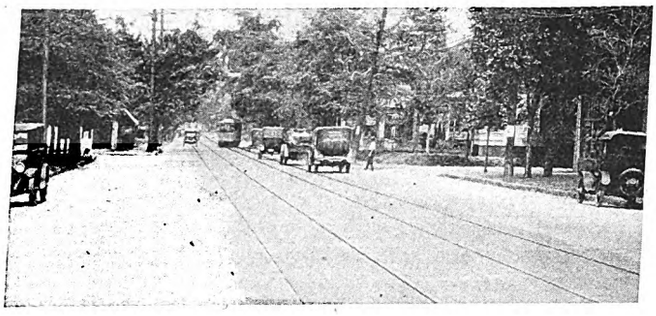
At left—Laying brick paving in Birmingham, Ala.

At right—Brick paving laid and ready for filler

Below — Appearance of completed track paving in Birmingham



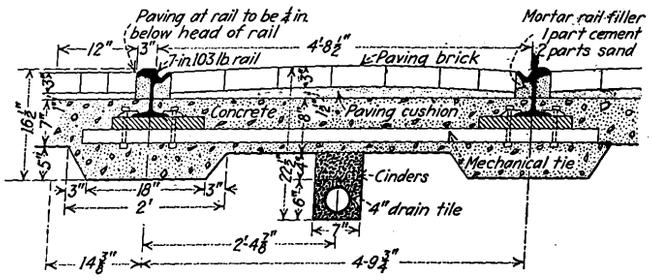


sq.yd. as compared with $5.90 for granite block and $4.40 for brick.

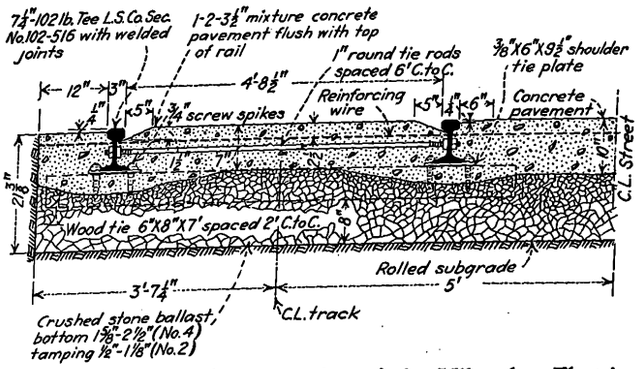
Wood block pavement, although used to a great extent in the past, is a material which has generally lost favor in recent years. This is apparently due to speedier vehicular traffic and the resulting hazard of skidding. Furthermore, considerable difficulty has been experienced in keeping wood block down to a smooth surface, as it is greatly affected by weather conditions which cause expansion and heaving. Many railways still have some wood block paving in their track area but are replacing it with a more sturdy surface when reconstruction becomes necessary. Other companies are continuing to use wood blocks as stretchers along the rail to take care of vibration and noise.

That the type of paving determines the type of track structure to be built, is more generally the case than the reverse, due to the various factors of cost, local municipal practices, etc. The demands of general traffic, vehicular and railway, require utmost consideration, resulting in a widespread practice of using a high, heavy rail structure with a hard, sturdy pavement in heavily congested areas and lower, lighter rail with lighter paving in the less congested districts. In Pittsburgh, brick is used with 7-in. rail and granite block with 9-in. rail. The Connecticut Company uses concrete with tee rail not over 5 in. high, two rows of granite block on either side of rail, with the balance asphalt on a concrete base or a complete asphalt on concrete construction with 6- or 7-in. tee rail; asphalt on a concrete base with 7- or 9-in. grooved girder rail is used exclusively in Hartford, and where the roadway is entirely paved with granite block, 6- or 7-in. tee rail is used. The Boston Elevated Railway uses 7-in. girder rail or 7¼-in. tee rail on wood ties in ballast with 6-in. concrete base, 7-in. girder rail where surface is to be asphalt or Warrenite and 7¼-in. tee rail with granite block. Other companies adopt a single type of rail and make the paving construction conform to their standard track structure. The Penn-Ohio System uses girder rail only. The New York State Railways in Syracuse uses 7-in. tee rail with brick or stone block paving and the Conestoga Traction Company in Lancaster, Pa., standardizes on 7-in. 122-lb. A.E.R.E.A. grooved girder rail.

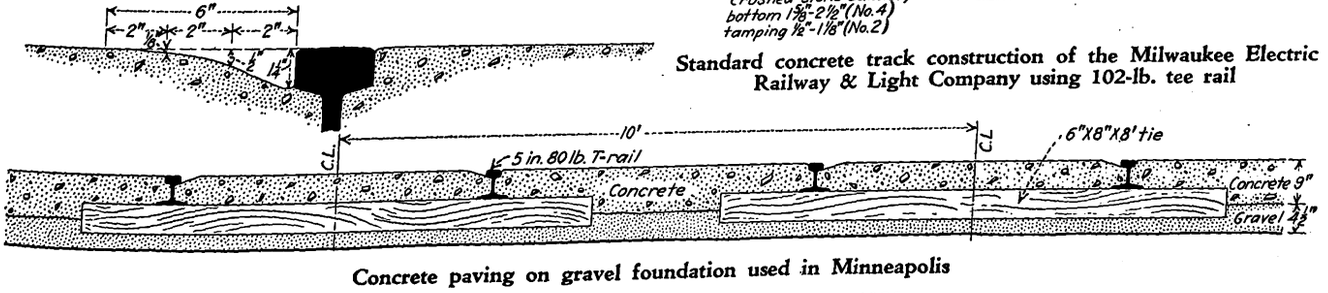
The attention to proper rail joints and the effective sealing of the rail by the paving material are, without question, two of the most important problems of the way engineer. Defects in track pavement usually make their first appearance at the rail joints because it is here that a greater strain is forced on the street surface and



Cross-section of track construction with brick paving used by Penn-Ohio System



Standard concrete track construction of the Milwaukee Electric Railway & Light Company using 102-lb. tee rail



Concrete paving on gravel foundation used in Minneapolis

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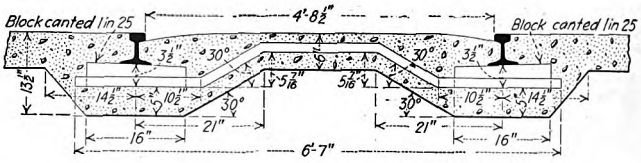
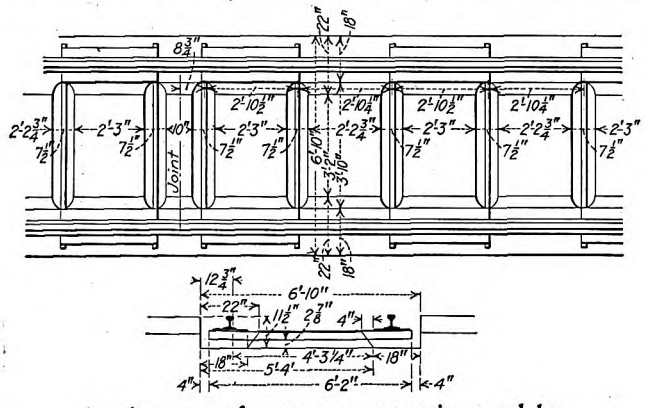


One type of monolithic concrete track construction used in Atlanta

likewise, at this point water is most likely to find its way into the track structure. A. Taurman believes he has solved this problem in Birmingham by adopting a dual method of joint filling. He finds that "it solves most of the difficulties hitherto encountered with block pavements in car tracks. We fill the lower half of the joint with cement grout filler and the upper half of the joint with asphalt filler. We need the cement filler to prevent rocking of the brick over the ties and displacement by the tracks. We need the asphalt filler for its water-proofing properties, for the quietness

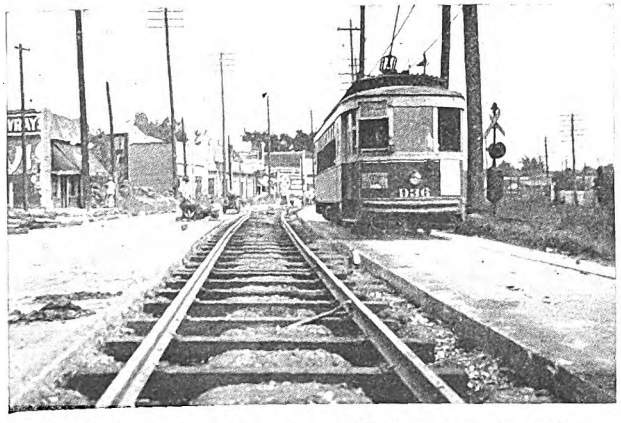


Another type of concrete construction used by Georgia Power Company

it gives the pavement, and for the conservation of the reuse value of the brick, either for minor restorations or for relaying when tracks have to be replaced. Thus we get the full advantage of the long life of this material, which constitutes an important credit item in figuring the cost of our paving over a period of years."

While first cost is not necessarily the primary consideration in determining the type of paving used in the track area, it is a factor of major importance. C. A. Smith, superintendent of roadway, Georgia Power Company, Atlanta, has prepared cost data on the various types of pavement and track which are based on the conditions of a particular locality but agree closely with the findings of many other engineers. The cost per square yard of paving alone is as follows: Dressed granite block paving on concrete base, $6.50; vitrified brick on concrete base, $4.25; asphalt on concrete base, $3.50; 7-in. concrete, $2.25. Costs of complete track structures with various types of paving are given in the following table.

Dressed Granite Block on Concrete	
8/9 sq.yd. of dressed granite block paving @ $6.50	$5.78
1 ft. of 7-in. 122-lb. track, beam construction, without concrete found'tn	4.70
With 11-in. pavement, concrete track foundation, 0.112 cu.yd. per foot @ $11 per cubic yard	1.23
	$11.71
Contingencies	1.17
Miscellaneous	1.22
Engineering and superintendence	0.50
Total	$14.60
Brick on Concrete	
8/9 sq.yd. of brick on concrete @ $4.25	$3.78
1 ft. of 7-in. 122-lb. track without concrete foundation	4.70
With 10½-in. pavement, concrete track foundation, 0.118 cu.yd. per foot @ $11 per cubic yard	1.30
	$9.78
Contingencies	.98
Miscellaneous	1.24
Engineering and superintendence	0.50
Total	$12.50
Asphalt on Concrete	
8/9 sq.yd. of asphalt on concrete @ $3.50	$3.11
1 ft. of 7-in. 122-lb. track without concrete foundation	4.70
With 9-in. pavement, concrete track foundation, 0.136 cu.yd. per foot @ $11 per cubic yard	1.50
	$9.31
Contingencies	0.93
Miscellaneous	1.26
Engineering and superintendence	0.50
Total	$12.00
Asphalt on Grouted Ballast	
8/9 sq.yd. of asphalt surface @ $1.75	$1.55
1 ft. of 7-in. 122-lb. track	6.00
Grout 1 ft. of track	1.25
	$8.80
Contingencies	0.88
Miscellaneous	0.97
Engineering and superintendence	0.50
Total	$11.15
Monolithic Concrete	
8/9 sq.yd. of concrete paving @ $2.25	$2.00
1 ft. of 80-lb. ASCE track	3.17
Concrete track foundation 0.131 cu.yd. per foot of track @ $11 per cubic yard	1.44
	$6.61
Contingencies	0.66
Miscellaneous	0.73
Engineering and superintendence	0.35
Total	$8.35



Wood tie track construction ready for concrete paving

Appearance of completed concrete track paving in Atlanta

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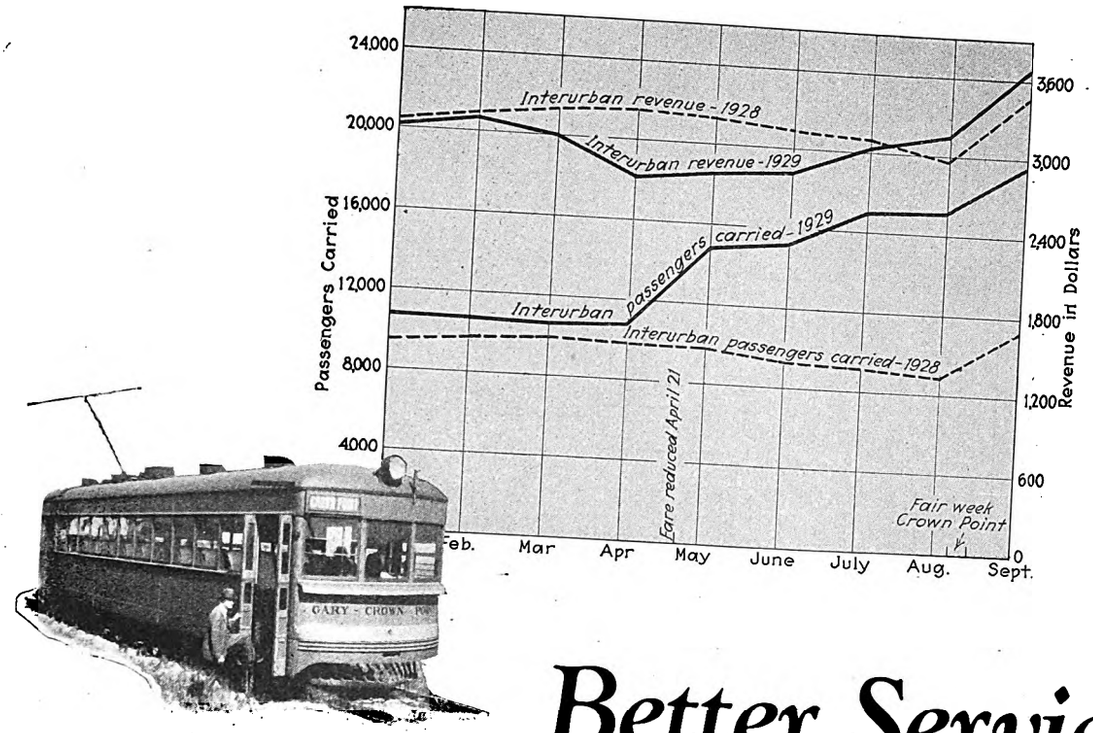

How better service and lower fares have increased revenue and riding on Gary-Crown Point line

Better Service at Lower Fares Saves an Interurban

An old interurban electric railway was slowly but surely dying. After a diagnosis of its ills, "Modernization" was prescribed as a remedy. Treatment, including new cars, installation of one-man operation, track and overhead improvement, up-to-date maintenance methods and publicity, was faithfully applied. The line has now recovered and is prospering

By
LAURENCE WINGERTER
Director of Publicity
Gary Railways, Gary, Ind.

THAT modernization is an effective solution of the interurban problem is indicated by the marked improvement in the condition of the Gary Railways' line between Gary and Crown Point, Indiana. Here, transportation service has been merchandised successfully. Increased revenue and decreased operating costs have followed modernization and lower fares. In the short space of a year, revenue has been increased and riding has risen 100 per cent.

Prior to October, 1928, the interurban line running between Crown Point and Gary, a distance of 15 miles, was operated by the Gary & Southern Traction Company. Its revenue was then declining sharply in the face of severe automobile competition. Its rapidly depreciating plant and antiquated rolling stock offered no hopes for attracting new business. Its credit was badly impaired, and its future prospects seemed drab indeed. Then the Midland Utilities Company became interested in the possibilities of developing transportation business between residential Crown Point and industrial Gary, and in October, 1928, this company purchased the interurban line. The property was leased to the Gary Railways, a Midland subsidiary that supplies local and interurban service to Gary and its surrounding communities.

An extensive rehabilitation program, calling for an expenditure of $120,000 for the purchase of modern interurban cars and revamping of the track structure and distribution system, was begun at once. All improvements were completed about May 1, 1929. The public of Gary and Crown Point has benefited greatly by these improvements and is now enjoying a vastly superior transportation service, including, briefly, more comfortable cars, smoother riding, more dependable service, greater speed and lower fares. From an operating standpoint, the Gary Railways has reaped many benefits from the rehabilitation program. Among these are: lower operating costs through the introduction of one-man operation, increased revenue from interurban passengers and extra revenue from local service.

Modern Cars Purchased

The first step in the accomplishment of these ends was the purchase of the new equipment. Two modern interurban cars were constructed by the Cummings Car & Coach Company. Light in weight, economical to maintain, designed for single-end control and one-man opera-

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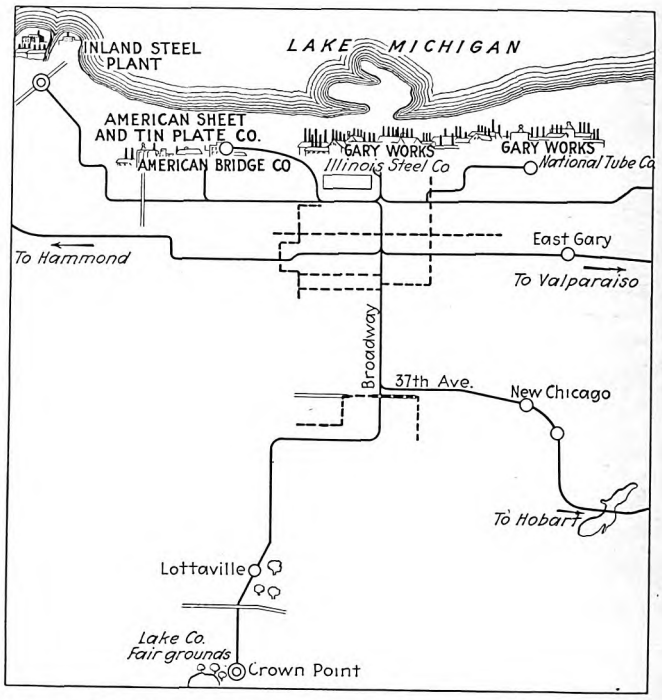
tion, these cars are a great improvement over the old rolling stock. Their sturdy appearance is more than matched by their interior comfort. The wide upholstered seats of gray plush, equipped with foot-rests and covered with white antimacassars, provide the utmost in passenger comfort. The seats are of the non-reversible "bucket" type. A smoking compartment seating fifteen passengers is located in the rear, and is so arranged that women passengers need not pass through it when entering the car. The main compartment seats 35 passengers. A glass partition separates the two compartments, affording a clear view of the front and rear from any seat in the car. The last row of seats in the smoking section is arranged in a chummy semi-circle, giving an observation-car effect.



Interurban line connects residential district of Crown Point with industrial Gary

Rubber floor tiling of tan and green harmonizes with a rich interior of mahogany and ivory. Ten dome lights provide bright interior illumination. Exteriors are painted orange and maroon. The new cars are powered by four GE-247 40-hp. motors with K-75 single-end control. Motors are provided with constant oil level armature and axle bearings. The cars attain a free running speed of from 40 to 45 m.p.h., and have a comfortable acceleration of 2.54 m.p.h.p.s. By reason of their high running speed and quick get-away they perform remarkably well in both city and interurban service.

The bodies are 44 ft. long and 9 ft. wide. On the right side, front and rear, are two double-leaf folding doors. The steps are set in wells. The front door is operated by air brake control, the rear door by an automatic treadle on each step. Cummings No. 64 light-weight motor trucks, equipped with slack adjusters, are used. The cars have proved to be very economical in operation. Weighing only 37,000 lb., they have been found to consume an average of about 2.5 kw.-hr. per car-mile.

Power Supply Improved

To provide more power, extensive improvements were made in the distribution system. A new 500,000-circ.mil feeder cable was strung along the right-of-way from 37th Avenue, Gary, to Crown Point. An improperly located 200-kw. substation at Lottaville was abandoned, and a portable substation of 300 kw. capacity was installed 3 miles north of Crown Point. The result of these improvements was to raise the trolley voltage at the Crown Point terminus from 150 to 550 volts, and to guarantee a sufficient supply of power for abnormal traffic and for heavy snow-fighting equipment in winter months. More than 100 poles were reset along the route, and trolley-basket guards were installed at four steam railroad crossings between Gary and Crown Point.

Further economies resulted from the closing of the old Gary & Southwestern Traction Company car shops and dispatching office at Lottaville. All maintenance work is now handled by the large well-equipped Gary Railway shops in Gary. All dispatching is likewise centralized in a general office located in Gary.

Track Rehabilitated

Rehabilitation of all track between Crown Point and the Gary city limits was pushed to completion before the arrival of the new cars. A total of 3,000 ties were replaced, rails were re-aligned, the roadbed was ballasted, and a sharp curve at Lottaville was lengthened for speedier operation. A wye was installed at the Crown Point terminal in preparation for the new single-end cars. Spring boxes were placed on all switches, making it possible for an operator to completely turn a car without leaving his controls. A novel lock-harp switch was placed in the trolley wire junction to guide the trolley wheel around the curve during the backing up process. As a further means of speeding service, sidings at Oak Hill Cemetery and at Sanitarium were double-ended. New block signals were ordered for a portion of the line along 45th Avenue, Gary.

A comprehensive publicity and advertising campaign in Gary, Crown Point and the surrounding communities kept the public well informed about the progress of the rehabilitation work. Newspaper advertising, placards and special news stories worked up a lively interest in the improvements under way.

Basic Electric Railway Data

More fundamental data *than ever before will be published in the Annual Statistical and Progress Number of* Electric Railway Journal. *The figures will show not only the changes occurring during the year 1929, but also the status of the industry before and after these changes occurred. Everyone interested in electric railways will find much valuable information in this nation-wide survey.*

Watch for the January Issue

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Comfort and convenience of the new cars have won over many former users of private automobiles

The public was not allowed to view the new cars until the day of their official inauguration. On April 20, 1929, the two new cars, carrying civic officials and prominent business men of the two cities as invited guests, made a tour of the line. On the following day the cars were placed in regular service, and operations under the new plan began in earnest. Fares between Crown Point and Gary were reduced from 45 cents to 30 cents, running time was cut from 55 to 50 minutes, and six new daily trips were added to the schedule.

For several weeks after the start of the new service a house-to-house canvass was made in the city of Crown Point to acquaint residents with the details of the new service, the new rates and the new schedules. It was found that the de luxe equipment and lowered fare structure had made a profound impression upon the people of Crown Point, and the representatives of the company who made the canvass were warmly welcomed wherever they called. A distinct improvement in public relations and a decided betterment in employee morale followed the introduction of the new equipment and fares. Business men were enthusiastic about the new service.

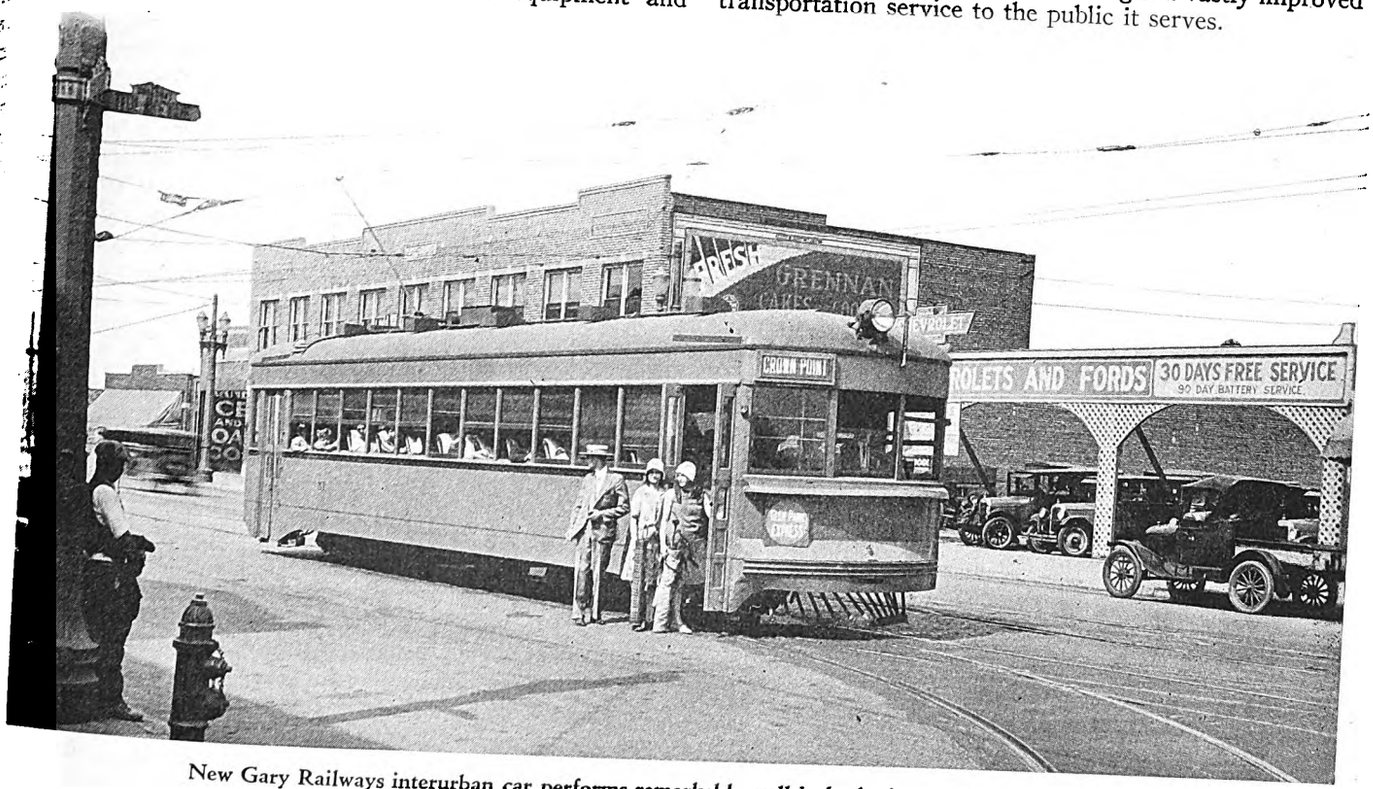
Although one-man operation was introduced in place of the old two-man cars, all Gary & Southern employees were given the opportunity to sign up on the Gary Railways board, if they so desired. Operators of the new equipment took a new interest in their work and made every effort to sell the service to the public.

Riding increased immediately after the introduction of the new interurban cars. Gross revenue, which had been dropping steadily under the old fares, began to rise. As indicated on the accompanying graphs, the number of passengers and the amount of revenue have continued to grow during the past few months, till now the total is much greater than it was a year ago when higher fares were in effect.

Another favorable factor is that the new cars are used for local service over a 4-mile run on Gary streets, thus replacing one car formerly used for city service exclusively. This represents a large daily saving to the company, and does not decrease the effective running speed of the interurbans, for their progress would be hindered by city cars in any case.

The passenger and revenue figures shown in accompanying charts refer to interurban passengers only, and show how riding and revenue have increased over last year. The revenue obtained from carrying local passengers on interurban cars, not indicated on the curves, is additional income without additional expense.

Future prospects of the line are excellent. New homes are being built along the right-of-way because of the new service, and a continued increase in revenue is expected. The new interurban cars provide every comfort of privately-owned automobiles. As a result, many auto owners have ceased driving to work and are taking advantage of the new low rates of fare. The combination of modernization and lower fares has meant success to this interurban line, and has brought a vastly improved transportation service to the public it serves.



New Gary Railways interurban car performs remarkably well in both city and interurban service due to its rapid acceleration and high running speed

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Equipment Improvement Topic at Iowa Meeting

TO BUY cars new or to rebuild old cars, was the subject of papers which provoked lively discussion at the annual convention of the operators' section, Iowa Electric Railway Association, held Nov. 7 and 8 at Waterloo. The first paper, on the car builder's contribution to economic and safe operation, was read by Charles F. Weil in the absence of the author, F. L. Markham of the American Car Company. C. W. Gifford, recently chosen general manager of the Des Moines City Railway, told of the success of the new cars on his property and stated that seats must compare in comfort with those used on the private automobile. He emphasized the need of schedule speeds up to 16 m.p.h.

In agreement with the statement as to the value of new cars, which should be faster and more attractive, was C. D. Porter, vice-president Omaha & Council Bluffs Street Railway. He stressed the point that with limited capital, money must be spent where it will bring the greatest return. On the Omaha property it had been thought desirable to modernize the present equipment. Electric heat has replaced hot water or hot air, automatic drawbars have been eliminated and other changes made to reduce the weight. Mr. Porter strongly advocated attractive painting and lettering, and told how a design selected by the riding public is being used by his company. He described the general rehabilitation program being carried out in Omaha, referring particularly to the new routes which will be in effect soon, the installation of nine new automatic substations to give outlying parts of the system proper voltage, and the organization of the shops to overhaul and maintain cars rather than to manufacture material which could be more advantageously bought outside. Nearly $750,000 is being spent, Mr. Porter indicated, and it is confidently expected that substantial savings will result.

Others who took part in the new car discussion were E. J. Anderson, Tri-City Railway, Davenport, and C. M. Feist, Sioux City Service Company. Mr. Anderson thought a mistake was frequently made in trying to rejuvenate worn-out equipment. Construction should be standardized so that cars could be bought advantageously in small lots, instead of an order of 50 being necessary to get a favorable price. Mr. Feist said that old cars not in use should be discarded, to effect a saving of taxes, insurance and expense for handling.

Power distribution was taken up in two papers. S. J. Fairbanks, Waterloo, Cedar Falls & Northern Railway, described problems connected with the replacement of insulators and poles, and repair methods followed in case of breakdown of the distribution system due to unusual weather conditions. The electrification and operation of the Illinois Central Railroad suburban service out of Chicago was explained by W. M. Vandersluis, its electrical engineer.

With the inauguration of electric service began a phenomenal growth of traffic and revenue, he said. The result becomes increasingly surprising as the growth continues without any sign of a let-down. Electrical operation of revenue trains began on July 21, 1926, when four electric units were put in local service. The schedule was gradually built up on a steam time-table basis until on Aug. 29, 1926, the first electric time-table was put in effect.

Just previous to the start of electric operations there were 378 Illinois Central trains and eighteen South Shore trains. At present there are 490 Illinois Central trains and 80 South Shore trains. In 1925 the Illinois Central carried 23,700,000 revenue passengers; in 1929 it is estimated from the latest figures that more than 36,000,000 revenue passengers will be carried.

This increase in traffic, according to Mr. Vandersluis, is laid to three things: (1) Increase in scheduled speed of from 10 to 25 per cent; (2) increase in frequency of trains especially during the non-rush hours; (3) cleanliness and noiselessness of operation. The increase in non-rush hour traffic has been of the greatest help in increasing revenue, since energy is cheap and equipment is available at that time.

It is also interesting to note, said the speaker, that operating expenses have increased only slightly with the increase in revenue. This is due largely to the increased efficiency of maintenance and operating forces and an honest effort on the part of enginemen to decrease energy consumption. The value of the rather elaborate sectionalization scheme is apparent from the statement that suburban trains average 99.9 per cent on time. Mr. Vandersluis also related in considerable detail the steps that led to the electrification of the road and the details of the installation.

Edward Wotton, superintendent of equipment Chicago Motor Coach Company, described maintenance practices of a large city operation, and discussed bus maintenance starting from its inception in 1907. A. H. Smith, Interstate Power Company, Dubuque, told of experiences with cars and buses, and advocated the routing of both to give the maximum service to the public with the minimum of transferring. The substitution of buses for street cars, as made in Marshalltown in October, 1928, was discussed by Charles Munson, Iowa Railway & Light Corporation. Operating costs were about the same with the buses, he said. Schedule speed had been increased from 7.5 to 9.5 m.p.h., routes covered were 4.8 miles more with the bus, and monthly miles went up to 32,290, as compared with the 29,670 operated with the cars.

An imaginary trip through the shops of the Tri-City Railway, at Rock Island and Davenport, was conducted by John Sutherland. This was accomplished by a series of papers, prepared by his foreman and delivered by Mr. Sutherland. The features of the blacksmith shop were presented by Hans Andresen; of the machine shop, by Ed Klein; of the carpenter shop, by James E. Reid; of the armature room, by William Sachau, and of the Davenport carhouse, by David Shillinglaw.

The executive committee chose Des Moines for the 1930 convention and elected Frank V. Skelly, Des Moines, as chairman of the operators' section to succeed Maurice A. Welsh, Waterloo. E. W. Miller, Des Moines, was chosen as chairman of the convention to succeed Frank McDonald of Waterloo. Railway members of the executive committee will be D. D. Bentzinger, Centerville; Charles Feist, Sioux City; A. H. Smith, Dubuque, and A. M. Welty, Omaha.

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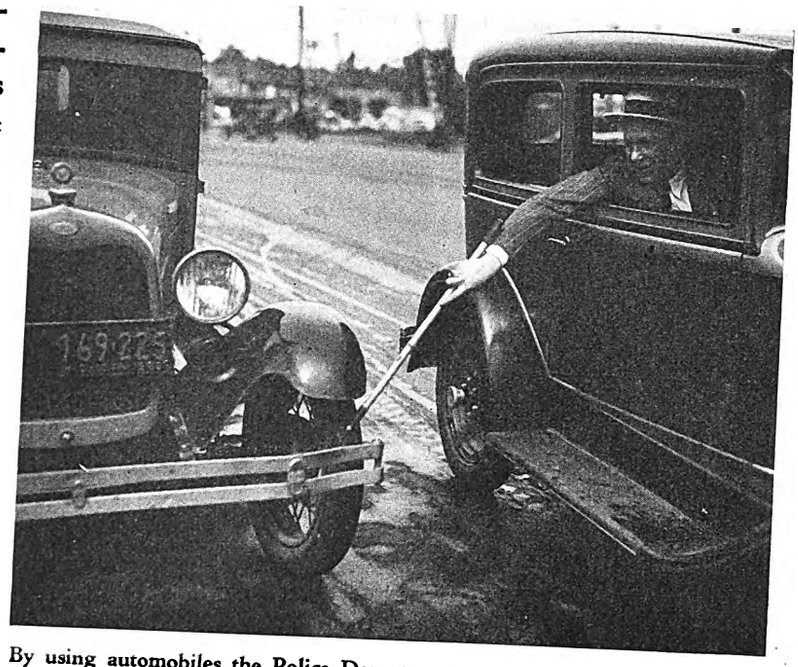
Rigid Enforcement of Parking Regulations Aids Flow of Traffic

During a 60-day drive against violators of parking ordinances in Detroit, a total of 41,367 automobiles were towed to city pounds. The move was requested by merchants' associations and sponsored by City Council

By

H. M. GOULD

Consulting Traffic Engineer
Police Department, Detroit, Mich.



By using automobiles the Police Department was able to cover the limited parking areas at hourly intervals very effectively and economically. The method of marking the tires with a piece of chalk at the end of a pointer is shown in this view

WITH an appropriation of $50,000 for a 30-day trial enforcement of the parking regulations in the downtown business section of Detroit, a strip along Woodward Avenue north of the business district and an industrial precinct in the eastern part of the city, the police department set out on Aug. 7 to curb the many violations. So successful was this first period of 30 towing days which terminated on Sept. 11, that another 30-day period, terminating on Oct. 16, was added. The drive was sponsored and financed by the City Council and was requested by several merchants' associations.

During the 60 days some 41,367 automobiles were towed to the city pounds and $84,582 was collected from those who had to retrieve their cars. At first the violators paid little attention to the enforcement move, but as they learned that the police department meant business there was less street storage of vehicles for excessive periods. Naturally, there were charges of discrimination and protestations by the victims who were compelled to pay fines. The public, however, was pleased with the trial. Those merchants who requested the trial, as well as others, were pleased with the results and asked that the enforcement be continued. Clearing the streets of illegitimate parking allowed a freer flow of traffic at all times through the business districts and permitted commercial vehicles to make deliveries of their products in much less time. Many previously congested areas were kept open for the movement of vehicles, enabling mass transportation vehicles in particular to get through the streets without frequent tie-ups.

Problem Studied in 1927

Two years previous, in 1927, a survey of the downtown business district was made, which showed that 3,342 vehicles parked at the curb during a normal business day. Of these, 78.08 per cent were parked for an hour or less and used 39.74 per cent of the hourly curb parking spaces, while the balance, or 21.92 per cent, were stored for periods in excess of one hour and occupied 60.26 per cent of the available space. Obviously, this mis-use of the parking privilege by those who remained more than one hour was unfair to the other parkers, as well as to the abutting owners and tenants.

The matter of enforcement remained dormant until the spring of this year when the merchants and property owners came to the conclusion that vehicles stored in the street for the personal convenience of a few people did not constitute an asset to the community. As a result the Common Council was petitioned to provide sufficient tow cars and auto pounds with which to enforce the ordinance. Three different groups requested enforcement in their respective districts: the residents of a factory district in the east side of the city; the Woodward Avenue Improvement Association, for the area along Woodward between the downtown district and Grand Boulevard; and the Retail Merchants Association, the Business Property Owners Association and the Washington Boulevard Association, for the downtown business district.

In answer to these requests the Common Council appropriated $50,000 for a 30-day trial enforcement period, to go into effect on Aug. 7. This sum was to be expended for the hiring of checking cars for the downtown and Woodward Avenue districts, the hiring of tow cars, and the payment of police officers, car drivers and patrolmen.

Arrangements were made with an automobile wrecking concern to tow the vehicles to the pounds for a flat rate for each car. With the aid of six tow cars already owned

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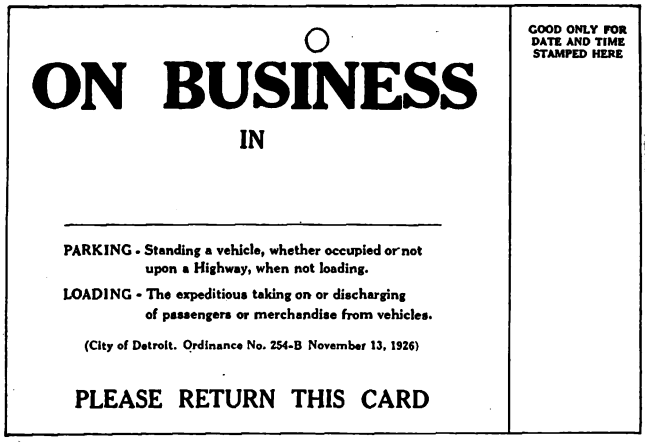
by the Police Department it was possible to remove from the streets a great many of the illegally parked cars. With the exception of one patrolman on foot who covered the Grand Circus Park area, all markers rode in automobiles along definite routes. By means of a piece of chalk at the end of a pointer they were able to mark the cars on their regular hourly rounds at a rapid pace. Much of the success of the plan was due to this effective system of indicating the length of time each vehicle was parked. Any car in the zones with no parking ordinances was subject to being towed away unless the owner had secured permission previously to make the stop. In the areas where hourly parking was allowed any car with two or more chalk marks was eligible for a towing. "On business" cards were prepared by the Police Department and distributed to stores to give to deliverers of merchandise during the no-parking periods. One of these cards properly filled out, signed and hung on the car prevented its being towed away.

Parking is prohibited by local ordinance in Detroit between 7:30 and 9:15 a.m. on the inbound side of the main thoroughfares leading to the downtown district,



Drivers of commercial vehicles desiring to load or unload merchandise in a "no parking" area can do so by having the above card properly filled out and hanging it on their car

and between 4:30 p.m. and 6:15 p.m. on the outbound side of the same thoroughfares. In the business district, parking is prohibited between 7:30 a.m. and 9:15 a.m. and between 4:30 p.m. and 6:15 p.m. Where parking is permitted in the period from 9:15 a.m. to 4:30 p.m. it is for one hour only. A total of 10,477 street spaces actually exist in the downtown district, the 1927 survey revealed. None of these can be used in the prohibitive rush hour periods, but from 9:15 a.m. to 4:30 p.m., 3,753 of these are available for hourly parking. In the Woodward Avenue and east side districts, parking is prohibited along the main thoroughfares also during the rush hours.

On the first day of the drive more than 600 cars were towed away; on the second day 785 were impounded. At the end of the 30-day trial period—that is, 30 towing days, Sundays being excluded—a total of 21,663 cars were removed from the streets. During the second 30-day period, added at the request of merchants, 19,704 violators were caught. This brought the grand total to 41,367 for the 60-day period. In an accompanying table are given the figures of cars towed, as well as the revenue and expenses of the enforcing. The total revenue for the 60 days was $84,582 and the expenses $77,698.92, leaving a surplus of $6,883.08. These figures are not a true measure of the operation, since the revenue includes only the fees collected from cars towed in by the private

Revenue, Expenses and Cars Towed for Two Thirty-Day Periods

	Aug. 7 to Sept. 11, Inclusive, (30 Towing Days)	Sept. 12 to Oct. 16, Inclusive, (30 Towing Days)	Total for 60 Towing Days
Revenue			
Towing and storage fees	$43,544.00	$39,625.00	$83,169.00
Cars on hand at pounds	315.00	288.00	603.00
Protested fees	616.00	194.00	810.00
Total revenue	$44,475.00	$40,107.00	$84,582.00
Expenses	39,992.17	37,706.75	77,698.92
Surplus	$4,482.83	$2,400.25	$6,883.08
Cars Towed			
By fourteen tow cars of private company	16,363	14,074	30,437
By six tow cars of Police Department	5,300	5,630	10,930
	21,663	19,704	41,367

wrecking company and not the Police Department, while the expenses include the cost of impounding the cars brought in by all tow cars.

Following the trial enforcement period the Police Department received a number of commendatory letters from associations and individuals, expressing their satisfaction with the move and their desire to have it continued. The three letters herewith appended were received by the department after the first 30-day period.

We would like to tell you of the great improvement that has been brought about on Woodward Avenue north of Grand Circus Park as a result of the recent 30-day enforcement of the parking ordinance.

Our association has been particularly pleased with the results accomplished and we believe it has been exceedingly beneficial not only to the merchants in this district but likewise to the legitimate parker who wishes to stop long enough to shop in one or more stores.

We have nothing but commendation to offer and we sincerely hope that the Police Department and the Council will both see fit to continue this method of enforcing the parking restrictions indefinitely. WOODWARD AVENUE IMPROVEMENT ASSOCIATION.

The Washngton Boulevard Association is well-pleased with the efforts the Police Department has made to enforce the parking ordinance during the past month. This enforcement, we believe, has had a salutary effect upon general traffic conditions on our boulevard, throughout the downtown district and in outlying business and residential districts.

Trusting that your department plans to continue strict enforcement of limited parking regulations on Washington Boulevard.

WASHINGTON BOULEVARD ASSOCIATION.

At a meeting of the directors of the Retail Merchants Association yesterday noon, the matter of the rigid enforcement of the traffic ordinance as now being tried by the Police Department was discussed. There was a unanimous feeling that the rigid enforcement of the limited parking ordinance has been a great improvement over past conditions and has afforded a great amount of relief in the downtown section.

RETAIL MERCHANTS ASSOCIATION.

Of course, many of those who parked illegally and were caught protested the rigid enforcement. This was expected by the department, particularly from publicity seekers and those with an "ax to grind." However, to show that there were enthusiastic supporters of the drive, a letter sent to one of the newspapers is reproduced herewith:

It's amusing to read the various reasons furnished in opposition to the parking rules by automobile owners and others using them for pleasure, sight-seeing, joy-riding, bootlegging, drunks, etc., all kicking because they cannot park anywhere or at any time they please, regardless of conspicuous signs, carefully placed, and covering the necessary information as to parking privileges. Signs that anybody with as much sense as God gives geese ought to be able to read and understand. The police are not responsible for the dumb, deaf and blind or the selfish who drive around without any idea as to where they come from or where they are going. In other words, mentally void of location or destination. Raise the pounding charge to $25, and it ought to abolish the nuisance forthwith.

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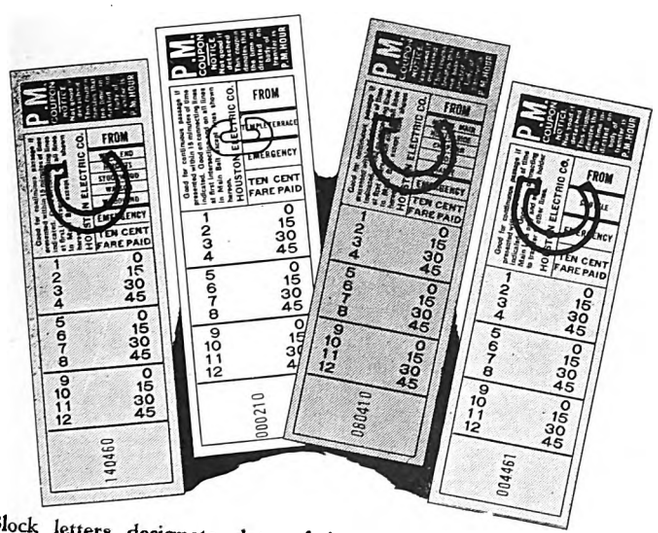
Preventing Transfer Abuse at Houston

By J. L. Alexander
Manager Houston Electric Company

As a result of a thorough study of its transfer system which the Houston Electric Company made during the past year, the company has installed a system which is simpler, easier to understand and more economical than the old one. The survey indicated that the chief abuses to which the transfers were being subjected were hoarding, round tripping and misuse of time allowance. It also indicated that a number of complaints were being received because passengers could not understand the use of the transfers. Proceeding on the theory that a transfer could be designed so simple that its privileges could be understood by all, yet so effective that it would prevent the many abuses so prevalent with other designs, a new system was devised.

The abolition of the old dating system and the substitution of block letters to designate the date of issuance is probably the most interesting innovation. This prevents hoarding from month to month, as only those



Block letters designate date of issuance, and different colors indicate the various lines. Time allowance is indicated by tearing rather than punching

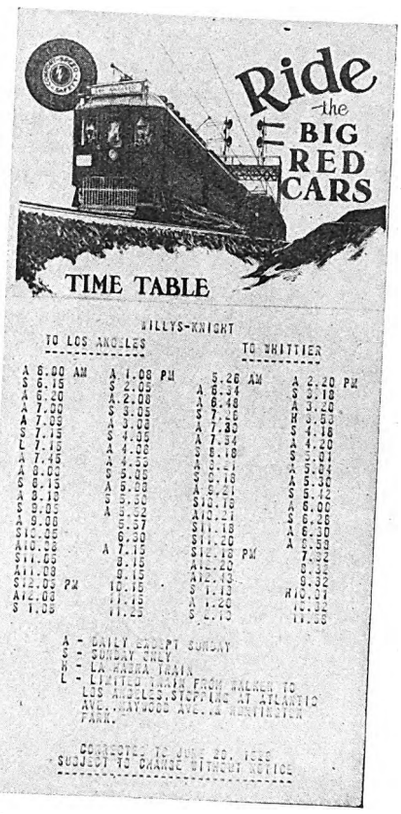
issuing the transfers know what letter will be used from day to day. Another new idea is the use of colors to distinguish the lines serving the same general section of the city, each section being marked by its respective color. This enables the operator to tell at a glance whether or not a transfer should be honored on his line. Incidentally, there is only one point where the operator can accept a transfer of the same color as the one he is issuing and that is at the first intersection.

The time allowance is indicated by tearing the transfer rather than by punching it. In this manner the proper time must be adhered to because further tearing of the transfer would only reduce the time allowed. The operator can see at a glance the length of the transfer and will know immediately whether it should have close scrutiny to get the exact hour. Having the time allowance so plainly in evidence on the new transfers, the passengers are not attempting to force old transfers on the operators.

A simple cutter was designed and installed on all street cars and buses. As this eliminates the necessity of the operator's punching transfers on the run, the benefits of the system are reflected in our schedule speeds and in the prevention of accidents. Operations under the new system show a definite saving of 10 per cent in transfers collected. Our operators tell us that the transfer complaints have been practically eliminated and we believe, also, that there is a marked tendency to reduce accidents.

Time-Tables Used to Popularize Interurban Service

To provide information concerning the arrival and departure of trains at non-agency stations on its interurban electric lines, a plan was put into effect about a year ago by the Pacific Electric Railway that has proved of benefit both to its patrons and the company. An attractive timetable poster was prepared on which is typed in tabulated form, in large figures and all-cap letters, the departing times of all regularly scheduled trains throughout the entire day from each designated stop on the line. At the top of each of these time-table posters is a very attractive advertisement urging the riding of the "big red cars," with the company emblem and a speeding typical interurban car completing the appeal.



Time-tables of this type have been effectively used by the Pacific Electric Railway in popularizing its interurban service.

At each non-agency stop the posters are placed in a conspicuous location. Where a shelter station is present it is possible to locate them where they may be readily seen and still be afforded a measure of protection from the elements. At the many stops where there is no shelter building it is necessary to place them on a nearby pole. In such instances they are necessarily exposed to the ravages of the sun and rain but their deterioration is materially retarded by painting with a waterproof preparation giving a glazed and protective coating. In addition to placing these posters at non-agency stations and stops, it has also been found helpful and desirable to hang them in waiting rooms where agents are assigned.

The plan of maintaining this poster service has now been in effect for one year on the Pacific Electric lines and the management believes that the expense and effort are well worth while.

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A.E.R.A. Washington Office Reorganized

PLANS for the expansion and reorganization of the Washington office of the American Electric Railway Association were announced at a meeting of the executive committee, held at association headquarters Nov. 15. It was pointed out that the problems of member electric railways reporting to the Interstate Commerce Commission are becoming more complex every year. The uncertain and indefinite standing of electric railways transacting interstate business is emphasized by many decisions of the I.C.C. and every year Congress proposes additional legislation tending to complicate conditions. In addition to the direct relation of these matters to electric railways engaged in interstate commerce, there is an indirect effect of I.C.C. decisions and acts of Congress upon electric railways not subject to the jurisdiction of the commission. For example, an order issued on a subject such as depreciation is likely to influence the various state commissions and may ultimately be applied to non-interstate electric railways.

For a number of years past the A.E.R.A. committee on national relations has maintained a small office in Washington with Paul McGovern, secretary of the committee, in charge. It has become apparent that the task of keeping abreast of proposed regulation, decisions and orders of the I.C.C., and cases before the commission and the courts, is an impossible one for the national relations committee. The Washington office, therefore, has been reorganized and expanded with C. D. Cass in charge as general counsel for the association. Office space has been taken in the new Tower Building at the corner of Fourteenth and K Streets, Northwest. A library of I.C.C. and Supreme Court decisions has been installed and will be kept up to date. Constant contact with commission cases and decisions will be maintained. Proposed regulation affecting electric railways will be studied and reported to the industry. Representation of the electric railways in cases affecting such carriers as a whole will be undertaken by Mr. Cass and his staff. In general, the new Washington office will function as the national representative of the members of the American Electric Railway Association.

Plans for the 49th annual convention to be held next June in San Francisco were discussed at length at the executive committee meeting. Various opinions were expressed concerning the relative advantages of different routes to be followed by eastern delegates going to and from the convention. It was emphasized, however, that the primary purpose of the meeting is to transact serious business and that the desire to include sight-seeing trips, etc., in the general program should not be allowed to overshadow the primary object of the convention. It was decided to leave the arrangement of details in the hands of the general 1930 convention committee, of which W. V. Hill, manager California Electric Railway Association, is chairman.

Routine reports were received from various committees of the American Association. Announcement was made of some re-allocation of duties among members of the staff at association headquarters and of the appointment of Hawley Simpson to be special engineer to fill the vacancy created by the appointment of Guy C. Hecker to the position of general secretary.

85 Per Cent of Brooklyn Shoppers Use Public Transportation

CUSTOMER counts at five large department stores, made on Oct. 23 under the auspices of the Downtown Brooklyn Association in co-operation with the Brooklyn-Manhattan Transit Corporation and the Transit Commission, convincingly demonstrated the importance of public transportation facilities.

An analysis of the 13,009 shoppers' traffic cards showed that 1,230, or 9.2 per cent of them, used the Fulton Street "L" to reach the shopping area; 5,445, or 41.3 per cent, used the subway; 3,185, or 24.2 per cent used surface cars; 1,221, or 9.3 per cent, used the Long Island Railroad, and 637, or 4.8 per cent, were pedestrians. Automobiles, including taxicabs, brought only 1,291, or 9.8 per cent. The percentage of trolley users was fairly constant throughout the five stores, ranging from 20.8 per cent to 26.6 per cent.

In conjunction with a shoppers traffic survey, the employees of the stores were asked to indicate what means of travel they used to reach work. The percentages using the Fulton Street "L," the subways and the surface trolley lines were closely comparable to those of the shoppers, 12.1 per cent using the "L," 47.7 per cent using the subways and 25.7 per cent using the trolleys.

The importance of the surface lines in transporting shoppers to the downtown stores is demonstrated by the fact that even with the extensive system of subway and "L" lines serving the section, approximately 25 per cent of the shoppers questioned in the survey used the surface lines to reach the stores. With the improvements resulting from the B.M.T. plan of rearranging its service on the surface lines, they will become even more important as transit arteries.

Main Line Electrification in England

ELECTRIFICATION of the main line from London to Brighton has been announced by the Southern Railway, London. Also to be electrified are the line from Preston Park (on the Brighton main line) to Hove and Worthing, the main line from Redhill (also on the Brighton main line) to Guildford, by way of Reigate and Dorking Town.

Work will be commenced during the next two or three months and it is hoped that it will be completed in two or three years. The Southern Railway will then have much the longest electrified route in Great Britain, and the first main line to be completely equipped for electric operation. Of the 445 miles electrified in the last seven years, no fewer than 408 were on the Southern Railway.

The magnitude of the undertaking may be realized from the fact that about 1,750,000 passengers are conveyed annually by rail between London and Brighton. In addition there are about 2,700 season ticket holders (commuters). The distance is 51 miles, of which 14 miles—to Purley—are already electrified. The project from Preston Park to Hove and Worthing involves the electrification of 11 miles, and that from Redhill to Guildford 20 miles. The line from Waterloo to Guildford, via Cobham, is electrified already. The direct-current third-rail system, now the standard throughout the electrified area of the Southern Railway, will be used.

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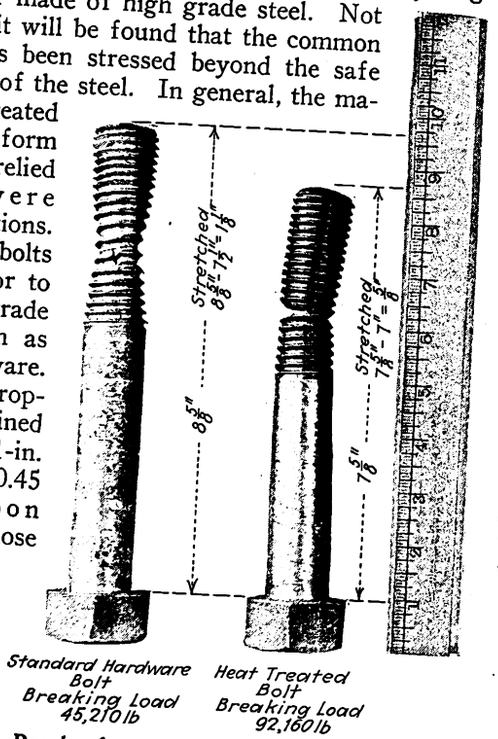
Heat-Treated Bolts Desirable for Railway Service

By E. F. Whitney
Renewal Parts Engineer
Westinghouse Electric & Manufacturing Company

MOTOR bolts or truck bolts which are subjected to shocks or severe loads may fail, due to fatigue or overstrain of the metal, unless they are unusually large in diameter or made of high grade steel. Not infrequently, it will be found that the common grade bolt has been stressed beyond the safe working limit of the steel. In general, the material of untreated bolts is not uniform and cannot be relied upon for severe service conditions. Heat-treated bolts are far superior to the common grade of bolts known as standard hardware. The physical properties as determined by test of a 1-in. heat-treated (0.45 per cent) carbon steel bolt with those of an untreated steel bolt, are shown in the accompanying table.



Result of test showing superiority of heat-treated bolt over ordinary bolt

The physical property of steel known as the "elastic limit in tension" is the maximum unit stress which the material will stand without permanent deformation of the member. In the case of bolts, such as axle cap bolts or frame bolts, it is the recommended practice to tighten or stress the bolt beyond the load which would likely occur on the bolt in service. The load in such an application should not exceed the elastic limit or, in exceptional cases, the yield point of the steel in order to avoid a permanent deformation of the material. High grade axle cap bolts and motor frame bolts that can be tightened without danger of overstretching the bolt are the best assurance that axle bearings and housings will not work loose in service and destroy the clamping fit of the parts in the motor frame or axle cap.

Other physical properties of steel, which are indications of its ability to stretch or stand strain, are its "percentage elongation" and its "percentage reduction of area." The accompanying illustration shows the elongation of the bolts under a load which ruptured them. It is evident from the test shown that the standard hardware bolt stretched nearly twice as much as the heat-treated bolt. Heat-treated bolts not only have high ultimate strength and uniformity of material, but they are noticeably harder than untreated steel bolts. The threads of heat-treated bolts will be found to remain standard much longer than a bolt made of softer steel. Likewise the head of the bolt will stand much more abuse than that of a standard hardware bolt. This quality of the heat-treated bolts will reduce to a large extent the possibility of loose nuts occurring in service.

	Not Heat-Treated	Heat-Treated
Elastic limit	47,250 lb. per square inch	71,500 lb. per square inch
Yield point	49,475 lb. per square inch	73,500 lb. per square inch
Ultimate tensile	82,675 lb. per square inch	112,300 lb. per square inch
Elongation	24.8 per cent	19.5 per cent
Reduction of area	40.1 per cent	46.9 per cent

Cement for Repairing Mica

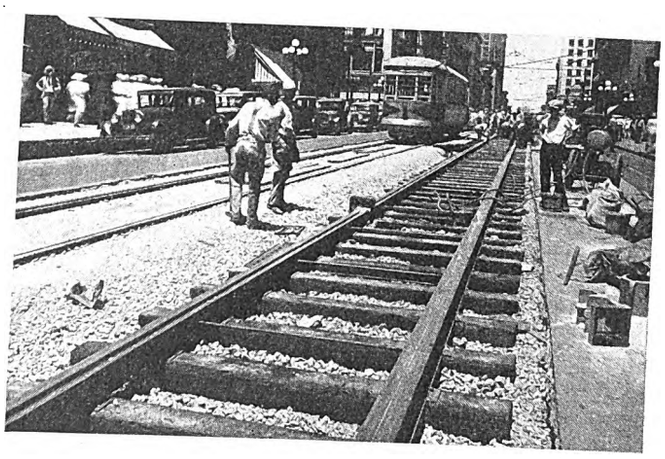
By W. E. Warner
Brighton, England

A MICA cement which is useful for repairing pitted or broken commutator insulation can be made easily. Mix a little French chalk with a little sodium silicate so that it forms a thick paste. Apply this to the part to be repaired and in a few hours it will be found to have set hard and solid. Cracks which develop at the end of the commutator can be filled with asbestos crumbs and shellac.

For switch gear a good cement can be made from litharge and glycerine as follows: Put some litharge on a flat glass plate and then gradually add some glycerine, working the two together until a pasty mixture of about the thickness of thick cream is obtained.

A disadvantage of this cement is that it is likely to swell after having been in service some time, due to its absorbing carbon dioxide from the atmosphere. To prevent this its surface should be kept painted with a good waterproof varnish.

Creosoted Pine Ties Relaid After Long Service



WHEN the Memphis Street Railway recently undertook to rebuild its track on Main Street, the old ties were found suitable for re-use with new rail. These ties were A & L short-leaf pine, 6 in. x 6 in. x 8 ft., pressure-treated with 12 lb. of creosote oil. They were laid in 1905 on a foundation of 8 in. of gravel, no tie plates being used. After 24 years of service they were found to be in perfect condition with the exception of a few minor cuts resulting from movement of the rail. The ties were merely turned over, therefore, and re-used in the new track structure with tie plates and 7-in., 122-lb. grooved girder rail. It is expected by J. H. Haylow, chief engineer, that an additional twenty years of life will be obtained.

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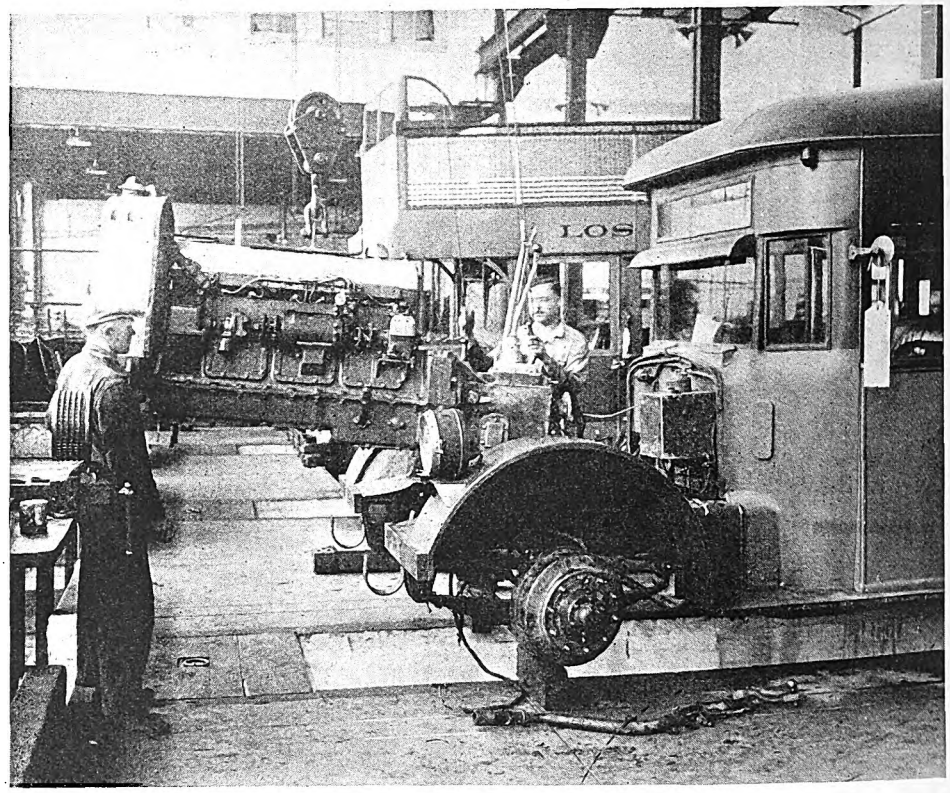
Adequate Equipment and Careful Attention

Vital to Proper Bus



Engine being removed from bus under unit replacement plan in effect on the Los Angeles Railway

ECONOMY in bus servicing and maintenance is of vital importance and the proper balance must be kept between the cost of equipment for maintenance, as expressed by interest and depreciation charges, and the saving in mechanics' time on maintenance work. It is most important that the work be done thoroughly, so that the operating company may avoid paying excessive amounts for fuel and other materials and supplies. All repairs must be made during the four or five hours when the bus is not in service. It is not alone the volume of the work that will determine the investment in repair shop equipment, but also the operating requirements. Adequate modern facilities insure economy and prompt handling of maintenance work.

Motor coach maintenance may be classified under four general headings, as follows: first, general inspection; second, repairs and adjustments; third, repairs to units; and fourth, annual overhauls and accident repairs. The operating division performs the first two operations and the central repair shop the other two.

Of these four items, the general inspection is unquestionably the most important. It is the pivot upon which the whole process of maintenance turns, and is based on the theory of anticipating trouble in order to avoid it. The object of general inspection is to locate the weak parts of the mechanism and repair or replace them, thus avoiding failure while the coach is in service, and consequent road delay. This company believes that the quality of bus maintenance work has a very definite effect upon the gross revenue, ranging from about 5 to 25 per cent according to the locality served, high class residential districts being more affected than industrial districts.

Systematic and thorough routine inspection keeps equipment failures to a minimum. It permits the mechanical personnel to detect worn and defective parts and make the necessary adjustment, repairs or replacement before such parts fail in service and cause a breakdown. The most important qualification of a good maintenance man is the ability to judge when a worn part has reached a state such that it should be replaced. It is upon this judgment that the efficiency of the repair department depends, for there are many parts the condition of which cannot be measured by limit-of-wear gages.

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By
H. E. JORDAN
Assistant Engineer
Los Angeles Railway

oper Maintenance

Installation of efficient modern machinery justified by reduction of costly "out of service" time. Maintenance procedure well-organized in shops of bus division of Los Angeles Railway

In order to keep the maximum number of buses available for service, everything possible must be done to expedite repairs. This can best be accomplished by the "unit replacement" plan which is becoming more popular every day. However, it has not met with much favor on the part of the stores department. In order for it to be effective, it is necessary to keep complete motors, front axles, rear axles and transmission units on hand for each type of bus, and this makes stock balances relatively high.

Interest and depreciation on a bus which average not less than $7 to $9 per day go on regardless of whether or not the bus is in service. If the bus is held out of service these costs are a dead loss, and at this rate it would not take long to pay for a complete set of replacement units. The Los Angeles Railway considers it essential that one complete set of replacement units be kept for every ten buses in operation.

Inspection Work Carefully Organized

The coach division of this company has adopted an inspection system for all buses, the rules governing which are set forth in detail in an operating manual furnished to each mechanic. By issuing these rules in printed form, a great deal of time is saved. Moreover, the manual eliminates the possibility of omissions and serves as a guide for making the inspection complete and thorough, as the rules tell the specific requirements of each inspection.

Inspections are divided into three classes, "A," "B," and "C," and also a "safety inspection" which is made every time a bus returns to the garage after having been in service, regardless of the number of miles operated. The "A" inspection is made after 500 miles of service, while the "B" inspection is made after 1,500 miles of service, and the "C" inspection or general overhaul is made after the bus has traveled a total of 50,000 miles. The number of miles operated by each bus is kept by a mileage clerk from the speedometer reading and recorded on the regular gasoline slips. From this record the date of the next inspection is determined.

Traveling hoist capable of lifting one end of bus is a great time-saver in shops of Los Angeles Railway

When the bus is ready for inspection, a card, which lists as headings the different units to be inspected, is placed upon it and the job assigned to a mechanic. The inspector checks the equipment which has been gone over and signs his initials at the place indicated on the card. Any repairs or adjustments made are recorded by him together with the date. After the inspection has been completed, the foreman O.K.'s the card and it is returned to an "active inspection card rack" and held there until the next inspection, at which time a new card is issued.

If the bus fails in service, or repairs are to be made between inspections, the card containing the last inspection record is taken out and placed on the bus with a memorandum stating what is to be done, and after the repair is made the mechanic records it on the card, stating the nature of the repairs or adjustment. The duty of the foreman is to see whether or not the failure between inspections was caused through any carelessness of the mechanic and, if he deems it necessary, he will take the appropriate action to prevent recurrence at some future date.

The data contained on the inspection card, with the date, are posted in ledgers against each bus, so that a continuous and permanent record is always at hand to show the repairs and replacements on each vehicle. A repetition of a particular kind of failure is quickly noticed by the clerk posting the data, who immediately notifies the superintendent of equipment. A regular

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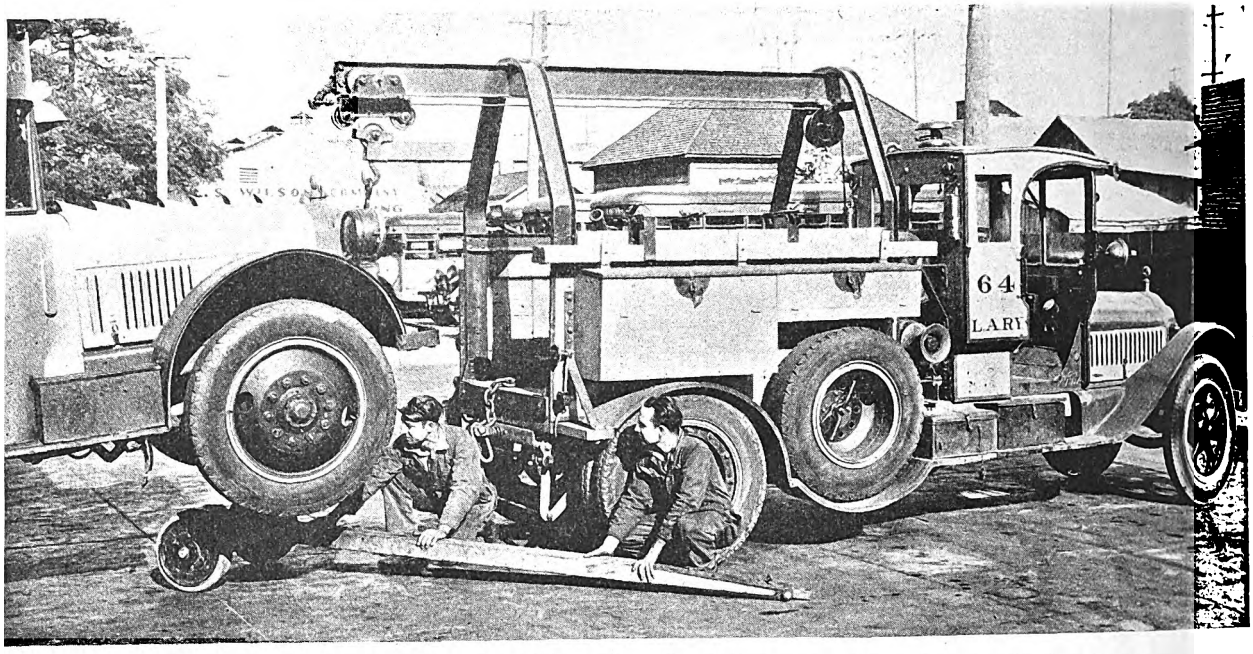

Service truck equipped with engine-driven winch for lifting front of bus when a pull-in is necessary

monthly summary and report is made by type of buses, on a mileage basis, under classified headings of adjustments, repairs and failures.

Modern Shop Equipment a Profitable Investment

The bus division of the Los Angeles Railway realized that in order to equip and maintain buses effectively and efficiently it was necessary to provide good light and adequate shop facilities with modern equipment. The company has a proving stand which has been made in its own shop. It is used to test the horsepower delivered at the wheels of the bus, to run-in buses after they have been overhauled, to locate unusual noises in the motor or drive mechanism, to check fuel and oil consumption, to adjust carburetors and to test speedometers for accuracy. This equipment has eliminated the necessity of many road tests and has aided in locating bus defects and reducing service and equipment failures. Every 1,500 miles the brakes of the buses are tested on a brake-testing machine, which is also used after the brake shoes have been relined. This brake-testing machine has proved to be a very effective method of keeping the brakes in proper adjustment, has reduced accidents and road calls caused by defective brakes and has also effected a material saving in tire maintenance.

For cleaning the buses, a high-pressure washing system is employed. It is so arranged that either hot or cold water or a combination may be used from any of the four nozzles in each washing bay. In order to facilitate this method of cleaning, a connection has been made by which it is possible to introduce a cleaning solution into either the hot or cold water line. This aids materially in taking the dirt off quickly.

A device which has saved a great deal of time is the traveling hoist which is capable of raising one end of a bus. Two of these hoists are available which have practically eliminated the use of jacks in the repair shop. Experience has shown that a combination of floor pit and electric hoist is much safer and more flexible and therefore more desirable for a repair shop than an elevated runway used with either an inclined plane or hydraulic lift.

Motor blocks are replaced when they show a taper of 0.01 of an inch, and valve springs are tested and discarded if found to be 10 per cent below the manufacturer's rating. Valves and valve seats are refaced and the carbon scraped out of the motor at approximately every 25,000 miles of operation. Seats of valves are replaced if necessary. A carburetor specialist is employed, who is furnished with a list showing the average miles per gallon of gasoline per coach per month. It is his duty to check the coaches with a low mileage per gallon and adjust the carburetors to remedy this condition.

Unit replacements are made when the bus is in the shop for general overhaul. Our greatest difficulty with differentials is the pitting of the bronze wormwheels. Ordinarily we are able to obtain only approximately 85,000 miles of service from these wheels.

There have been several instances of broken drive shafts and all coaches have been equipped with safety loops or guards to prevent the broken shaft from whipping about and damaging the air brake equipment.

We use the composition brake block and cast-iron drums, and have found that the blocks give longer life and are much more easily and more quickly replaced than the steel shoes. We have had some trouble with the squealing of blocks, but have partially overcome this difficulty by changing the composition and by using a cast-iron drum instead of cast steel. The braking efficiency is perhaps not as effective as with the steel lining, but is entirely satisfactory when four-wheel brakes are used. By the use of oversize cam points we obtain the full life from the blocks.

It has been found that four-wheel brakes greatly increase the safety of operation, prolong tire life and reduce brake maintenance. The maintenance of air brake equipment is more costly than that of mechanical or hydraulic brakes, but the former type is almost essential for frequent-stop city service where heavy duty is required and relatively high schedule speeds are maintained.

Two coach-body men are employed whose duty it is to endeavor constantly to eliminate all body noises, and also one painter who is kept busy touching up coach

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Analysis of Maintenance Cost and Failures

Item	Maintenance Cost (Account 632), Per Cent	Equipment Failures, Per Cent	Service Failures,* Per Cent
Body	9.2	2.6	4.2
Brakes	13.7	19.1	42.9
Chassis	6.2	2.6	0.3
Drive	15.0	16.2	0.7
Ignition	6.7	20.4	14.4
Miscellaneous	5.4	13.5	18.1
Motors	17.5	19.2	12.9
Tires	24.7	6.4	6.2
Wrecks	1.6	.....	....
Total	100.0	100.0	100.0

*Failures repaired on the road and coach not removed from service

bodies and accessories. We think that the efforts of these three men are invaluable in keeping up the general appearance of the coaches. All coaches have been changed from a six-volt to a 12-volt system to improve the interior lighting.

Some of our later coaches are equipped with collision rails along each side. There have already been several collisions of these coaches where the rails have prevented what might have been expensive damages. We think the collision rail is a very worthwhile addition to coach design.

Overhauling of bodies and painting are done in the general car shops. When a bus body is to be overhauled, the carpenter foreman rides in the bus several miles over rough streets. He makes notes of all body noises, loose joints, etc., and these observations form the basis for the body repairs. A similar ride is taken after the overhauling, and additional repairs or adjustments are made if necessary. In practically all makes of coaches that we operate we have found pockets in which water and mud collect, tending to rot the side sills and rust the metal siding. This is being overcome by providing slots to let out the water and to let in air. It has been necessary to put cross-braces between the body posts on many of the coaches to give them more rigidity and to prevent weaving.

Lacquer formerly was used in coach painting, but we found that it soon became dull from washing unless it was rubbed and polished. Rubbing and polishing was rather expensive so we have changed to enamel, which gives a finish that holds its brightness much longer than the lacquer.

Each coach is lubricated after 500 miles of operation. At this time all lubrication points are checked and the proper lubricant is applied if necessary. The crankcase oil is changed after every 2,500 miles of coach operation.

From our 1928 cost and inspection reports an analysis has been made showing the relative importance of the different bus parts with respect to maintenance costs, equipment failures and service failures. By devoting particular attention to the parts which give the most trouble we have been able to keep down failures to a minimum.

Improved Truck for Metropolitan Electric Tramways

MOTIVE power for the double-deck cars recently built for the Metropolitan Electric Tramways, London, England, is provided by two Metropolitan-Vickers 105 F.W. self-ventilated motors per truck, connected permanently in series, the whole equipment being operated by a two-motor controller. The motors are each rated at 35 hp. for one hour at 262½ volts, the temperature rise being to the B.E.S.A. specification No. 173, 1928. Ventilation is arranged on the parallel flow system, the air being drawn through the machine by a fan fitted at the pinion end of the armature. In order to prevent dirt from entering the motor with the ventilating air, the air inlet has a special cover fitted with an efficient system of baffles.

Motors are of the box-frame type, the frame being made of high permeability cast steel. The armature is mounted on roller bearings, and particular attention has been paid to the construction of the labyrinths, in order to protect the bearings from foreign matter and to insure that no grease escapes from them into the motor. To reduce the weight of the machine to a minimum, many of the parts are constructed of a special light aluminum alloy.

The gearcase is made of sheet steel, its lowest portion being constructed of very thin material, so that if it strikes any obstacle in the road it will collapse and thus save the whole gearcase from being damaged. The gearcase clearance is 2.85 inches, and the pinions are made of case-hardened nickel steel. The forged steel gearwheels are surface-hardened by a process that eliminates the distortion usually associated with this procedure. The gear ratio is 14/61, 3½, D.P., and the teeth are cut to a special form to insure quiet running. The trucks have four 24-in. wheels instead of a pair of 31¾-in. drivers and a pair of pony wheels.

The weight of the two trucks, complete with equipment, is 8 tons as compared with 6 tons for the old type.

Inspection station where oil, gas and mileage are checked on incoming buses. Safety inspection is also made here

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Monthly and Other Financial Reports

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Key System Transit Company, Oakland, Cal.					
September, 1929.....	587,640	.....	.....	.....	*32,438*
September, 1928.....	612,328	.....	.....	.....	*52,136*
9 mo. end. Sept., 1929	5,286,208	.....	.....	.....	*812,100*
9 mo. end. Sept., 1928	5,387,465	.....	.....	.....	*483,811*
Market Street Railway, San Francisco, Cal.					
October, 1929.....	843,134	680,318*a*.....		162,816	105,444
October, 1928.....	845,621	710,365*a*.....		135,256	74,595
12 mo. end. Oct., 1929	9,568,360	8,110,158*a*.....		1,458,202	741,225
12 mo. end. Oct., 1928	9,834,079	8,331,986*a*.....		1,502,093	750,663
Denver Tramway, Denver, Col.					
9 mo. end. Sept., 1929	3,141,662	2,148,576	370,836	657,994	271,841
9 mo. end. Sept., 1928	3,204,651	2,104,581	379,845	747,041	377,511
9 mo. end. Sept., 1927	3,272,495	1,819,947	383,595	1,101,710	734,815
9 mo. end. Sept., 1926	3,399,958	1,823,123	413,664	1,204,727	771,040
Jacksonville Traction Company, Jacksonville, Fla.					
September, 1929.....	86,811	75,242	9,195	2,372	.....
September, 1928.....	93,247	77,040	8,583	7,623	.....
12 mo. end. Sept., 1929	1,156,423	945,763	106,646	103,012	*61,336*
12 mo. end. Sept., 1928	1,225,019	980,526	107,633	136,858	*36,476*
Honolulu Rapid Transit Co., Honolulu, Hawaii					
September, 1929.....	86,253	49,266	7,843	30,398	17,174
September, 1928.....	88,297	51,963	12,989	24,833	17,402
9 mo. end. Sept., 1929	790,028	452,433	82,079	265,442	146,388
9 mo. end. Sept., 1928	805,063	472,755	107,827	234,169	163,212
Chicago Surface Lines, Chicago, Ill.					
October, 1929.....	5,469,617	4,244,886*a*.....		1,224,731	.....
October, 1928.....	5,475,840	4,220,405*a*.....		1,255,435	.....
United Railways & Electric Co., Baltimore, Md.					
September, 1929.....	1,352,582	908,470	139,971	322,216	41,548
September, 1928.....	1,279,006	847,016	123,279	322,225	39,034
9 mo. end. Sept., 1929	12,378,256	8,481,078	1,200,100	2,832,092	294,410
9 mo. end. Sept., 1928	12,044,670	8,126,303	1,152,386	2,876,077	323,669
Boston Elevated Railway, Boston, Mass.					
3 mo. end. Sept., 1929	7,538,121	5,941,713	380,923	1,237,884	*845,378*
3 mo. end. Sept., 1928	7,603,837	6,131,245	409,599	1,087,959	*934,526*
9 mo. end. Sept., 1929	25,095,812	17,963,601	1,243,875	5,953,226	*321,767*
9 mo. end. Sept., 1928	25,681,011	18,579,992	1,299,944	5,880,230	*190,710*
Eastern Massachusetts Street Railway, Boston, Mass.					
September, 1929.....	659,140	412,023	32,552	232,698	74,466
September, 1928.....	713,141	435,946	31,989	267,172	94,162
3 mo. end. Sept., 1929	2,035,336	1,542,365	92,104	456,641	178,527
3 mo. end. Sept., 1928	2,154,388	1,637,633	87,249	494,946	199,520
9 mo. end. Sept., 1929	6,472,825	4,798,387	291,685	1,549,587	716,216
9 mo. end. Sept., 1928	6,788,517	5,072,163	265,473	1,628,149	742,167
Boston, Worcester & New York Street Ry., Framingham, Mass.					
September, 1929.....	66,015	53,238	1,625	11,630	10,160
September, 1928.....	59,417	48,600	1,614	9,426	7,956
9 mo. end. Sept., 1929	557,455	448,316*d*	14,898	105,105	91,875
9 mo. end. Sept., 1928	569,023	484,835*d*	14,533	71,458	58,079
Holyoke Street Railway, Holyoke, Mass.					
3 mo. end. Sept., 1929	160,897	119,955	3,338	43,846	23,165
3 mo. end. Sept., 1928	168,338	143,696	3,921	37,787	16,856
9 mo. end. Sept., 1929	534,785	448,877	9,736	93,660	31,540
9 mo. end. Sept., 1928	581,794	485,375	11,842	107,409	44,638
Springfield Street Railway, Springfield, Mass. *e*					
3 mo. end. Sept., 1929	626,595	540,214*a*.....		86,381	15,687
3 mo. end. Sept., 1928	631,305	528,155*a*.....		103,150	31,536
9 mo. end. Sept., 1929	2,037,851	1,680,877*a*.....		356,974	144,820
9 mo. end. Sept., 1928	2,093.629	1,705,411*a*.....		388,218	180,915
Department of Street Railways, Detroit, Mich.					
October, 1929.....	2,129,774	1,652,129	61,936	425,792	276,682
October, 1928.....	2,160,702	1,676,831	63,435	445,146	278,901
12 mo. end. Oct. 1929.	26,684,738	21,145,235	749,469	4,927,723	3,251,132
12 mo. end. Oct., 1928	24,202,398	18,881,729	784,485	4,777,267	2,866,760
Twin City Rapid Transit Co., Minneapolis, Minn.					
3 mo. end. Sept., 1929	3,042,990	2,423,576	.....	619,414*c*	38,008
3 mo. end. Sept., 1928	2,941,371	2,382,454	.....	558,917*c*	*17,867*
9 mo. end. Sept., 1929	10,056,521	7,509,914	.....	2,546,607*c*	724,932
9 mo. end. Sept., 1928	9,817,622	7,487,000	.....	2,330,622*c*	555,804
Kansas City Public Service Co., Kansas City, Mo.					
October, 1929.....	761,928	.....	.....	.....	66,889*f*
October, 1928.....	767,247	.....	.....	.....	68,124*f*
10 mo. end. Oct., 1929	7,434,118	.....	.....	.....	614,330*f*
10 mo. end. Oct.. 1928	7,525,322	.....	.....	.....	603,681*f*
International Railway, Buffalo, N. Y.					
9 mo. end. Sept., 1929	8,333,955	6,845,033*a*.....		1,558,991	587,567
9 mo. end. Sept., 1928	8,430,190	6,868,985*a*.....		1,602,013	577,846
9 mo. end. Sept., 1927	8,457,031	7,306,998*a*.....		1,196,529	114,984
9 mo. end. Sept., 1926	8,529,372	7,319,400*a*.....		1,249,991	147,338
Fonda, Johnstown & Gloversville R.R., Gloversville, N. Y.					
September, 1929.....	81,673	59,354	7,840	29,068	*1,585*
September, 1928.....	80,018	57,785	7,840	39,802	8,487
9 mo. end. Sept., 1929	754,581	571,060	70,560	217,960	*68,894*
9 mo. end. Sept., 1928	778,319	560,997	70,560	233,087	*53,258*

	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
Brooklyn-Manhattan Transit System, New York, N. Y.					
October 1929.....	5,170,393	3,390,008	339,676	1,509,042	738,262
October, 1928.....	4,179,152	2,686,805	284,827	1,294,204	594,918
10 mo. end. Oct., 1929	20,223,779	13,676,547	1,322,535	5,500,030	2,378,871
10 mo. end. Oct., 1928	16,030,178	10,665,025	1,118,640	4,579,252	1,826,509
Brooklyn & Queens Transit System, New York, N. Y.					
October, 1929.....	2,027,618	1,567,259	123,076	358,486	232,938
October, 1928.....	2,094,263	1,752,529	114,499	250,002	120,693
4 mo. end. Oct. 1929....	8,003,595	6,325,119	467,215	1,296,394	797,038
4 mo. end. Oct., 1928...	8,112,136	6,802,205	427,064	967,224	449,776
Hudson & Manhattan Railroad, New York, N. Y.					
October, 1929.....	1,081,539	531,801*a*.....		549,738	215,297
October, 1928.....	1,063,493	549,396*a*.....		512,097	176,384
10 mo. end. Oct., 1929	10,346,171	5,230,051*a*.....		5,116,120	1,759,302
10 mo. end. Oct., 1928	10,242,733	5,345,547*a*.....		4,897,186	1,542,024
Interborough Rapid Transit Co., New York, N. Y.					
September, 1929.....	5,674,364	3,497,917	198,552	1,977,895	123,536
September, 1928.....	5,253,472	3,450,518	198,305	1,604,648	*196,881*
3 mo. end. Sept., 1929	16,573,468	11,000,135	597,574	4,975,758	*466,986*
3 mo. end. Sept., 1928	15,399,342	10,284,576	593,110	4,521,655	*884,606*
Long Island Railroad, New York, N. Y.					
September, 1929.....	3,873,730	2,240,102	414,866	1,127,792	955,575
September, 1928.....	3,733,076	2,294,557	364,069	1,072,158	928,807
9 mo. end. Sept., 1929	31,552,785	20,420,266	2,477,550	8,639,180	7,206,705
9 mo. end. Sept., 1928	30,545,563	21,275,540	2,174,193	7,078,048	5,769,998
New York, Westchester & Boston Railway, New York, N. Y.					
September, 1929.....	221,654	155,079*a*.....		66,575	*148,898*
September, 1928.....	208,714	161,419*a*.....		47,296	*160,780*
9 mo. end. Sept., 1929	1,892,809	1,350,068		542,741	*1,386,885*
9 mo. end. Sept., 1928	1,770,630	1,359,066		411,564	*1,394,883*
Staten Island Rapid Transit Co., New York, N. Y.					
September, 1929.....	246,192	156,008	18,000	72,184	66,529
September, 1928.....	262,106	170,643	20,000	71,518	33,992
9 mo. end. Sept., 1929	1,995,299	1,492,936	158,800	343,546	288,108
9 mo. end. Sept., 1928	2,353,317	1,602,864	182,850	566,745	235,379
T hird Avenue Railway, New York, N. Y.					
September, 1929.....	1,279,548	977,252	90,444	233,391	*86,650*
September, 1928.....	1,267,710	975,805	95,066	215,022	*55,665*
3 mo. end. Sept., 1929	3,816,335	2,949,588	269,781	657,727	*189,071*
3 mo. end. Sept., 1928	3,831,497	2,870,780	384,029	629,312	*188,786*
New York State Railways, Rochester, N. Y.					
September, 1929.....	667,684	616,566	44,625	15,131	*111,645*
September, 1928.....	.....	.....	.....	.....	.....
9 mo. end. Sept., 1929	6,858,799	5,679,763	431,095	823,875	*518,411*
9 mo. end. Sept., 1928	7,263,506	.....	.....	.....	125,198
Cincinnati Street Railway, Cincinnati, Ohio					
September, 1929.....	705,766	473,016	59,246	175,758	546
Philadelphia & Western Railway, Philadelphia, Pa.					
September, 1929.....	65,444	36,432		29,012*c*	13,851
September, 1928.....	69,093	37,968		31,125*c*	15,968
Galveston-Houston Electric Railway, Houston, Tex.					
September, 1929.....	51,275	30,974	2,720	17,580	.....
September, 1928.....	52,745	30,421	2,931	19,391	.....
12 mo. end. Sept., 1929	604,191	337,023	31,638	235,702	34,731
12 mo. end. Sept., 1928	661,938	388,586	30,928	242,423	26,641
Houston Electric Company, Houston, Texas					
September, 1929.....	276,779	169,483	26,887	80,409	.....
September, 1928.....	272,096	173,774	23,742	74,579	.....
12 mo. end. Sept., 1929	3,388,716	2,091,045	291,868	1,009,668	607,277
12 mo. end. Sept., 1928	3,304,641	2,019,669	302,574	982,396	576,771
Pacific Northwest Traction Co., Seattle, Wash.					
September, 1929.....	88,857	59,210	4,427	25,217	.....
September, 1928.....	77,284	62,928	4,043	10,331	11,774
12 mo. end. Sept., 1929	925,710	742,161	54,708	128,839	*60,416*
12 mo. end. Sept., 1928	887,880	725,887	50,272	111,719	
Calgary Municipal Railway, Calgary, Alta.					
September, 1929.....	.....	.....	.....	.....	*8,795*
September, 1928.....	.....	.....	.....	.....	*997*
9 mo. end. Sept., 1929	.....	.....	.....	.....	41,850
9 mo. end. Sept., 1928	.....	.....	.....	.....	41,169
Edmonton Radial Railway, Edmonton, Alta.					
August, 1929.....	.....	.....	.....	.....	*5,161*
August, 1928.....	.....	.....	.....	.....	*5,212*
8 mo. end. Aug., 1929	.....	.....	.....	.....	9,682
8 mo. end. Aug., 1928	.....	.....	.....	.....	*1,683*
Lethbridge Municipal Railway, Lethbridge, Alta.					
August, 1929.....	.....	.....	.....	.....	*1,511*
August, 1928.....	.....	.....	.....	.....	*1,017*
8 mo. end. Aug., 1929	.....	.....	.....	.....	*15,175*
8 mo. end. Aug., 1928	.....	.....	.....	.....	17,048

Italic figures indicate deficit. *a* Includes taxes. *b* Net operating revenue. *c* Before taxes. *d* Includes depreciation. *e* Net earnings. *f* Before depreciation.

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	Operating Revenue $	Operating Expenses $	Taxes $	Gross Income $	Net Income $
British Columbia Electric Railway, Vancouver, B. C.					
August, 1929	1,168,753	642,308		526,445*e*	
August, 1928	1,121,788	623,142		498,636*e*	
2 mo. end. Aug., 1929	2,325,473	1,281,764		1,043,709*e*	
2 mo. end. Aug., 1928	2,183,276	1,221,006		962,270*e*	
Guelph Radial Railway, Guelph, Ont.					
August, 1929					*2,823*
August, 1928					*3,184*
10 mo. end. Aug., 1929					*26,132*
10 mo. end. Aug., 1928					*21,108*
London & Port Stanley Ry., London, Ont.					
August, 1929	81,425	56,194		25,231*e*	
August, 1928	81,666	56,494		25,172*e*	
Ontario Hydro-Electric Railways, Essex District					
August, 1929	97,395	79,347	400	17,648	*12,901*
August, 1928					9,085
10 mo. end. Aug., 1929	1,049,711	785,820	3,946	259,944	*36,754*
10 mo. end. Aug., 1928					*6,588*
Regina Municipal Railway, Regina, Sask.					
September, 1929					*2,405*
September, 1928					*1,644*
9 mo. end. Sept., 1929					11,211
9 mo. end. Sept., 1928					*3,794*
Saskatoon Municipal Railway, Saskatoon, Sask.					
September, 1929					*3,313*
September, 1928					*2,417*
9 mo. end. Sept., 1929					6,590
9 mo. end. Sept., 1928					3,149

Bus Development Urged at S.A.E. Convention

NEED of even more intensive development of motor buses and their component elements was stressed at the transportation meeting of the Society of Automotive Engineers held at Toronto, Canada, Nov. 11-15. The program was made up entirely of papers on subjects of interest to operators of motor buses and trucks for public service.

Trends in bus design were discussed in a paper by F. R. Fageol, president Twin Coach Corporation, which was read by Ross Schram. The abandonment of the double-decker in favor of the large-capacity single-deck bus is a foregone conclusion, according to the author. He also pointed out that there is a distinct move toward 40-passenger and 21-passenger buses, with abandonment of the 29-passenger size.

Standardization of body design and dimensions is worth striving for, according to E. O. Dalzell of the Bender Body Company. The combination wood and metal construction seems to be in greatest demand, while the all-steel body does not seem practicable for present use. The entire wood frame should be treated for protection against rot and all exposed surfaces should be sheathed with metal, said the speaker.

William C. Naegel of the Lang Body Company compared steel bodies with wood or composite bodies. The latter are somewhat lighter, while the steel are more rigid. Insulation of bodies against noise and cold is essential. Dead air space, frequently considered valuable, is hard to produce. Possibilities of the materials for interior finish also must be given consideration.

Buses for use on rides of more than two to three hours duration should be designed with first thought to the comfort of the passengers, according to a paper by Dwight E. Austin, vice-president and chief engineer Pickwick Nite Coach Corporation, which was read by C. G. Moore. Reclining seats with deep cushions, comfortable heating, lighting to make reading easily possible, and suitable provision for baggage are essential. Accessibility of all parts for repair is an essential, so that the time required in the shops for servicing and repairing will be reduced to a minimum.

Several papers were presented on the six-wheel vehicle. A. M. Wolf, consulting engineer, Newark, N. J., discussed the structure of six-wheel vehicles; E. W. Templin of the Chrysler Corporation, the development history; L. R. Buckendale, executive engineer Timken-Detroit Axle Company, four-wheel drives for six-wheel chassis; and G. M. Sprowls of the Goodyear Tire & Rubber Company, the tires for use on six-wheel vehicles. The general opinion as expressed in the papers and in the discussion that followed is that it is necessary to restrict wheel loads with present types of paving, and that the six-wheel vehicle is one means of doing it. For freight haulage the trailer and the semi-trailer offer other methods of keeping wheel loads within limits while providing large carrying capacity in one unit. Considerable question was raised as to the excellence of four-wheel drives in use on six-wheel chassis, and it was felt that there is considerable room for improvement in this respect. One proposal is for the use of gas-electric drive with individual motors on each of the four rear wheels. Where the drive has been confined to one rear axle there has been insufficient traction in hilly country under some conditions.

Garage and shop design was the subject of a paper by Albert Kahn, architectural engineer, Detroit. He favors a floor as unrestricted as possible, preferably without pillars. A single floor is always to be preferred, be held. The fire regulations adopted in many cities are unwarranted. In fact, fires in garages are relatively few. Where multi-story garages with ramps are necessary, they should be of fireproof material. Wheel guards should be installed to prevent damage to vehicles. If the ramps are outside the building they should be fully protected.

Carbon deposits with heavy duty engines were considered in a paper by C. J. Livingstone, E. C. Martin and S. P. Marley, all of the Mellon Institute of Industrial Research, Pittsburgh. Tests of buses of the Pittsburgh Motor Coach Company were made with a paraffine-base oil having a high carbon residue, with a paraffine-base oil having a low carbon residue, and with a typical naphthene oil. In the sleeve-valve engines tested the naphthene oil produced materially less carbon than the paraffine-base oils, and the valves required correspondingly less cleaning to keep them open.

Some discussion developed on the practical effects of interstate regulation if this is adopted by Congress. The opinion was expressed that it may add as much as 2 cents per mile to the cost of operation. Others held that while undoubtedly there will be some added cost, it will be less than that amount.

Other papers were presented by Charles A. Harnett, commissioner of motor vehicles, New York State, in which he outlined how motor vehicle commissions can help develop motor vehicle transportation; H. B. Hewitt of the Philadelphia Rural Transit Company, on application of production standards to maintenance of motor vehicles; G. A. Green, General Motors Truck Corporation, heavy duty motor coach brake design; F. C. Horner, General Motors Corporation, application of motor transport to the movement of passengers and freight; and B. B. Bachman of the Autocar Company, on factors governing the construction and use of motor trucks. The last three papers were prepared for presentation at the World Engineering Congress held at Tokio last month and are abstracted elsewhere in this number.

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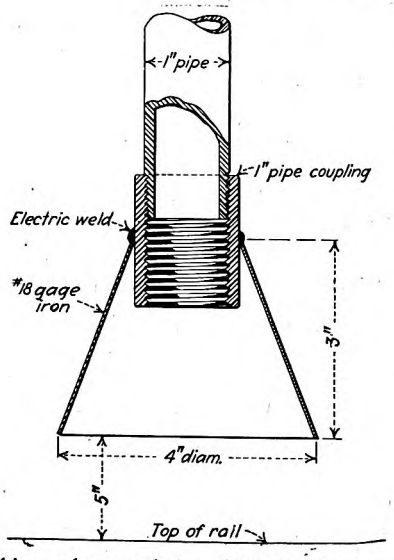
Many Handy Maintenance Devices Developed for Use

Improved Sand Spout Used at Cincinnati*

By George Kline
Foreman Cincinnati Street Railway
Cincinnati, Ohio

SAND spouts clogged with wet sand and ice have for years been a source of annoyance and delays to service. After trying various schemes to overcome this trouble, a simple funnel-shaped piece welded to a pipe sleeve has been adopted by the Cincinnati Street Railway. This was tried for several months on one division with such success that its use rapidly spread to all divisions of the system. The application of this device has almost completely eliminated renewals of sand spouts which used to be necessary, because crews break them off when attempting to clear clogged spouts by pounding. It has also reduced car changes due to sand trouble. The very simplicity of this device caused considerable skepticism and it was not until two years experience proved its efficiency that it was accepted at its full value. The theory is that sand does not come in contact with the wet inner surface of the lower part of this spout.



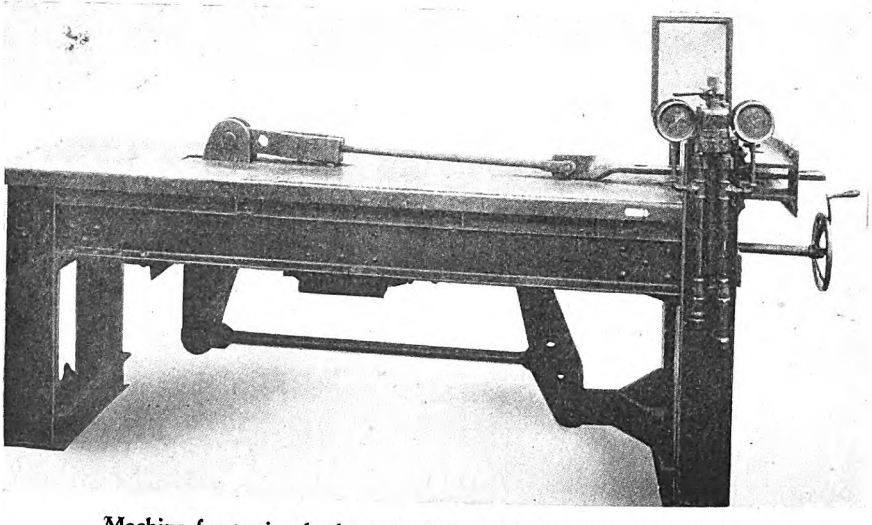
This sand spout designed by the Cincinnati Street Railway does not become clogged in wet or freezing weather

Brake Rod Testing Machine*

By M. J. Leary
Assistant Superintendent Buildings and Equipment Cleveland Railway, Cleveland, Ohio

BRAKE rod safety is now secured by means of tests on a special machine installed in the Harvard shops of the Cleveland Railway. In order to insure safety in what is really the most important part of a car, it was necessary to develop some machine that would properly test brake rods before they were put in service. Formerly we had no way of testing this important item of equipment and, therefore, were always fearful of some serious accident. This machine consists of a frame work built up of channel and angle iron with a series of levers and rods, set up so as to get any desired pressure on any size brake rod. The tension is obtained by air pressure from a 10-in. brake cylinder, controlled by an ordinary straight air brake valve, and transmitted to the brake rod to be tested. The brake rod is given a tension test of 100 per cent more than it would ever receive in service. This test will show up any defective weld or thread. The cost of this machine is approximately $50.

Submitted in Electric Railway Journal Prize Contest.

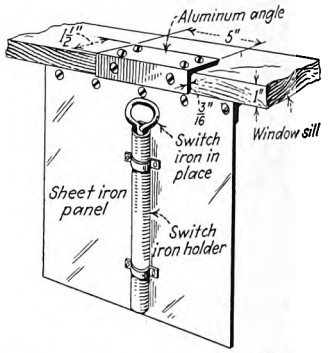


Machine for testing brake rods designed by the Cleveland Railway and installed in its shops

Aluminum Angle Piece Protects Window Sill

By Benjamin H. Hall
Shop Foreman West Penn Railways, McKeesport, Pa.

PROTECTION to wooden sills of vestibule windows has been afforded on cars of the West Penn Railways by placing an aluminum angle on the edge of the sill, countersunk even with the sill and fastened on with flat bevel screws also countersunk. This angle is $\frac{3}{16}$ in. thick, 5 in. long, $1\frac{1}{2}$ in. wide at the top section and 1 in. wide at the lower section. On these cars the switch iron holder is placed at the right hand of the vestibule window near the door post, within convenient reach of the



Aluminum angle plate prevents damage to vestibule window sill from switch irons

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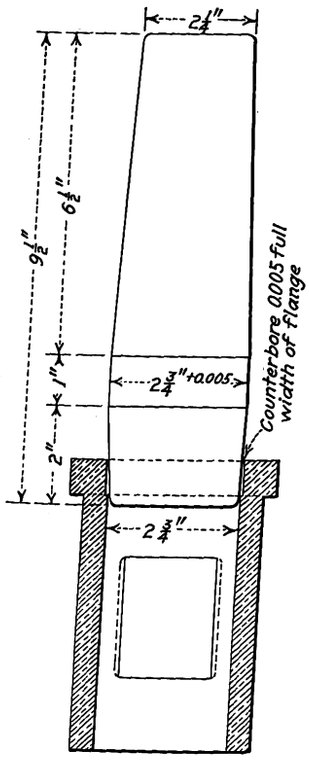
ntenaPractices and Devices
oped for Railway Shops

motorman. Formerly, when the iron was placed in the holder, if great care was not taken the hand grip would turn and come down on the sill, resulting in considerable damage and an unsightly appearance.

Armature Bearing Shell Expanding Broach*

By Charles Herms
General Foreman
San Diego Electric Railway
San Diego, Cal.

EXPANSION of bearing shells has been made possible by means of a tool designed by the San Diego Electric Railway. It has been found that bearing shells can be successfully



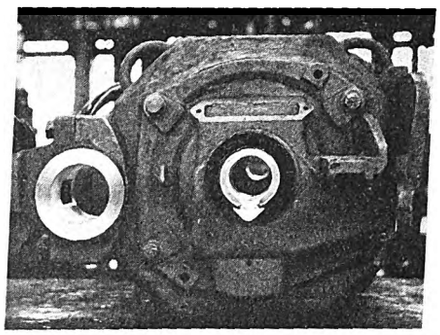
Armature bearing shell expanding broach used in the San Diego Electric Railway shop

expanded several thousandths of an inch with a broach as shown in the accompanying illustration. However, it is necessary that the bearing shell be counterbored the full width of its flange to a depth equivalent to that to which the shell is to be expanded. This is imperative because the shell will split through the flange if not counterbored, due to the rigidity of the flange. Broaches can be made up in 0.003-inch steps, after which the shells can be expanded at the first indication of looseness, thereby prolonging the life of the housing. This is important as the wear on the housing is rapid once a bearing is permitted to run loose in the housing.

Pocket Below Armature Bearing Prevents Oil Loss*

By Adam Hansmann
Shop Foreman Hamburg Elevated Railway, Hamburg, Germany

LOSS of lubricating oil formerly experienced with the 110-hp. motors used on the Hamburg Elevated Railway has been eliminated by placing a pocket below the armature bearing. Formerly it was not possible to confine the oil entirely.



Pocket at end of armature shaft bearing prevents loss of oil used for lubricating motors of Hamburg Elevated Railway

As the bearing clearance increased a part was lost, particularly from the outer end of the housing, by flowing out between the thrower ring and the pinion. In this way the bearing eventually emptied itself of oil, the babbitt melted out and the armature went down, resulting in serious damage. From this trouble there was an average repair cost of about 3,000 Reichsmarks ($720) per year per 100 cars.

For more than two years the cars that have come in for renewals have had the outside of the bearing housing on the pinion end fitted with a pocket placed beneath the bore, which is connected with the oil reservoir by a drilled hole. Two ring-shaped grooves are turned in the bearing surface and between the bearing and the housing. With this arrangement it is possible to direct the escaping oil through the grooves to the pocket and back to the reservoir. As a result the lubricating oil circulates with virtually no loss. By this means the life and economy of the babbitt bearings have been made to compare favorably with those of roller bearings. The cost of installation of this oil return is about 1 Reichsmark (24 cents).

*Submitted in Electric Railway Journal Prize Contest.

Judges for the

Maintenance Contest

MEMBERS of the committee of judges appointed by President W. W. Wysor of the American Electric Railway Engineering Association for the 1929-1930 Electric Railway Journal Maintenance Contest will be:

***Chairman,* C. A. SMITH, engineer maintenance of way Georgia Power Company, vice-chairman of the standing committee on way and structures A.E.R.E.A.**

T. H. NICHOLL, research department Cleveland Railway, chairman standing committee on rolling stock A.E.R.E.A.

DWIGHT L. SMITH, electrical engineer Chicago Rapid Transit Company, vice-chairman standing committee on power A.E.R.E.A.

GUY C. HECKER, general secretary A.E.R.A.

JOHN A. MILLER, Jr., managing editor *Electric Railway Journal.*

Hand Truck for Transporting Wheels

VERY often the layout of a shop is such that wheels have to be taken from one department to another by hand. Where this is the case some means must be provided to perform this work so that the maintenance schedule will not be retarded. This condition existed in the shop

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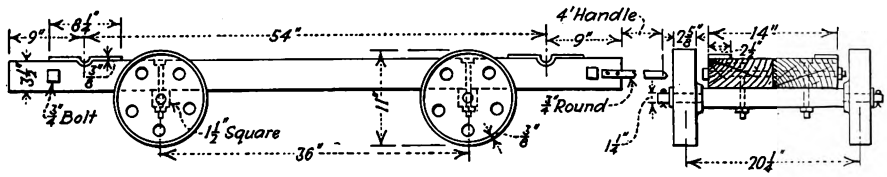


This truck has been found very useful for transporting wheels throughout the shop and yard where crane facilities are not provided

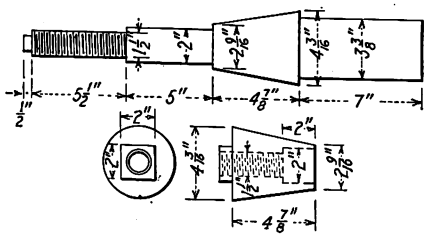
of the Staten Island Rapid Transit Railway, Staten Island, N. Y.

A special hand truck was designed and constructed in the shop to facilitate the handling of the wheels. It is made from two 7-ft. oak timbers bolted to two 1½-in. square axles; the axles are 26 in. apart and are equipped with 11-in. iron wheels with a 2⅝-in. face. The wheels are spaced 20¼ in. from center to center. Each beam is provided with two ⅜x2½x8¼-in. grooved plates, fastened to the upper surface at 54-in. centers. The flanges of the wheels rest in these grooves during transportation, preventing the wheels from rolling. The truck has a handle made of ¾-in. round iron.

Mandrel for Machining of Axle Bearings

By E. H. McGill
Foreman Machine Shop
Omaha & Council Bluffs Street Railway
Omaha, Neb.

MACHINING of the outer surfaces of axle bearings has been greatly facilitated at Omaha by a special mandrel which has been made from an old street car axle. When a bearing has to be machined the

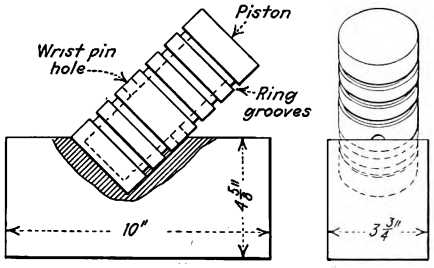


For machining the outer surface of axle bearings this mandrel, made from an old street car axle, is used in the Omaha & Council Bluffs Street Railway

mandrel is placed with the long shaft in the chuck of the lathe. The bearing is then put over the mandrel against the conical end. After this the nut, which also has a conical shape, is screwed on until the bearing is properly centered and tied in its place. The entire outside is turned off at one setting of the lathe, and if necessary both ends can be turned off also. A saving of 35 per cent in labor over the old method paid for the mandrel in a very short time.

Jig for Drilling Pistons

TO DRILL small angular holes in pistons, the jig shown in the accompanying sketch is being used in the shop of the Surface Transportation Company, a subsidiary of the Third Avenue Railway, New York,



This jig saves time in drilling pistons

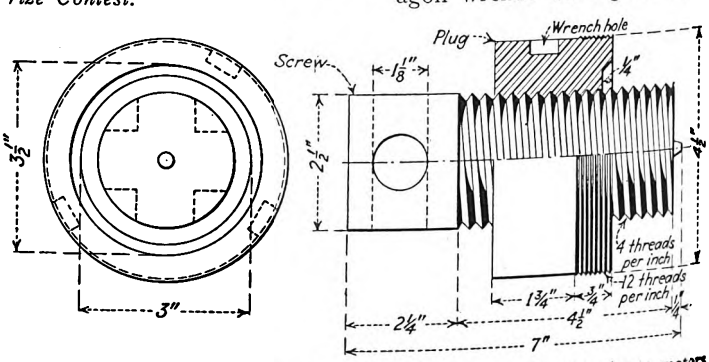
N. Y. It is made of steel and is 4⅝ in. high, 3¾ in. wide and 10 in. long. The angularity of the recess is determined by the angle of the drilling desired. This jig assures accuracy of the drilling process, eliminates loss of time in setting up the job in the drill press and prevents drill breakage and slippage.

Removing Housing of Barrel Motors*

By Herbert Senior
Foreman Louisville Railway,
Louisville, Ky.

HOUSING removal from barrel-type motors on various occasions has been accomplished only after much difficulty. In order to facilitate this work a special tool has been designed in the shops of the Louisville Railway. This tool consists of a plug with screw, as shown in the accompanying sketch. The outer side of the plug has a thread which fits into the commutator end of the housing where the dust cover is screwed in over the end of the armature shaft. The plug is placed therein and the screw which goes through the center of the plug is turned in, thus pressing the motor out of the barrel. It has been found that this method takes about four minutes, while if it is necessary to resort to hammer and chisel about 11½ minutes are required.

**Submitted in* Electric Railway Journal *Prize Contest.*

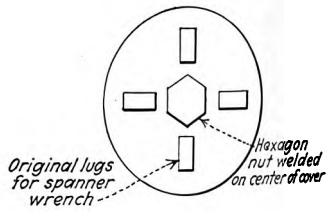


Housing puller designed by the Louisville Railway for barrel-type motors

Improved End Cover for Commutator End Frame

By H. J. Beadle
Electrical Engineer Dallas Railway & Terminal Company, Dallas, Tex.

KEEPING covers on commutator frame heads of motors is often quite difficult. These covers screw into the frame head and it is difficult



Hexagon nut welded on end cover for frame facilitates tightening and prevents loss

to use a spanner wrench underneath a car. Each type of motor requires a different type of spanner wrench and much inconvenience is caused in keeping these wrenches on hand. Almost invariably after being tightened with a spanner wrench the covers work loose and often are lost on the road. To overcome these difficulties and make everything standard on the property, a hexagonal ⅞-in. nut is welded on to the cover so a ⅞-in. hexagon wrench will tighten any cover.

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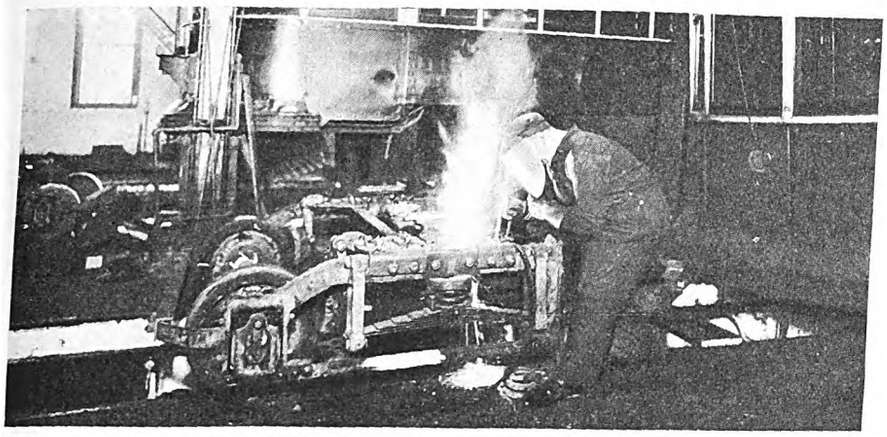


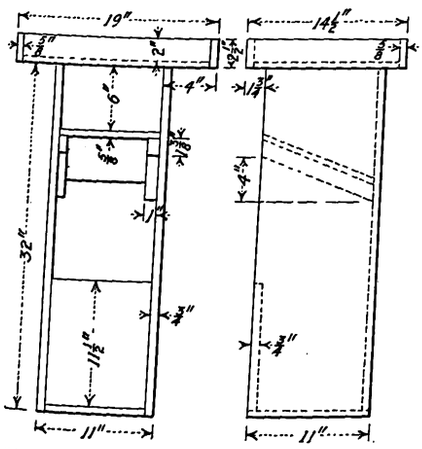
Extensive use is made of electric arc welding in the repair of car trucks at the Cold Springs shop of the International Railway, Buffalo

Repairing Car Trucks Without Dismantling

REPAIRING hanger seats and other wearing parts in car trucks is accomplished in the Cold Springs shops of the International Railway, Buffalo, N. Y., by means of electric power leads that are extended into the truck shop so that electric arc welding can be used, without having to take the truck completely apart. The use of the electric arc weld likewise permits the spotting in of pedestal jib plate bolts, making it possible to keep plate bolts tight, and eliminating excessive wear, noise, broken truck frames, etc.

Armature Winders Tool and Material Stand

ARMATURE winders in the shop of the New York & Queens County Railway, Woodside, N. Y., are furnished with a special tool and material tray and stand, which permit the storage of all tools and material required for repair or rewinding jobs. This eliminates loss of time in going back and forth to the storeroom. It is made of maple and occupies a space of 19 x 14½ in.



Handy fixture for storage of armature winding material and tools

A tray, 19 in. long by 14½ in. wide and 2 in. deep, is made of ⅝-in. material and is mounted upon a stand 11 in. square, made from ¾-in. maple. This stand is totally inclosed on three sides and designed with two compartments.

The upper tray compartment is formed by the bottom of the tray and an incline shelf screwed to two 1-in. x 1¾-in. strips fastened to the sides of the stand. This shelf is installed 6 in. from the bottom of the tray and projects downward so that the back edge is 4 in. lower than the front. The lower compartment is formed by partially closing off the front of the stand with a ¾-in. x 11½-in. board. Because the workers' tools and the necessary material are within easy reach, production has been substantially increased.

BUS AND GARAGE DEVICES

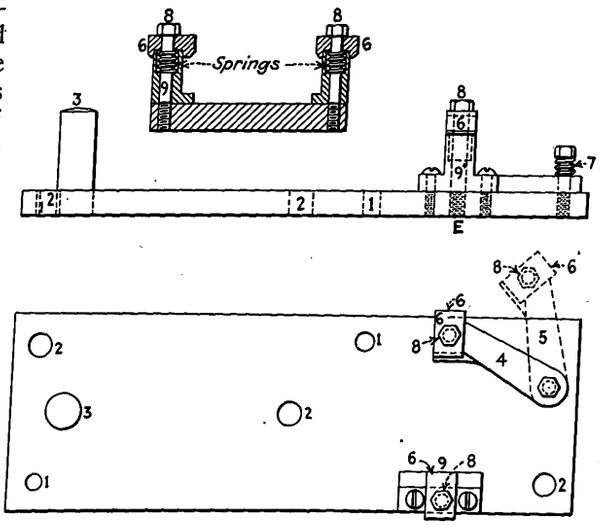
Jig for Machining Bus Connecting Rods*

By F. A. Marsh
Superintendent of Equipment Municipal Railway, St. Petersburg, Fla.

TO SECURE increased efficiency in reconditioning bus connecting rods, the Municipal Railway of St. Petersburg, Fla., has designed a jig for the purpose of machining such rods with the minimum of labor, both in setting up and in the actual boring. This jig consists of a baseplate together with a stud and a clamp arranged in such a way as to hold the connecting rod in place in a lathe. In order to secure accurate machining it is best to smooth off the faceplate of the lathe and also one side of the baseplate of the jig. The plate is brought into position by dowels (1) and cap screws (2) shown in the accompanying illustration. A stud (3) of the exact size of the piston wristpin is located at one end of the jig. When the lever (4) is swung open to position (5) the rod is pushed down over the wristpin stud (3) and against post (9). The lever is then returned to closed position (4) and hexagonal capscrews (8) are tightened, forcing dogs (6) down on to the connecting rod.

Any twisting or bending of the rod to make it perfectly true should be done before it is placed in the jig and it should not be forced by dogs (6) but simply held in position by them. If the rods are perfectly babbitted, the machining will consist only of running a heavy boring tool through the bearing. The sides of the bearing adjacent to the stud may be machined by an electric drill.

A counterbalance should be bolted to the faceplate of the lathe in order to eliminate vibration when running



Jig for machining connecting rods designed and used by the Municipal Railway of St. Petersburg

*Submitted in Electric Railway Journal Prize Contest.

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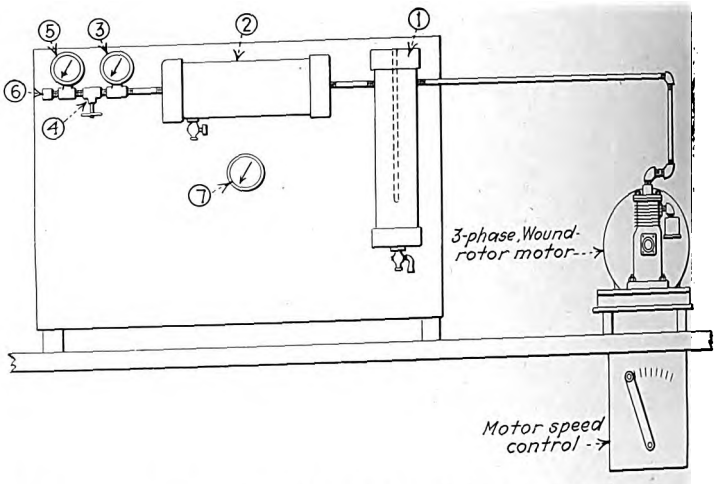
at high speed. If great accuracy is maintained in making the jig, and a heavy boring tool is used in machining, the rods can be reconditioned with small expense and with a minimum of time, assuring ease of assembly and identical dimensions of all rods. By this method the entire cost of rebabbitting and machining should not exceed $1 per rod, including babbitt, and if the crankshaft is true no scraping and fitting of the rod is necessary, as rods should be exact within a few ten thousandths of an inch variation.

Bus Compressor Test Stand

By L. Rose
Assistant Superintendent Cleveland Railway
Cleveland, Ohio

IN ORDER to test new compressors for buses and also to check removed units without dismantling, a combined run-in and test stand was designed by the Cleveland Railway. The examination of a used compressor consists chiefly of running it at a low, predetermined speed for a fixed period, when its pumping capacity is tested and if found satisfactory it is passed. The procedure is as follows: The compressor is connected to the apparatus shown in the accompanying sketch. This consists briefly of (1) a vertical oil separator tank equipped with a baffle plate, to drive out of the air all oil pumped by the compressor; (2) a cooling and expansion tank; (3) an air gage to show the pressure the compressor works against; (4) a needle valve; (5) a second gage as in (3), and (6) a pipe cap drilled to form an orifice of a specific diameter, as determined by trial ($\frac{1}{16}$ in. is satisfactory for most work). The compressor is then run at a predetermined speed for a given time with the needle valve (4) wide open, and the amount of oil passed in a given time, as measured in cubic centimeters, is determined. If this amount exceeds the limit set the compressor is torn down and the rings and pistons inspected for wear. If the compressor passes the "oil" test it is then checked for capacity to pump. This is done by again running at a predetermined speed and adjusting the needle valve so that the compressor pumps against a given pressure (100 or 125 lb.) as indicated by the gage (3). After a short run, until temperatures become constant, the needle valve is again adjusted and the pressure on gage (5) is read. If this pressure is below the limit for this type unit, the head is removed and the valves ground or inspected to determine what the difficulty is. If the unit passes this test it is felt that it may be sent out to be installed for at least the balance of mileage due before its scheduled inspection, and in most cases a bearing takeup will render the compressor as satisfactory as an entirely rebuilt unit.

As may be readily seen, the cost of such a set-up is nominal, with the exception of the motor and the control resistance. This installation, a few years ago, cost approximately $200 and paid for itself a few months after completion.



Air compressor test panel used by the Cleveland Railway for the maintenance of the air equipment on buses

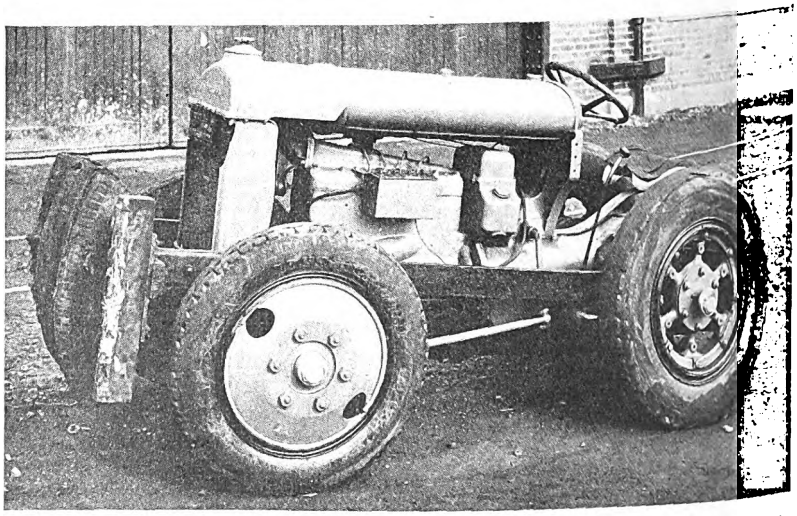
Reducing Trolley Wire Breaks

A survey of overhead line maintenance methods and results on various electric railway properties will appear in a future issue

Tractor Used as Shop Locomotive

By Del A. Smith
General Manager
Department of Street Railways
Detroit, Mich.

IN THE garage of the Department of Street Railways, Detroit, an old Fordson grader has been converted into a very useful shop locomotive. At the front it has rubber bumpers attached to sills running back and braced to the rear axle, for pushing coaches about the garage. A rugged hook is provided at the rear for towing vehicles if necessary, while for obtaining better traction a weight box has been installed. The wheelbase is 67 in. and width over all is 52 in., which enables this machine to turn in a circle of less than 12 ft.



Shop locomotive made from an old Fordson tractor is used for haulage around the shops of the Department of Street Railways in Detroit

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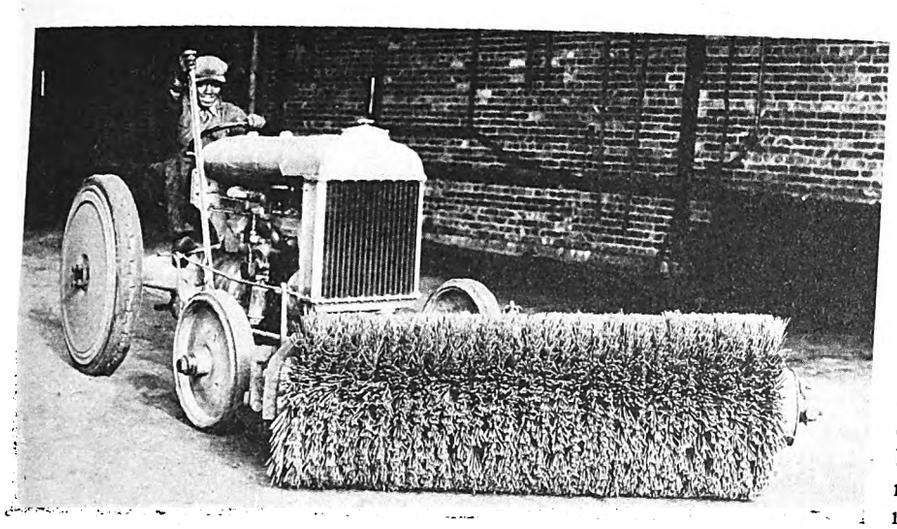


Sweeping the floor of the Walden garage of the International Railway

Motor-Operated Sweeper Speeds Cleaning

THE total floor area of the Walden garage of the International Railway, Buffalo, N. Y., including the bus driveway, approximates 53,000 sq.ft. Fourteen hours of one man's time has heretofore been required daily to take care of the sweeping of this space. In an effort to conserve a part of this man-power for other purposes a mechanically-driven rotary brush has recently been substituted with most satisfactory results.

A brush of 30 in. diameter and 8 ft. long, connected in a frame just ahead of a Fordson tractor mounted on solid rubber-tired wheels, makes it possible to complete the sweeping job in 2¾ hours. The work is not only performed in something less than one-fifth the time previously required, but is done as well or better than by hand.

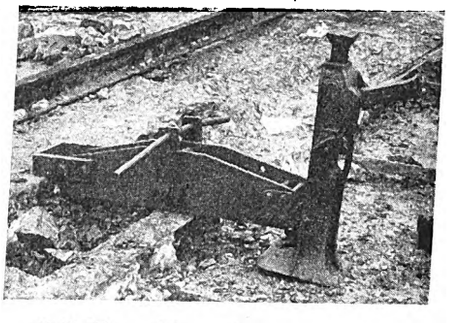
Rail Lifter with Track Jack*

By Roy F. Bragdon
Division Superintendent
Way Department Cleveland Railway
Cleveland, Ohio

A RAIL lifter used in combination with an ordinary track jack in the way department of the Cleveland Railway has facilitated greatly the removal of rails. This device is clamped to the head, allowing the rail to be lifted from the top, which eliminates the necessity of using bars or the digging of jack holes under the base of the rail, which was the method followed prior to the development of the rail lifter.

The rail lifter was developed primarily to meet the problem of lifting and holding the rail suspended during the process of resurfacing old track laid on the steel ties with a concrete base, this being done without disturbing the track base. The rail was lifted first and then steel plates were welded to the old ties, in order to bring it up to the proper elevation of the street.

Employing a gang of about 40 men, the Cleveland Railway reconstructed about 2½ miles of single track in this manner. The rail lifter weighs about 148 lb. and is easily handled by two men. By its use the progress of reconstruction was increased about 50 per cent, which was a saving of about $75 per day.



Rail lifter with track jack ready for operation

*Submitted in Electric Railway Journal Prize Contest.

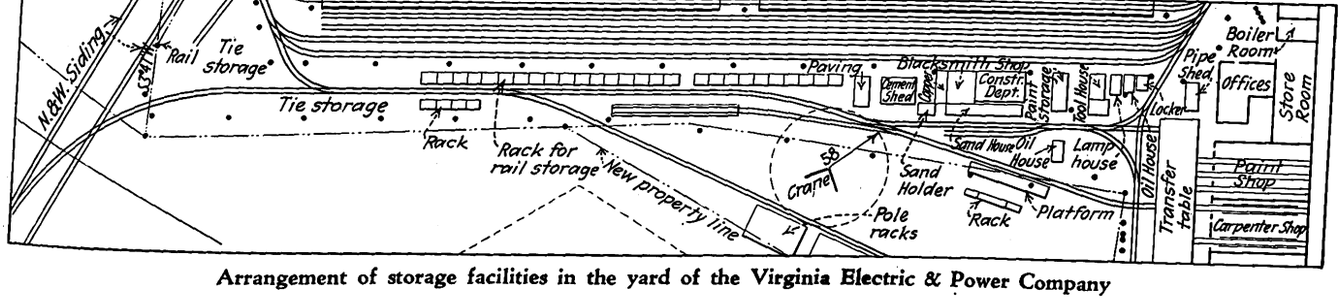
NEW IDEAS IN TRACK WORK

Assorted Layout of Track Materials*

By J. C. Newman
Engineer Maintenance of Way
Virginia Electric & Power Company
Norfolk, Va.

A CONVENIENT system of assorting track materials is employed by the Virginia Electric & Power Company at Norfolk. The material is unloaded from cars with the company's traveling crane and skidded in place on racks as shown in the accompanying illustration. These racks are made from old bridge lumber used as mud sills, on top of which T-rails are spiked down as stringers. The material is systematically arranged, each article being numbered for storeroom purposes, the numbers corresponding with stock cards, so that a complete record is kept of the material in stock. The material is placed in the yard from one end to the other in the following order: New special work layouts complete, switches, mates, frogs, portable crossovers, guard rail, main rail and relaying material. When any article is required for service, it is requisitioned according to the number on the stock card. The racks were built during odd times by the company's force at a cost of approximately $500.

*Submitted in Electric Railway Journal Prize Contest.



Arrangement of storage facilities in the yard of the Virginia Electric & Power Company

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ELECTRIC AND LINE EQUIPMENT

Reclaiming Negative Battery Groups*

By F. W. Braund
Superintendent of Power Conversion
Cleveland Railway, Cleveland, Ohio

ELEMENTS of lead acid storage batteries are constantly deteriorating and disintegrating. The time actually required for this deteriorating process to cause the battery to become unserviceable is a function of battery cycling, rates of charge and discharge, height and strength of electrolyte, insulation, plate shedding, temperature, etc.

Plate shedding is the loss of active material from the positive and negative groups. It is caused primarily by chemical action of the electrolyte penetrating the plate on discharge, only to be driven out of the plate while charging, thus carrying particles of active material to the free surface where they are deposited in the sediment chamber. Freezing, overheating, and overcharging cause expansion and contraction of active material, breaking down its binder or adhesive qualities, which results in abnormal shedding.

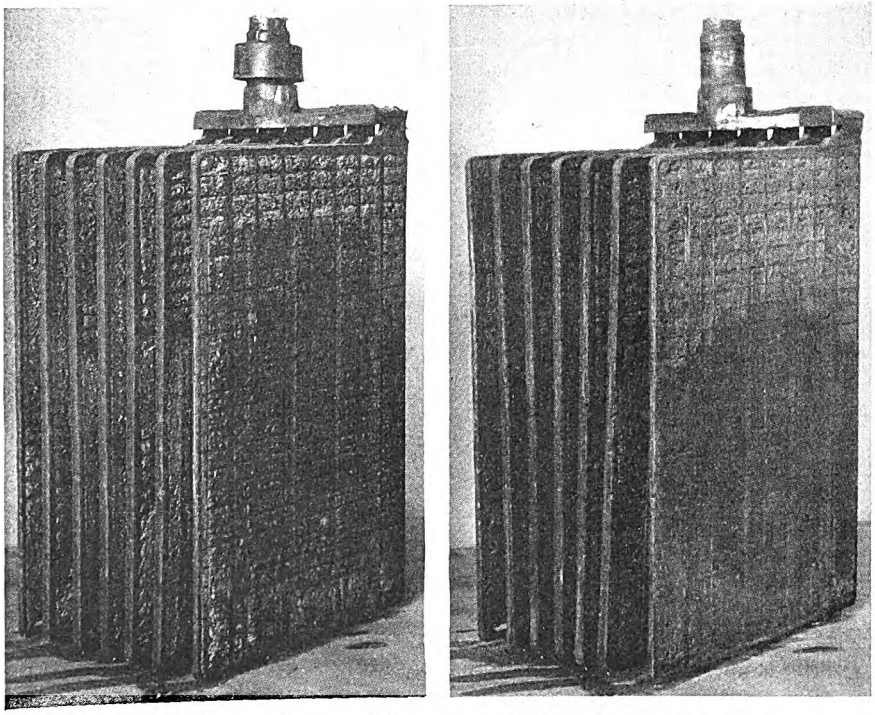
Insulation usually of the vertical ribbed type is constructed and arranged in a battery so as to fill in the space between the negative and positive plates and form a solid or compact cell. With this compact assembly, much of the shedded negative plate active material banks up or packs between the surface of the plate grid and the insulating sheets. In the past, when reinsulation or a renewal of positive groups was necessary, this loose shedded negative material was scraped or washed from the negative plate surfaces, leaving a battery with new positives acting on 50 or 60 per cent negatives.

Much of this loose shedded material can be reclaimed by pressing the material back into the plate grids. Before this pressing process is performed, however, it is necessary to charge the battery thoroughly, chemically changing the lead sulphate existing in the negative plates when discharged to spongy lead which exists under charged conditions.

Fillers of wood or sheet lead, with thicknesses sufficient to fill the space, are then placed between the negative plates in the group. This compact assembly is placed in a screw press, which forces the loose, spongy lead back into the plate grid, and results in a 90 to 95 per cent negative plate.

The average life of negatives in the service of the Cleveland Railway is approximately two years. While the reclaiming process has been in service but six months, it is estimated that approximately two years additional life will be obtained by the reclaiming method, and will result in a four-year over-all life for the negative plates, which are discarded sooner otherwise.

**Submitted in* Electric Railway Journal *Prize Contest.*



Reclaimed battery plates; at left, elements before the pressing process; at right, after pressing

Metal W-S Signs an Improvement Over Painting on Poles*

By D. H. Walker
Chief Engineer
Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

WHISTLE and Stop signs for many years have been painted directly on the trolley poles of the Terre Haute, Indianapolis & Eastern Traction Company. Whenever a pole was changed the sign was necessarily destroyed. Moreover, the white letters did not last long on creosoted poles and had to be painted every other year on cedar poles. To eliminate this trouble the use of metal signs was begun. This has resulted in lower maintenance costs and signs which were easier to distinguish. It has also eliminated the danger of having no sign after a pole was taken out for renewal.

Whistle and Stop Sign

Attached to span wire poles of the Terr Haute, Indianapolis & Eastern Traction Company, these signs have reduced maintenance cost

These metal signs are 12x12 in. for the single "W" or "S" and 12x24 in. for the combination of the two. They are made of 20-gage metal, painted white, with black letters 9 in. high. The new sign is nailed to the trolley pole. When renewal is needed a few extras which are kept in stock in the shop are then sent out for the section men to change. The average cost for painting the letters on trolley poles was about 30 cents, but these had to be painted every second or third year at best. The metal signs average 45 cents in cost, of which 30 cents is for material. The lettering will remain clear twice as long as the old type. Since this company has almost 1,100 such signs the saving in maintenance amounts to a considerable sum.

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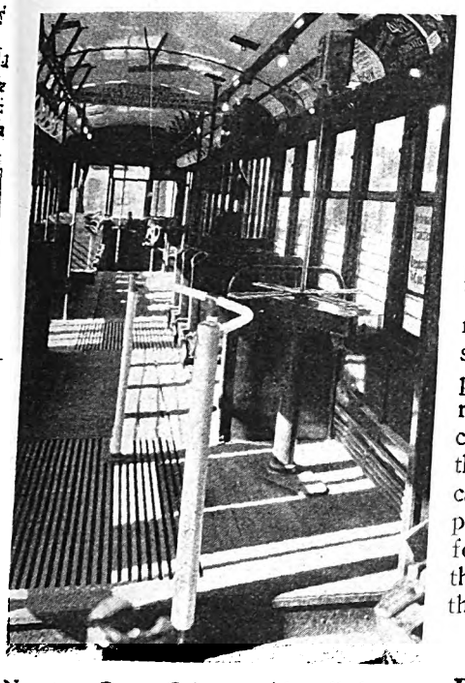
New Car and Line Products

Turnstile Fare Collector for Street Cars



New type Perey Coinpassor installed near the front entrance door of a Brooklyn & Queens car

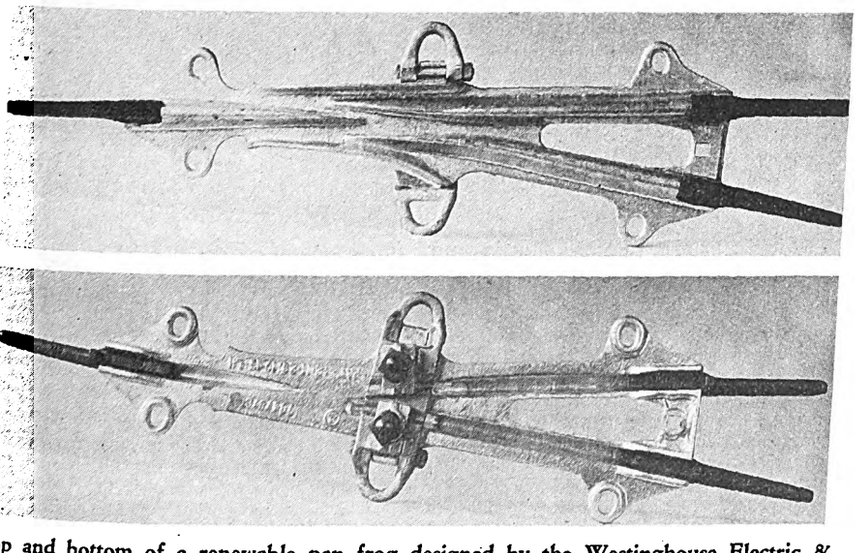
A VARIATION of the Perey "Coinpassor," developed for use on street cars, is being tried out on the lines of the Brooklyn & Queens Transit Corporation.

This new turnstile has been evolved from the Perey Coinpassor in use by subways and elevated railways in prepayment areas for a number of years past. An advantage claimed for it is that it allows the car to pick up its load quickly at any stop and to proceed while the passengers are admitting themselves through the Coinpassor. Moreover, it reduces the responsibilities of the car operator, since he only has to make change for a few passengers who do not have the correct coin, and does not need to pay attention to the others. Tokens are issued in exchange for transfers by the operator and are then inserted in the Coinpassor the same as the 5-cent piece. The small size of this Coinpassor makes it possible to locate it on one side of the car, thus, allowing the full platform space to be utilized as a reservoir for passengers boarding the car, and also, if necessary, leaving the other half of the end of the car body for exit, although the best practice would be to use the front end for entrance only and have all exit through pneumatic treadle doors at the center or rear of the car.

Renewable Pan Trolley Frog

IN THE design of a new Westinghouse renewable pan frog the work of resetting has been eliminated by the addition of an anchor plate, which remains in position permanently. The trolley wires, tangent or curve, are fastened to the anchor plate by the usual individual clamping method. After the anchor plate is set, the frog body or renewable pan is brought up underneath the plate and inserted into its place. A pin holds the pan in place and the frog is then ready for the approaches.

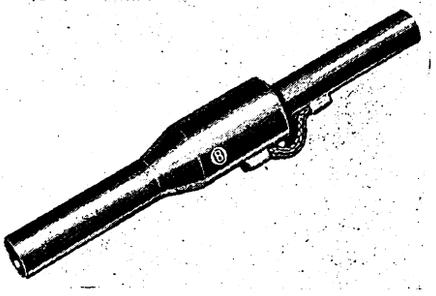
No guys are required, providing the anchor plate is set correctly. The trolley wires will line up the frog, and after the approaches are driven into place the frog is permanent until it wears out. When it becomes time to renew the pan the approaches are removed and the bolt in the anchor plate is slipped out, the worn pan is taken out and a new one put in its place.



Top and bottom of a renewable pan frog designed by the Westinghouse Electric & Manufacturing Company, which permits replacement in a minimum of time

Silencer Stops Trolley Noise and Reduces Wear

A CUSHION silencer is a recent addition to trolley pole equipment made by the Ohio Brass Company, Mansfield, Ohio. Besides eliminating trolley noises, this also reduces the wear on both the overhead and the collector by its cushioning action. This method of reducing noise differs from experiments which have been tried previously, in that the object is to damp the noise immediately below the trolley wheel, rather than to attempt to silence the entire assembly by some sort of cushion under the trolley base. The silencer consists of a steel tube upon which a rubber cushion is vulcanized by a patented process which makes it adhere firmly to the steel. Another steel tube, tapered to fit over the end of the trolley pole, is swaged over this rubber cushion. So assembled, the device deadens the vibration and noise of the current collector. A braided copper shunt carries the current around the rubber cushion. The device is easily installed and weighs only 28 oz. It adds 8½ in. to the length of the trolley pole, but if increased pole length is objectionable, the pole can be shortened at the base.



O-B cushion trolley silencer deadens noise and vibration immediately under the harp

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News *of the* Industry

No Curtailment of Improvements

Electric Railway Representatives Assure the President Market Crash Will Not Affect 1930 Expenditures

REPRESENTATIVES of three public utility groups—electric railways, electric light and power, and manufactured and natural gas—met with President Hoover at the White House Nov. 27 to discuss their programs for the coming year. All expressed optimism concerning the prospects for business and industry. No curtailment of its expenditures is anticipated by any of the public utility industries as a result of the stock market depression.

Speaking for the electric railways, J. N. Shannahan, chairman of the Advisory Council, said:

"A canvass of the electric railway companies of the United States, comprising street car, rapid transit, interurban and bus lines handling approximately 16,000,000,000 passengers annually, indicates that 97 per cent of the executives responding to our inquiry do not anticipate that the present stock market situation will affect their capital and maintenance expenditures during the coming year.

"This survey, made at the suggestion of Paul Shoup, president of the American Electric Railway Association, who is unfortunately unable to attend this conference due to his presence on the Pacific Coast, indicates that this industry which during 1929 is spending approximately $1,000,000 a day for maintenance, betterments and extensions, expects to maintain or exceed this rate of expenditure in 1930.

"At a meeting held at the association's headquarters in New York on Nov. 26, 1929, representative executives of companies operating in various parts of the country expressed their confidence in the business outlook and their desire to cooperate with President Hoover in every possible way in his effort to stabilize and insure the continued progress and development of business.

"Analysis of the transportation situation in a number of large cities indicates that as progress is made in bringing about better public understanding of the economic problems involved, improvement in credit will permit considerable increases in capital expenditures to be made for expansion of facilities."

In addition to Mr. Shannahan, the electric railway delegation included J. H. Hanna, G. A. Richardson, W. A. Draper, J. P. Barnes, T. N. McCarter and L. S. Storrs.

Kansas City Case Argued

R. J. Higgins, who presented the case of the Kansas City Public Service Company, Kansas City, Mo., before the Missouri Supreme Court, in his initial appearance before the court contended Judge Latshaw was wholly without jurisdiction to interfere with the official duties of the Public Service Commission when he granted the temporary injunction which blocked the commission's valuation and audit of the company's properties. He charged further that the power to fix rates with a public utility rested entirely in the Public Service Commission, and that Judge Latshaw had no power to limit or abridge the powers of the commission.

D. D. McDonald, chief counsel for the commission, said the Circuit Court's action was not an orderly one, and that Kansas City, or any other city of its class, had no power to tie up police power of the commission.

John T. Barker, city counselor, insisted the franchise was a "service-at-cost" grant, under the amendment to the 1925 public service law.

City Appeals From Recent Louisville Decision

The city of Louisville, Ky., on Nov. 18 filed an appeal in the U. S. District Court of Appeals at Cincinnati against the decision of Judge Dawson in the U. S. District Court at Louisville, who some weeks ago granted the Louisville Railway an injunction to prevent the city's interfering in its plan for increasing fares to 10 cents cash with three tickets for 25 cents. The city questions the jurisdiction of the federal court in the case. According to City Attorney Baskett, oral arguments will be heard first and then briefs will be filed.

Meeting of Standing Committee on Rolling Stock

Members of the standing committee on rolling stock met on Nov. 20 for the first time since the recent convention with the chairmen of the sub-committees to outline the work for the ensuing year. Reports were presented on the progress of the thirteen sub-committees. This work is to be continued to the latter part of February when the second and last meeting will be held. There will be only two meetings due to the limited amount of time available before the convention in San Francisco in June.

New Company Paper in Columbus

The initial number of "The Illuminator," a 32-page monthly magazine published by the Columbus Railway, Power & Light Company, Columbus, Ohio, has just come from the press. When the company decided several weeks ago to publish the magazine, a committee was named to select a title, and the entire personnel was asked to suggest appropriate names. The request brought in more than 800 names. Earl E. Grover, claim agent for the company, has been made editor and George M. Kaufman, assistant editor. Each department of the organization has a representative on the staff responsible for furnishing news from his division.

Separate Operation Ahead in Augusta

F. Bayard Culley, division manager of the Georgia Power Company at Augusta, Ga., has explained the recent incorporation of the Augusta Railway & Transportation Company in part as follows:

"The application for a charter by the Augusta Railway & Transportation Company is with the view of organizing a new company which will acquire by purchase and take over the operation of the railway system in Augusta.

"In the development of the electric industry, the problems incident to the operation of street railroads on the one hand, and light and power plants on the other, have become increasingly dissimilar and difficult to handle under combined management. In order more readily to meet and solve these problems as they arise, it has been deemed advisable to separate the railway properties from the electric service, thereby simplifying the handling of each.

"It is also considered desirable that each of the services should stand on its own bottom, as it is obviously unfair to the patrons of one or the other service that losses in operation of one service be made up from funds paid in by customers of the other service. Under unified management this is inevitable to some extent.

"There is no present intention to make any change in the staff or operating personnel of the railway in the event that the charter is granted and the change takes effect. Similar plans are being perfected for the separation of the street railway properties from the electric in Rome, Athens and Macon."

Ten-Cent Fare Asked for Casual New Jersey Rider

Public Service Co-ordinated Transport, Newark, N. J., applied on Nov. 21 to the Public Utilities Commission to change the present 5-cent unit fare on trolley cars and buses to 10 cents, but to sell twenty tokens for $1. Thus the 5-cent fare would be retained for regular riders. The proposed change will become effective Jan. 1 unless suspended by the commission. The situation is best explained in the statement by President Thomas N. McCarter, in part as follows:

"Since the start of the 5-cent fare the company's operating revenues have failed to meet operating costs and fixed charges by approximately $5,000,000, with no return upon nearly $48,000,000 invested in the property represented by stock of the company.

"This situation and the necessity of establishing the credit of the company, so that it can attract the necessary additional capital with which to furnish the public adequate and proper service, require some change in the rate of fare.

"In its desire to preserve the 5-cent fare, the company proposes a rate which will

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retain this fare for the great body of 310,000,000 car riders and 365,000,000 bus riders who are transported annually. To do this, it proposes a plan involving the sale of tokens at the rate of twenty for $1, each token good for a 5-cent ride as at present defined, with an alternative 10-cent cash fare for the occasional rider, whose use of the facilities, though casual, requires the company to keep them available at all times to serve him.

CASUAL RIDER ALONE AFFECTED

"As stated by me in an interview in the public press two months ago, the rate suggested will permit the regular passenger to continue to ride for the 5-cent fare through the purchase of tokens. The only increase will be in the fare of the occasional rider who would not resort to the use of tokens.

"We are willing to try this experiment in the hope that it will produce additional revenue, rather than seek a horizontal increase in the rate of fare to be paid by all riders on street cars and buses.

"The best interests of both the public and the company will be served by permitting this change in the rate to go into effect as soon as possible, exactly as the present fare experiment was put into effect by the company at the board's suggestion without suspension and without hearings.

"The company has already shown its good faith in making a six-year trial of the present rate of fare and pledges that it will give the rate now proposed a full and fair trial. We seek the co-operation of the public and respectfully request that your board permit the proposed rate to go into effect without suspension."

W. B. Wheeler Heads Met. Section

At a meeting of the Metropolitan Section, A.E.R.A., held at the Engineers' Auditorium, New York City, Friday evening, Nov. 1, W. B. Wheeler, assistant superintendent of transportation, Third Avenue Railway System, was chosen president for the ensuing year. Other officers elected were W. G. Strait, vice-president and purchasing agent, New York Railways, first vice-president; G. H. Ord, treasurer, the Ellcon Company, second vice-president; F. T. La Velle, division superintendent, New York Rapid Transit Company, third vice-president; W. H. Eisemann, secretary; L. G. Monroe, assistant auditor, Third Avenue Railway System, treasurer.

For directors there were chosen Niles Persons, superintendent surface lines shops, Brooklyn-Manhattan Transit Corporation; K. R. Lewis, assistant superintendent of car equipment, Interborough Rapid Transit Company; S. S. Hamilton, assistant superintendent of transportation, Brooklyn & Queens Transit Corporation; M. J. O'Connor, superintendent of transportation, New York Railways; W. W. Brown, assistant to superintendent of equipment, Brooklyn-Manhattan Transit Corporation; and H. Vander Veer, sales engineer, National Pneumatic Company.

The meeting was addressed by Guy C. Hecker, general secretary, American Electric Railway Association, who spoke on the recent Atlantic City convention. Charles Gordon, managing director, American Electric Railway Association, was also requested to speak. The program of entertainment was ably handled by Charles Witzel, Third Avenue Railway System, and his aides.

Co-operative Association in New Orleans

The charter of the Co-operative Street Railway Employees Association of the New Orleans Public Service, Inc., a new association made up of motormen, conductors and other men now employed by the company, has been recorded in New Orleans by St. Clair Adams, attorney.

Mr. Adams said the purpose is to permit collective bargaining with respect to working conditions, hours, wages, etc., and to provide for insurance, sick and death benefits.

Those eligible for membership in the new association are conductors, motormen, pitmen, pitmen helpers and car washers. The association has a full complement of officers with a board of trustees.

The objects of the association as outlined in the charter are:

1. To co-operate with the company in giving the public the most efficient service.
2. To insure fairness and justice to employees, the management, the stockholders, and the public, and to provide means for collective bargaining with our employer in respect to wages, hours and working conditions.
3. To promote mutual understanding, harmony and spirit of co-operation among those of all ranks in our organization.
4. To provide our members with certain incomes when incapacitated by illness or accident and to pay definite sums to the beneficiaries of such of our members as may die.
5. To create, administer and maintain funds for those purposes from dues, donations and other sources so that benefits shall be furnished at the current cost of the same.
6. To provide and administer such other welfare activities and forms of relief as may be adopted.

The preamble of the charter expresses the purposes of "building up an organization where all working members can participate in the free discussion of those practical problems upon the solution of which depends our welfare and prosperity; encourage the principle and practice of conciliation in the settlement of all differences between ourselves and our employer; establish order; inspire harmony; promote the general cause of humanity and brotherly love, and secure the blessings that come from true friendships."

Jitneys have not entirely disappeared from the streets of New Orleans, but police continue to make numerous arrests each day and the number is gradually being reduced. The courts recently decided that operators of jitneys must be specifically charged with operating without the required bond. Convictions under this charge are being upheld.

Preparing for Washington Fare Appeal

At a meeting of the executive committee of the Washington Railway & Electric Company, Washington, D. C., on Nov. 21, the officers of the company were directed to proceed with an appeal to the court from the recent order of the Public Utilities Commission denying the application of the Capital Traction Company for increased rates of fare, to which application the Washington Railway & Electric Company was made a party by order of the commission.

The commission in its order concluded that the companies had not fully met the burden of proof, but left the way open for them to submit further evidence. The Washington Railway & Electric Company confidently rests its case on the evidence already submitted and feels that the importance to the community and to itself of the matters involved requires that they should be presented promptly to the court for review. President Ham of the company said:

"We confidently believe that with an adjudication by the court of certain matters of fact and of principle, concerning which there is now a difference of opinion, there will come a realization on the part of all concerned that the street railways in Washington, with their expensive underground conduit system, cannot continue to render the class of service desired by the public at the present rates of fare."

The form that the Capital Traction Company's legal action for relief will take is now before the company's legal staff.

Omaha Bridge Vote in Spring

Citizens of Omaha and Council Bluffs will probably vote at a special election next March on the purchase of the bridge spanning the Missouri River from the Omaha & Council Bluffs Street Railway.

The company's price of $4,155,296 was rejected by the City Councils of the two cities in a joint session by a vote of nine to three. This led President Shannahan to announce that the purchase of the bridge at the company's price would be submitted to the voters. At the joint Council meeting, Mr. Shannahan presented in writing what he said was the final offer of the bridge owners. The counter offer by the cities to purchase the bridge for $3,500,000, made at this meeting, was rejected by the company.

The proposal which will be submitted to the voters will be the only question on the ballot and the election will be held at the expense of the bridge owners. In brief, the proposal to turn the bridge over to the two cities is as follows:

1. The bridge owners will deed the bridge to the two cities for $1.
2. The two cities will lease the bridge to the present owners for $1 a year.
3. The bridge owners will collect the tolls for 6½ years dating from Oct. 31 of this year. At the end of that period they will turn the bridge back to the two cities without further cost.
4. If the price of $4,155,296 fixed on the bridge is realized from the tolls in a shorter time than 6½ years the bridge will be turned over to the two cities as soon as the amount is received.

The Councils have passed a resolution asking Senator R. B. Howell of Nebraska and Congressmen Sears of Omaha and Swanson of Council Bluffs to further a congressional act empowering either city or both cities to construct a new bridge to be paid for out of tolls. This action was taken so that if the bridge proposal is rejected by the voters, the two cities will have the right to proceed to build a new toll bridge without further delay.

Ten-Cent Cash Fare Bill in Denver Council

A 10-cent fare, continuance of present free transfers, installation of four bus lines, and discontinuance of six present rail lines in whole or in part are the major provisions of a bill for a new Denver Tramway ordinance introduced in the City Council on Nov. 18. They represent the initial changes proposed by Howard S. Robertson, president of the Denver Tramway,

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and his associates in a comprehensive Tramway rehabilitation program announced late last summer.

On the fare question, the bill provides that the fare for adults shall be 10 cents cash each; tokens three for 25 cents; for children under six years old when accompanied by paying passenger, free; for children six or more and under twelve, 4 cents each.

Transfers would be free, but passengers would not be given them if transferring from one bus to another or one street car to another when the second bus or car ran into the same territory tapped by the first.

The tramway would pay to the city $10,000 annually, in twelve monthly installments, as an annual license fee, and in addition its regular property, gasoline, automobile and other licenses and taxes.

It would also post a $50,000 indemnity bond, in return for which the city would release it from a bond provided for in the 1906 franchise, which, the bill recites, "expired by limitation of the time therein fixed on or about May 15, 1926."

The company also would keep books and records on all its business, and these would be available for inspection by the city at all times.

H. S. Robertson, president of the railway, is quoted as follows:

"The increased gross revenue that may be received is speculative because dependent upon so many varying conditions. We are certain it will not bring in enough to earn the full return allowed on the valuation fixed by the court. If I were to hazard a guess, my estimate would be that the earnings probably would be increased by about $300,000 gross. All of this, however, might or might not be reflected in net income dependent upon the situation in respect to operating expenses."

Middle Atlantic Equipment Men Meet at Richmond

"New Practices in Lubrication" was the subject of a paper, by R. B. Varnum of the Texas Oil Company, presented at the fall meeting of equipment men of the Middle Atlantic states, which convened in Richmond, Va., on Nov. 6 and 7. Lubricating problems encountered by the United Railways & Electric Company of Baltimore were discussed at length. After presentation of this paper the meeting was thrown open for discussion in which many of the 58 members and guests participated. N. B. Brownyer, Timken-Detroit Axle Company, read a paper on "A New Era in Street Car Mechanics and Operation," pointing out that the design of entirely new types of car trucks was started about three years ago by W. L. Harwood of the Springfield Street Railway, Springfield, Mass., and J. R. Blackhall of the Chicago, North Shore & Milwaukee Railroad.

Mr. Brownyer then expressed the opinion that the main factors which are retarding popular use of the street car today are noise in operation and low average speed. Maintaining cars properly is expensive and not always thoroughly carried out because inspection of the complicated units is difficult. Another point stressed was the desirability of light weight. When the unsprung weight is kept down to a minimum, riding comfort will be greatly increased.

What can be done to improve operation of existing cars was told in a paper presented by H. A. Leonhauser, assistant superintendent of rolling stock and shops, United Railways & Electric Company of Baltimore. The necessity of faster operation of cars and methods of obtaining this in existing slow-moving equipment were discussed in detail by Mr. Leonhauser. He explained how increased acceleration may be had by the changing of gears and shunting of fields. Better retardation by increasing the braking ratio was also discussed at length in his paper. As a means to give better service, the United Railways & Electric Company of Baltimore discarded slow motors and substituted new high speed equipment.

W. J. Hicks, of the Virginia Electric & Power Company read a paper on "Outstanding Features of the 1929 A.E.R.A. Convention," discussing in detail the various pieces of new equipment shown at the convention in Atlantic City. George W. Hall read a report by the committee to investigate step and platform construction with regard to rapid loading and unloading of passengers. The opinion was reached by the committee that the well type of step is preferable to the folding step.

During the second day, a visit was paid to the shops of the Virginia Electric & Power Company, after which the meeting was adjourned to reconvene on May 14 and 15 at Scranton, Pa.

Chicago Franchise Draft Unpresented

A further delay in Chicago's railway settlement was caused when Alderman Frankhauser, chairman of the sub-committee which is drafting the new ordinance, was unable to submit the draft to the committee on local transportation before he left the Council on Nov. 27 to become a judge of the superior court. At the time of his election to this post it was agreed by the attorneys for the companies, the city and the citizens committee that the ordinance, minus financial sections which are being drawn up by the committee of bankers, would be turned over to the full committee before Mr. Frankhauser left, so that the committee could become familiar with the ordinance.

Alderman McDonough, chairman of the local transportation committee, said the delay is caused by "too many lawyers." When counsel have finally obtained their companies' approval of the ordinance, it is planned to ask Judge Frankhauser to leave the bench temporarily and submit the draft to the full committee, together with a report of what has been accomplished.

The committee of four bankers appointed by Samuel Insull to draw up the financial sections is now hard at work on a tentative financial plan.

COMING MEETINGS

Dec. 2-7—National Exposition of Power and Mechanical Engineering (National Power Show), Grand Central Palace, New York City.

Dec. 12—New England Street Railway Club, Copley-Plaza Hotel, Boston, Mass.

Jan. 23-24, 1930—Central Electric Railway Association, Statler Hotel, Cleveland, Ohio.

Jan. 27-29—Electric Railway Association of Equipment Men, Southern Properties, Birmingham, Ala.

May 14-15—Association of Electric Railway Equipment Men, Middle Atlantic States, Scranton, Pa.

Cincinnati Warned

Railway President and Utilities Director Say Suburban Extensions Jeopardize City Fare

AN INCREASE in fare in Cincinnati, Ohio, may be expected if any of a number of proposed extensions to suburban districts are made. This is the gist of reports from Walter A. Draper, president of the Cincinnati Street Railway, and E. D. Gilman, municipal utilities director, filed with the City Council on Nov. 15.

The extensions to three suburbs, Mr. Draper estimates, would entail yearly operating losses of $170,790 if routed according to one proposed plan, or $104,852 according to another. He asserted that another proposed rail extension would cost $50,000, add $15,000 a year to operating costs, and yield an estimated annual revenue of only $4,781. A fifth extension, he said, would cause a loss of $47,600. Extensions to four of the suburbs by bus would cause a loss of $75,240.

Mr. Draper observed that under the present "service-at-cost" franchise the City Council should be held responsible for any increase in fare occasioned by ordering extension of service. He said the franchise gave the company an assured return on its investment, but at the same time gave full control of operation to the city.

The Fernbank-Saylor Park or "down-river" extension, already ordered by the Council as the result of a long-fought contest over abandonment of an interurban line serving the district, is expected to cause a loss of $45,000 a year. In the recent city elections the referendum showed that the public desired the Fernbank extension.

The Few Penalize the Many

In conclusion, Mr. Draper said the extension of rail service to one of the suburbs under discussion could not possibly be considered until the fare control fund was high enough to absorb additional loss. He named October, 1930, as a tentative date to consider this extension.

For the other suburbs under consideration, Mr. Draper recommends continued motor coach service. He reiterated that it is not fair for a few thousand people in suburbs to obtain service at the same rate charged urban residents for short hauls, since this penalized all car riders.

Mr. Gilman went into detail on the technical and financial aspects of an extension program. He was none too optimistic about the ability of the company to carry out the present rehabilitation program without depletion of the fare control fund. He estimated that even with renewals and replacements limited to $577,400 a year for the next five years, the fare control fund would be depleted approximately $165,705 by the end of 1934. This assumes that fares and lines in operation remain unchanged, that reasonable depreciation and amortization are set up next year, that $1,000,000 indebtedness is paid up in five years, that there is no increase in wages, and that no other unusual expenditures are made. He recommended that the Public Utilities Commission be called in by the Council prior to the adoption of any extensions made by the city.

No definite recommendations on extensions were made by Mr. Gilman. He indicated clearly, however, that each would mean a loss, and in his discussion of the finances asserted that the company could not stand additional losses and maintain the present fare. The report of Mr. Gilman was transmitted through C. O. Sherrill, City Manager, who concurred in it.

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St. Louis Not Ready for Rapid Transit

R. F. Kelker, Jr., consulting engineer of the St. Louis Transportation Survey Commission, in a report to be submitted to the commission, is expected to say that St. Louis is not yet ready for a rapid transit system. It is understood his studies have convinced him there would not be a sufficient number of passengers to justify the large expense to provide a subway or elevated system. Mr. Kelker will probably recommend that the city concentrate on a more effective use of the existing surface lines, co-ordination of street cars and buses, extension of the skip-stop plan especially during rush hours and the entire elimination of service cars or "jitneys."

He will recommend a comprehensive system of reroutings and extensions, the purchase of new cars and the carrying out as quickly as possible of the City Plan Commission's proposals for major streets.

In addition he will suggest that additional bridges be built across the Mississippi River to East St. Louis and that all parking of automobiles and other vehicles in the downtown sections of the city be abolished.

The adoption of Mr. Kelker's recommendations will entail expenditures of $20,000,000 or more. His report will emphasize the necessity of a new franchise for the St. Louis Public Service Company to enable it to finance the improvements the engineer will suggest.

New Bus Devices Tested

Tests of a new labor saving and safety device for bus operation were made at Richmond, Va., recently by E. Govan Hill, inventor. A large White bus was furnished by officials of the Virginia Electric & Power Company. Without touching either the clutch or brake pedals, the inventor drove the bus over a hilly section of the city, shifting gears and stopping the vehicle by means of his manually operated lever and button device. William E. Wood, chairman of the board of the Virginia Electric & Power Company, June Penick, general manager, John T. Porter, superintendent of equipment, J. W. Cole, master mechanic of the bus department, and Hunter M. Arkwood, who assisted the inventor in applying the device, were passengers on the trial trip. They expressed themselves favorably in connection with the operation of the device.

Service North of Milwaukee Speeded Up

New schedules, improved rapid transit service and reduced fares were put into effect on the Northern division of the Milwaukee Electric Railway & Light Company on Nov. 18. The changes include faster running time, better connections at Milwaukee with south and westbound rail and bus lines, and the use of all-steel equipment similar to that on rapid transit lines.

The faster schedules will apply to both local and limited trains, saving from 17 to 25 minutes between Milwaukee and Sheboygan, while institution of round trip fares and several forms of commutation will reduce the cost to regular riders.

New substations have been installed at Thiensville, Grafton and Pierrons, while those at Port Washington, Belgium, Cedar Grove, Oostburg and Weedens have been improved. In addition, the feeder capacity in the vicinity of these substations has been increased.

The running time of limited trains will be one hour and 40 minutes between Milwaukee and Sheboygan. Local trains will be speeded up to the time of present limited trips, with some of the trips scheduled for one hour and 55 minutes.

Way and Structures Committee May Meet in Chicago

The standing committee on Way and Structures met at the A. E. R. A. headquarters in New York on Nov. 21. The various sub-committees reported progress in the work on assignments and outlined the study and investigations yet to be made. A definite date for the next meeting was not set due to a suggestion made to hold it in Chicago in March during the A.R.A., convention. Committee members will be notified of this meeting by the chairman.

Late News Briefs

Worcester, Mass.—President Mahon of the Amalgamated Association, here to attend the New England Labor Conference, told a representative of the *Labor News* that he did not think the death of Thomas E. Mitten would change the relations of the carmen's union with the Mitten lines in Philadelphia and elsewhere.

Champaign, Ill.—The Illinois Terminal Railroad has secured property on Neil Street at the Wabash tracks in Champaign, Ill., as the first step in the program to provide for rerouting of the interurban trains through Champaign. Final changes will be made in the spring by connecting tracks running down Neil Street with the Wabash tracks, eliminating the John Street and the South Neil Street lines. Freight trains of the Illinois Terminal now are routed over the electrified Illinois Central tracks to Staley while the passenger trains from the west enter on John Street. When the changes are made, the passenger trains of the interurban will come down the Illinois Central tracks on Neil Street.

Lincoln, Neb. — The Nebraska Supreme Court has held that where an insurance company issues an accident policy to an employee of an electric railway, being advised by his application of the nature of his occupation, it cannot later deny responsibility by citing a clause in the contract that the policy does not cover employees of public utilities.

Annapolis, Md.—The Maryland courts will be called upon to settle a controversy between the Washington, Baltimore & Annapolis Electric Railroad and the municipal officials. The case involves a left turn made by the cars at Church Circle in Annapolis. The city wanted the company to remove its tracks to eliminate the left turn, but the company declined to do so. The city then passed an ordinance prohibiting a left turn at the corner. The railroad contends that its franchise is not superseded by the ordinance. In order to get the case into the courts the city officials arrested the crew of a car which made the left turn on Nov. 14. Attorneys for the railroad have since secured a temporary injunction to prohibit the Mayor and police of the city from interfering with the making of the left turn.

Chicago, Ill.—Attendance at the performances of the Chicago Civic Opera Company, which opened its first season in its magnificent new Civic Opera House Nov. 4, is made possible to music lovers in Northern Indiana by the high-speed service offered by the Chicago, South Shore & South Bend Railway, conveniently arranged for their accommodation.

Birmingham, Ala.—The Birmingham Electric Company is sodding the track areas on several streets in the residence sections of the city. The company is also paving several miles between track with brick with a cement coating.

San Francisco, Calif.—The service of the Pacific Avenue Cable Railroad line between Polk and Divisadero Streets was discontinued on Nov. 17, after having been in operation since 1887. The man who drove the first cable car over this track was a passenger on its final trip. The cessation of service was observed with appropriate ceremonies.

New York, N. Y.—Approval of the proposed ten-year contract between the city and the New York Edison Company for power to operate the new subway system has been postponed for three weeks by the committee of the whole of the Board of Estimate. The Edison contract calls for a net charge of 7.99 mills per kilowatt-hour. It gives the city an option for renewal for a second ten-year period. It also provides for part or complete cancellation by the city on twelve months notice without liability for the company's unamortized investment. During the discussion of the contract, Chairman Delaney, of the Board of Transportation, disclosed that city officials were considering the advisability of erecting a municipal power plant. Officials of the New York Edison Company, Mr. Delaney said, had been told that the proposed ten-year contract might be canceled, in the event of a unification of transit lines and the erection of a municipal plant.

Louisville, Ky.—The executive committee of the Kentucky Association of Public Utilities will meet in December to decide on the 1930 state convention, generally held in mid-January. In view of the fact that the General Assembly reconvenes at Frankfort in January the association will probably meet this coming January at Louisville or Lexington.

Johnstown, N. Y.—An Interstate Commerce Commission examiner has recommended that the commission permit the Fonda, Johnstown & Gloversville Railroad to abandon 12 miles of its line between Mayfield and Northampton. The road is a steam and electric line. The portion to be abandoned is part of its steam line. Abandonment is a result of the construction by the state of a reservoir which will flood 7 miles of the line. Relocation of the road is undesirable owing to the large expenditure. The road has been awarded $1,500,000 in condemnation proceedings.

Louisville, Ky.—The question of permitting smoking on street cars has been taken up by the Louisville Railway

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President Barnes declaring that if the public wished to smoke on all or parts of street cars, it would be permitted. Vice-President Miller has pointed out that smoking is now permitted on front and rear platforms, where such platforms are bulkheaded from the main body of the car, but where there are no intervening partitions, smoking is not permitted. This has caused some complaint from persons who desired to smoke in the vestibules.

Lincoln, Neb.—Officers of the Lincoln Traction Company have proposed to the city planning committee that the company be allowed to take up its tracks on O Street, the main business street, and to operate cars over P and N Streets, next adjoining on the north and south respectively, between Ninth Street and either Sixteenth or Eighteenth Street. This would relieve traffic conditions in the most congested areas, benefit business men, and permit faster service. Only one of the bus lines traverses any part of the main street. The company's experience has been that cars are better on the long runs.

Wheeling, W. Va. — Arguments for and against the proposed Wheeling Traction Company fare increases at Martins Ferry, Bellaire and Shadyside were heard on Nov. 12 by an examiner for the Interstate Commerce Commission. A. C. Spurr, for the company, asserted that the increase would only enable the company to receive a fair profit.

St. Louis, Mo. — The resolution of State Senator Kenney, passed by the last Missouri General Assembly, authorizing cities to issue public utility bonds for 50 years has been declared faulty and unless there is a special session of the Legislature in the meantime it will be necessary to submit it in defective form to the voters of the state at the general elections in November, 1930. The proposed constitutional amendment was favored by the St. Louis Rapid Transit Commission.

Newark, N. J. — Mayor Jerome T. Congleton broke ground on Nov. 19 for the first section of the city's high-speed railway, in the old Morris Canal bed, extending through Newark to Bloomfield. The ceremonies were held in the canal bed between Central Avenue and Norfolk Street. When it is completed the line will be leased by the Public Service Co-ordinated Transport.

Evanston, Ill.—Thomas F. Airth, new president of the Chamber of Commerce, says one of the efforts of his administration will be to induce business men to use the street cars in place of their own automobiles. He said merchants now drive downtown and park their cars in front of their stores, preventing prospective customers from parking.

St. Louis, Mo.—The St. Louis Public Service Company has changed the design of the weekly tickets to provide a space in which purchasers may write their names and addresses. This was decided on after a patron told the company he recovered a lost ticket because he had had the foresight to write his name and address on it. An honest person found the pass and returned it to its owner. Nov. 10 marked the eleventh week of the experimental fare of twelve-ride weekly tickets for 90 cents and extra rides at 5 cents and straight adult fares of 10 cents.

Richmond, Va. — A ballot was distributed on the bus lines of the Virginia Electric & Power Company in Richmond on Nov. 25, in an effort to determine the rider sentiment as to the near or far side bus stop controversy now being waged before the City Council. The company had the ballot prepared at the suggestion of Alderman Sullivan, proponent of the near-side bus stop ordinance which is scheduled for final action by the City Council on Dec. 9. Mr. Sullivan asked that in addition to having all bus operators distribute the ballots, they be put in all department stores and in hotels, etc.

Detroit, Mich. — Joseph Bower, financier of the Ambassador Bridge over the Detroit River, now seeking permission to construct an elevated motor speedway from Detroit to Pontiac, has asked the Council to permit the people to vote on his proposed project. He asked that the matter be submitted at a special election in order to hurry completion of the improvement. He is willing to pay the cost of a special vote.

Foreign News

Increase in Paris Underground Traffic

The Metropolitan Underground Railway, Paris, France, handled increased traffic during the second quarter of 1929, the number of passengers carried reaching 143,000,000 as against 135,000,000 in the corresponding period of 1928. Receipts totaled 98,000,000 francs ($3,920,000). The terminal stations dispatch daily 9,000 trains, 700 per hour during the rush periods. The growth of the Metropolitan since its inception in 1900 is shown in the following table:

Year	Average Length of Lines Operated During Year Kilometers	Number of Passengers Carried
1900	5.13	17,660,286
1901	13.32	55,882,127
1903	23.44	118,201,772
1910	63.58	318,254,368
1913	87.74	467,474,226
1917	94.82	588,225,144
1919	94.82	726,486,140
1923	103.08	704,755,000
1928	111.80	818,000,000

The Metropolitan has placed important orders for equipment, including 130 electric motor cars and 119 first class coaches, all with French firms.

Paris Favors Return of Double-Deck Buses

Paris authorities are considering the possibility of re-introducing double-deck buses. The single-deck six-wheel bus recently installed has a large carrying capacity, but apparently has not given satisfactory results. Narrow streets and sharp corners tend to limit the length of the bus. There are, however, many opponents of the double-deck bus. It was suggested in one of the newspapers that if Parisians would only learn to catch their buses on the fly after the fashion in London the problem would be solved. At present, printed signs on street corners and in the vehicles warn the passengers not to enter or leave a bus while it is in motion. As further comment puts it "to adopt the London method would result in a revolution in French manners and customs."

Japanese Plans Subject to Modification

An announcement early last year gave the cost of new electrification plans in Japan at about 2,000,000 yen spread over a period of four years. Since then the government Department of Railways has announced a program for the electrification of nine sections of five trunk lines at a cost of 4,000,000 yen spread over a period of six years. The new plan, to go into effect next year, is to electrify all of the sections of the railway throughout the country that include tunnels or heavy gradients. The scheme also includes the construction of a new elevated electric line about 1½ miles in length to connect the present Ochanomizu station of the Yamanote line, which is the inner hoop of the line encircling Tokyo, with the Ryogoku railway station, the terminus of the Boso and Hojo lines. Parallel tracks will be built between Ryogoku and Kameido and the system electrified.

Bus and Car Fares Increased in Paris

The Paris Transports en Commun recently asked the Municipal Council to permit increased fares on certain suburban lines, since adoption of a ticket and zone system necessitated making the fares between certain points a round figure. The privilege was granted and the new fares have gone into effect. The increase in fare does not materially increase the revenue, but the public is protesting the higher rate. What complicates the situation for the Paris commuter, and incidentally for the operating companies, is the traditional two-class system. From time to time it was suggested this be abolished as had been done in many smaller cities of France, but Paris clings to this ancient custom. If the first class were abolished, all other fares would have to be raised. And that would not be popular.

Douglas, Isle of Man—Cable traction on the Douglas Tramways has been abandoned and buses have been substituted. There are now practically no cable lines left in Great Britain. The Douglas cable tramway has been operating since 1896.

Tokio, Japan—A profit of 280,363 yen has been reported by the Tokio Underground Railway during the first six months of 1929, compared with a profit of 293,067 yen during the last six months of 1928. Gross earnings were 417,432 yen and gross expenditures were 137,128 yen during the 1929 period. These statistics apply to the first section of tube railway to be put in operation by this company from Ueno Station to Asakusa Station.

Rome, Italy—Fourteen miles of railway included in the limits of the old city will be torn up and replaced with roads for buses. They will connect with tram lines outside the bus limits.

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Glasgow, Scotland—In spite of the advice of the tramway manager and of the tramways committee, the Town Council has resolved to continue the halfpenny minimum fare on the tramways. The proposal of the manager was that one penny should be the minimum fare. His contention was that this was necessary in order to put the finances on a better footing. The halfpenny fare has long been abolished on other British tramway undertakings.

Bradford, England—The Town Council has received confirmation from the Ministry of Transport of a provisional order authorizing the running of trackless trolley buses on most of the 40 routes of the Bradford tramway system, or alternatively the running of petrol buses. The total cost of equipment for the former system is estimated at £494,000. The Town Council proposes, as the tramway tracks wear out, to supersede them by the trackless trolley or buses.

Glasgow, Scotland—The Town Council has decided to promote a bill in Parliament to confer on the Council a complete monopoly of street passenger transport within the city, on Glasgow's tramway routes outside the city, and on routes in competition therewith. The bill is also to extend the Council's existing powers to run buses and to authorize the abandonment within or without the city of such tramways as it may consider proper, with a view to substituting bus services. It may be noted that, in a few cases in England, Parliament has granted powers for restriction of competition, but nothing so sweeping in its nature as that proposed by Glasgow has ever been authorized.

Matanzas, Cuba—Fifty girls divided into three shifts handle the fifteen trolleys of the Compania de Tranvias de Matanzas, each group working eight hours. This is the only city in Cuba using women conductors.

Manchester, England—R. S. Pilcher, general manager of the Manchester Tramways, has reported on various causes of noise associated with the operation of cars. He recommends that a steel check be fitted instead of chains on the bogie cars so as to avoid rattling at crossings. About noise associated with hand brakes, he says that experiments have been made with a new type of hand brake. Instead of brake blocks being applied to the wheel tires, Ferrodo blocks press against steel discs which are fitted to the axles on a principle similar to that of the brakes on automobiles. Forty new single truck cars are to be fitted with this type of brake.

Rio de Janeiro, Brazil—Depending on a revision of its concessions which will permit it to furnish modern service, the Rio de Janeiro Tramway, Light & Power Company is disposed to spend $12,500,000 in extending and improving its lines, and to co-operate with the municipality in minimizing the congestion in the center of the city by the establishment of rapid transit lines.

London, England—The Underground winter program of train services introduced on Oct. 7 is now in full swing. Compared with last winter, there are 112 more cars in daily service. The speed of trains on all lines has been increased and close interval services are being worked. Moreover, 36 additional cars will be put into commission on the Hampsted & City line in a few weeks time. This will bring the total number of cars operating this winter up to 1,835.

Recent Bus Developments

Interstate Bus Bill

Much Speculation Over Prospects of Bringing Interstate Bus and Truck Carriers Under Regulation

AFTER three years of effort, the committee on interstate and foreign commerce of the House of Representatives, of which Representative Parker of New York is chairman, appears to be prepared to push interstate bus legislation at the regular session of Congress which convenes in December.

That real need exists for legislation there is no doubt. What form it should take has been the stumbling block in the past. The concern of the bus and truck interests is that the legislation shall be so drawn as not to act as a deterrent to the legitimate expansion of the business. It is generally admitted that in the absence of control there has grown up a class of interstate bus transportation which is entirely unregulated and, much of it, irresponsible, the activities of which subject both legitimate bus lines and other forms of transportation to unfair, injurious and unscrupulous competition. In short, the present condition is highly detrimental to the interests of each of the states, to the legitimate transportation interests, to the traveling public and to the public generally.

But Congress rarely acts on important legislation until there is abundant evidence of public demand for action. Just at present there is a strong probability that the discussion of the tariff will be extended into the regular session, but this would give the house ample time to act upon various important pending bills, including Mr. Parker's proposal for the regulation of interstate bus operations. In the Senate the proposed bus regulatory measure will come before the committee on interstate commerce, of which Senator Couzens of Michigan is chairman. This committee will be one of the busiest in Congress at the December session. As an astute observer at Washington sees it, Senator Couzens will probably wait until the House acts on the bus bill before he calls upon his committee to take up the measure.

Since legislation is practically certain before the end of the long session, those who disagree with the provisions of the Parker bill, or who have suggestions, are being urged to bring their ideas promptly to the attention of the respective committees if they wish to impress them upon those handling the legislation.

As the Parker bill now exists, it forbids the operation of any motor carrier in interstate commerce which has not first obtained a certificate of convenience and necessity from the Interstate Commerce Commission. It proposes to delegate the regulatory authority of Congress over "interstate commerce by motor vehicles operating as common carriers of persons on the public highways." Joint boards made up of one representative of each state in which any part of the operation is, or is proposed to be conducted, are to conduct hearings on applications for certificates of convenience and necessity. State Public Service Commissions are to designate the members of the joint board. Decisions of these boards are to be filed with the commission. The commission must act in not less than 10 days or more than 30 days. Joint boards must pass upon applications within 60 days or the authority in the matter passes to the Interstate Commerce Commission. On appeal the commission may order a rehearing. There will be reserved to the Interstate Commerce Commission authority to set aside or modify decisions of the joint boards.

Any violation of the act or failure to observe orders of the commission carries with it a fine of $100 for the first offense and $600 for subsequent offenses. Each day of violation is to constitute a separate offense.

From the date of the approval of the act, 90 days are allowed for the filing of applications for certificates. Lines that were in operation some months before the approval of the act will simply be required to fill out a questionnaire. If this shows bona fide operation, the certificate will be issued as a matter of course. If the commission is not satisfied with the answers to the questionnaire, it then can refer the application to the joint board. No certificate is to be issued or to remain in force unless the bus operator complies with the rules and regulations with regard to the filing of bonds, and to the taking out of insurance to cover possible judgments growing out of negligent operation. The usual conditions applying to carriers with regard to just and reasonable rates and with regard to the filing of tariffs are provided for in the bill.

The measure contains this significant clause:

"The commission, while acting under authority of this act, shall not have any jurisdiction or authority over intrastate commerce by motor carriers and the commission is expressly prohibited from interfering in any way with, or attempting to regulate such intrastate commerce by motor carriers."

The Parker bill applies only to "vehicles or machines propelled by their own power, other than muscular power and used upon the public highways for the transportation of persons." It does not apply to vehicles used exclusively in the transportation of property.

It is believed that the house committee, even though it will not call regular hearings on the subject of interstate bus regulation, will invite the views of the members of the various industries interested. An informal meeting will be held with these groups, it is understood, and attempts will be made to iron out differences of opinion. It has developed recently that some of the rail carriers are unsatisfied to leave truck lines outside of the regulation proposed. Protest has also been made by farm organizations against the exclusion of trucks. They point out that regulation of the rates charged by these interstate carriers is essential to a sound farm relief program. On the other hand, the National Automobile Chamber of Commerce and other organizations are known to be opposed to any attempt to include trucks in the bill. Opposition

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has also been manifested against the setting up of regional control boards, a main working principle of the present bill, lest they become so powerful as to prevent appeal to the Interstate Commerce Commission.

Quietus on Free Service in Ohio

A permanent injunction which prevents the Sebring-Alliance Bus Company from continuing its free service between the two Ohio cities has been granted by the Court of Appeals at Youngstown on the application of the Ohio Public Utilities Commission. The Mahoning County Common Pleas Court refused the injunction, but the state board carried the case into the appellate court.

This action writes another chapter in the effort begun about two years ago by the Stark Electric Railroad to have a certificate granted the bus company declared illegal. The state board did revoke the certificate, but issued a new one in face of the Stark Electric's protest. The Supreme Court ordered a new grant to be issued which restricted the bus company from carrying passengers from points within one city to points within the other. The bus company carried the case to the United States Supreme Court, but that body refused to admit the case.

Forced to operate under the restricted certificate, owners of the bus line decided to ignore the state board. They appeared before the Councils in Sebring and Alliance and secured a franchise to carry passengers in each corporation for 5 cents. Then the company began carrying passengers free over the 4-mile rural route between the two cities. These two charges replaced the former 10-cent rate from one city to the other.

It was this action which caused the commission to ask the Common Pleas Court for an injunction against the bus company. When Judge Lyons refused it, the case was carried to the Court of Appeals. In handing down the decision of the appellate court Judge Sherrick said:

"It is clear to this court that the plan of operating the Sebring-Alliance bus line is only a subterfuge and scheme to avoid control by the commission. It is for the sole purpose of contemptuously ignoring and avoiding the orders of the Public Utilities Commission and the Supreme Court."

Substitution Suggested Between Rochester and Geneva

The New York State Railways has petitioned the Public Service Commission for approval of the substitution of buses for the trolley cars of the Rochester and Eastern division from Rochester to Geneva, passing through Canandaigua. The company also asks permission to operate an alternate route from the Geneva-Canandaigua turnpike to Seneca Castle to Geneva. The company alleges the trollev line has suffered a decline in the number of passengers carried and the amount of freight handled. The petition states that the buses will follow the present line of the trolley as far as possible, that eight buses will be used with an operating schedule practically as at present and with the same rates of fare, except that the minimum fare for adults will be 10 cents and for children 5 cents.

Present Companies Should Operate Manhattan Bus Lines

The gradual elimination of the street car lines in the borough of Manhattan, New York City, as they become obsolete, and the substitution therefor of up-to-date bus lines operated by existing transportation companies, is proposed by the Merchants Association in a report adopted by the directors at their meeting on Nov. 14, 1929. This report reads in part as follows:

"It is common knowledge that the surface railways in Manhattan are in poor financial condition, and that their equipment is either obsolete or deteriorating rapidly. Moreover, some of these companies have signified their willingness to accept short term franchises for omnibus lines in exchange for their present long term railway franchises.

"With reference to street car lines in Manhattan only, where traffic congestion produces conditions not found in other boroughs, your committee recommends that the association encourage the use of existing equipment until a point is reached when replacements are necessary.

"When obsolescence or deterioration makes necessary any considerable capital expenditures for replacement of railway equipment, including trackage, the association should encourage the exchange of the existing franchises for short term, recapturable bus franchises.

"Such exchanges of franchises should be encouraged earlier if the companies are willing to do so upon proper terms.

"Your committee on city transit believes this method of eliminating street car lines in Manhattan is in accord with the established policy of the association, that when new omnibus lines are established it should be done by the existing transportation companies rather than by untried companies."

Alameda, Cal. — The Key System Transit Company has been authorized by the Railroad Commission to reroute its Central Avenue bus line in Alameda from Central Avenue to Santa Clara Avenue, and to establish a shuttle bus service on San Jose Avenue from Par Street to Grand Street and along Grand Street to Santa Clara Avenue, as a feeder to the Santa Clara Avenue line.

Lincoln, Neb.—The City Council has authorized the Lincoln Traction Company to remove its overhead on a number of streets where bus lines have been substituted for street cars. The Council will not require the tracks to be removed, as the salvage value is less than the cost of removal.

New York, N. Y.—A report by the Board of Transportation on applications for bus franchises which have been submitted since the collapse of the Equitable Coach Company is being prepared and will probably be ready early in December.

Quincy, Ill.—The Illinois Power & Light Company is systematically replacing its street cars here with buses. It is the policy of the company to remove its tracks on streets which are to be repaved and to substitute buses for the cars. The city is carrying out an extensive street paving program and it is believed that before the close of another year all street car lines will be replaced by buses.

St. Louis, Mo.—The utility of buses in co-ordinated service was emphasized on Nov. 18 when traffic on the Manchester and Kirkwood-Ferguson divisions of the St. Louis Public Service Company in St. Louis County was tied up from 5:10 p.m. to 9:30 p.m. because of the grounding of a high-tension electric line between Hodiamont Avenue and Brentwood, Mo. The company furnished service to the affected areas by using buses and by an improvised shuttle car service between University City and Clayton over the Kirkwood-Ferguson tracks.

Evansville, Ind.—The Consolidated Coach Corporation and the Evansville & Ohio Valley Railway have formed the Owensboro Bus Station and leased a building and space in Allen Street, between Third and Fourth Streets, for a bus terminal at Owensboro, Ky. The terminal station will be in operation in December.

St. Louis, Mo.—Buses will supplant the street cars on the Marcus Avenue and Spalding Avenue divisions of the St. Louis Public Service Company, under authority of the Missouri Public Service Commission. The company also plans to reroute its Loughborough-Macklind Avenue bus line. The change will shorten the line and furnish better service to the affected area.

New Rochelle, N. Y. — The Public Service Commission on Nov. 25 denied the petition of the County Transportation Company, Inc., for a certificate of public convenience and necessity to operate a bus line between New Rochelle and Mamaroneck.

Greenville, Miss.—E. J. Lenz, division manager of the Mississippi Power & Light Company, said that the track would be removed and brick put back in the space, as part of the program under which the street car has been supplanted by the bus as Greenville's transportation system. The buses operate on regular schedule with Washington Avenue and South Shelby Street as the terminal point.

Beacon, N. Y.—The Fishkill Electric Railway on Nov. 25 petitioned the Public Service Commission for permission to substitute buses for trolley cars over certain streets in Beacon under a consent by the Council of Beacon on Nov. 4 last. The petition states that congestion will be prevented on the streets wherein it is proposed to operate buses and that the company will be enabled to provide quicker and more frequent service.

Chattanooga, Tenn. — The Railroad and Public Utilities Commission has approved franchises granted the Tennessee Electric Power Company by the cities of Chattanooga and Lookout Mountain, the town of St. Elmo and Hamilton County for the Chattanooga-Lookout Mountain Hotel Bus Line.

Denver, Colo.—The Denver Tramway rose to the occasion by arranging a special bus service on the four days of the great celebration incident to the opening of Denver's new airport, Oct. 17, 18, 19 and 20. The buses operated from 23d Avenue and Fairfax Street to 32d Avenue and Ulster Street, the entrance to the airport. The buses connected with Route 40 (Park Hill) street car line at 23d Avenue and Fairfax Street, but the bus transportation was not a transfer service from the rail line. The bus fare was 10 cents each way no transfers issued.

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Financial and Corporate

Seventh Annual Toronto Statement

Affairs of System in Canadian City Reviewed —Net Income Carried to Surplus $168,931

THE COUPLER, published by the Toronto Transportation Commission, operating the municipal railway and bus lines in Toronto, Ont., says in part in its October issue:

"In examining an annual statement of an organization there are three primary factors one usually considers. First, is it financially sound? Second, is it giving service? Third, is it efficiently operated?

"As the T.T.C. statement has the certificate of the city auditor appended, and as the city auditor has audited the books of the T.T.C. ever since the commission was formed, it would appear ridiculous to question its finances. There is no doubt that its finances are sound.

"In the matter of giving service, it is noted in the statement that there has been an improvement to the extent of 69 per cent in the number of seats provided for passengers during the rush hours, compared with the number of seats on Sept. 1, 1921. With reference to the third question, probably nothing could illustrate the improved efficiency better than the fact that in 1928 the T.T.C.'s operating expenses were about $620,000 less than in 1923. This achievement is the more remarkable when it is considered that the track mileage of the city system was increased by 12 per cent in 1928."

The financial results of the year's operation were as follows:

Gross revenue	$13,269,718
Total expenditure for operation and maintenance	8,172,306
Net income available for fixed charges	$5,097,412
Fixed charges and reserves	4,929,081
Net income carried to surplus	$168,331

The investment in fixed assets as of Dec. 31, 1928, was $49,504,333.

All of the extensions outside of the city and other miscellaneous construction and equipment added during the year to the city system were financed from reserves of the commission. No new debentures have been issued for transportation purposes since 1924.

The net funded debt, less funds transferred to the city treasurer for redemption of debentures, is $38,314,727, as of Dec. 31, 1928. More than $1,170,000 was paid from earnings during the year for reduction of the funded debt, but the acquisition of the Mimico and the Scarboro divisions of the Toronto & York Radial Railway, previously referred to, added $977,000 to the existing capital structure. After 7½ years of operation the fixed assets exceeded the net funded debt by nearly $11,200,000.

The gain in revenue passengers in 1928, compared with the previous year, was 5,885,904, resulting in a total of 193,642,927 passengers for the year. Thus a new high record for business was established.

The revenue from motor coach operations has continued to expand in a most impressive way. The gross earnings from this form of transportation in 1928, which is operated under the name of Gray Coach Lines, Ltd., was $816,234, an increase of nearly 45 per cent over the revenue for the year 1927. The growth of the motor coach services, started in May, 1925, is shown by the following figures of gross passenger earnings for each year:

1925	$132,008
1926	300,811
1927	568,275
1928	816,234
1929	$1,230,000 (estimated)

There has been a surplus each year from the operation of motor coaches after paying 5 per cent dividends on the capital stock of Gray Coach Lines, outstanding since its incorporation, and after appropriating adequate reserves.

The mileage operated by street cars and buses, but not including motor coaches, aggregated 26,453,680 miles in 1928, an increase over the mileage in 1927 of 483,589 miles.

The revenue passengers in 1923 (when the last new street cars were purchased) were 189,143,145, and in 1928 were 193,642,927 passengers, an increase of 2.4 per cent. In October, 1923, however, there were 44,035 seats provided at the hour of peak traffic (which is 5:30 p.m. on a normal day), and in October, 1928, there were 47,819 seats, an increase of 3,784 or 8.6 per cent.

During the year 1928, the average fare collected on the Toronto Transportation Commission system was 6.177 cents. Attention is directed to the fact that if the average fare in Toronto were the same as in the United States, the car riders of Toronto would pay $3,000,000 more a year for transportation.

Employees Subscribe to Investment Fund

A total of $758,950 was subscribed by 1,425 employees of the three transportation companies participating in the Interurban Railroads Employees' Investment Fund No. 1, established under the authority of Britton I. Budd, president, according to incomplete figures compiled at the close of the subscription period.

The North Shore Line leads in subscriptions with a total of $497,950 subscribed by 973 employees.

Employees of the Chicago, Aurora & Elgin Railroad ("Sunset Lines") totaling 384 subscribed $212,950 to the fund.

A total of $48,050 was subscribed by 68 employees of the Metropolitan Motor Coach Company ("Marigold Lines"), who are also included in the fund.

Designed to enable employees to save systematically and to invest advantageously, the fund follows the plan which has been in effect for some time among employees of other local utility companies in and around Chicago. It will be administered by five trustees, namely: President Budd, Vice-Presidents Bernard J. Fallon, Charles E. Thompson and William V. Griffin of the North Shore Line, and Clement A. Whonsetler, secretary-treasurer of the "Sunset Lines."

Every employee of the companies who has been two years or more in service was eligible to subscribe to the fund. Under this provision 1,911 employees in the three organizations were eligible.

I.C.C. Prepared to Value Electric Railways

The Interstate Commerce Commission is ready to undertake valuation of electric railway properties, as directed in the act of March 1, 1913, if Congress will provide necessary funds. This requirement of the statute has been permitted to remain in suspense for years, although the commission has reminded Congress from time to time that no appropriation ever has been made for the purpose of evaluating the properties of common carriers, other than steam roads, which are subject to the interstate commerce act.

With primary valuation of the steam roads practically completed, the commission now feels that it should commence work on ascertaining the value of minor carriers. Embraced in this classification are the electric railways, water carriers, oil pipe lines, and telegraph, telephone, cable and radio companies. The commission has submitted to the bureau of the budget a request for an appropriation to initiate this work, together with an estimate of the amount necessary for the fiscal year commencing July 1, 1930. No announcement will be made by the commission regarding its plans in this direction until the budget estimates are presented to Congress by the President next month. Premature dissemination of such information by government departments and agencies is prohibited by law.

The American Electric Railway Association recently filed a brief with the commission, in connection with the proceeding on depreciation accounting for steam railroads, in which it stated that little public benefit would accrue from the valuation of electric railway properties as none of them, except those operated as a part of a general steam railroad system or engaged in the general transportation of freight, are subject to the provision of the transportation act providing for the recapture of earnings in excess of 6 per cent of the value of their property used for common carrier purposes.

Third Avenue Doing Well

Directors of the Third Avenue Railway, New York, recently declared 1¼ per cent semi-annual interest on company's adjustment 5 per cent bonds. This leaves 32¾ per cent accumulated interest due on these bonds and because of accumulated interest adjustment bondholders have voting power.

Third Avenue reported record operating income for the year ended June 30, 1929, but income available for adjustment bond interest was not as large as in the previous year because of increased operating expenses and unusual charges incident to the introduction and operation of buses in Bronx County.

After all deductions, including taxes and interest on the mortgage bonds, earnings available for adjustment 5 per cent bonds were $840,467, equal to 3.72 per cent on total amount of $22,536,000 adjustment bonds. This compares with $1,072,309 shown in the preliminary report of the preceding year, or 4.75 per cent. Final figures for the 1927-28 year showed a balance equal to 4.8 per cent.

In a review of the company's affairs preliminary to the issuance of the report for the year ended June 30, the *Wall Street Journal* said that gross income was about $7,000 lower in July than in the preceding year, due in part to congestion in traffic and interference by sub-

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way building. Steps have been taken by the management to overcome traffic difficulties and effect other economies to increase net income. Development of the company's bus system in the growing county of Westchester also is expected to improve earning power.

Border City System Earning Interest

The *Canadian Financial Post* says that it is estimated that the net earnings from the operation of the system operated by the Windsor, Essex & Lake Shore Electric Railway Association, Windsor, Ont., will be equal during the current fiscal year to more than 1½ times bond interest. These bonds are due Feb. 1, 1959.

The association is covenanted in the mortgage deed of trust to pay to the trustees as a sinking fund the sum of $10,523.50 on Feb. 1 each year, commencing Feb. 1, 1934, and for the exclusive benefit of the first mortgage bonds the following municipal debentures are specifically pledged in favor of the trustee:

City of Windsor	$354,488.00
Town of Essex	81,296.87
Town of Kingsville	105,390.33
Town of Leamington	159,254.30
Township of Gosfield South	138,203.45
Township of Gosfield North	104,462.71
Township of Sandwich West	55,657.38
Township of Sandwich East	56,881.84
Township of Sandwich South	44,365.12
Making a total of exactly	$1,100,000.00

The municipal debentures so pledged are of the same maturity and bear the same interest rate as the bonds of the railway association. The sinking fund is sufficient to retire the issue by maturity.

The bonds of the association are also secured by a first mortgage on the land of the association, and by a floating charge on its assets and undertakings.

The municipalities referred to have agreed to bear the cost of acquiring, rehabilitating, equipping, operating and extending the electric railway, and to pay over annually to the Windsor, Essex & Lake Shore Electric Railway Association in the proportion adjusted and specified by the association, any deficits which may arise in the operation of the railway.

It is also provided that in case the association should make default in payment of these bonds, and the trustee, under the mortgage securing the bonds of the association, should not have sufficient moneys as a result of the realization of the mortgaged premises, including the proceeds from the sale of the debentures of the municipalities, that they, the municipalities, on notification from the association or from the trustees, will make up such deficit to the trustee in the same proportion in which they have respectively issued and deposited debentures with the association.

New Company at Binghamton Chartered

The formal incorporation of a company to take over the local railway interests at Binghamton, N. Y., has been perfected with the filing of a certificate of the Triple Cities Traction Corporation. The new directorate consists of nine members, all living in Greater New York or vicinity. The stockholders number fifteen.

It is the object of the corporation, states the certificate, to operate an "electric street surface railroad of standard gauge," over 31 miles of track. The company may issue 5,000 shares of stock without classification and without par value but the capital shall not be less than $310,000.

The directors are J. F. McKenna, E. T. Edmonds, H. C. Fleck, H. A. Stix, J. L. Rice, Jr., R. N. Thompson, J. H. Shinn, H. C. Hasbrouck and C. A. Dougherty, who, together with J. H. Mackenzie, F. E. Taylor, A. P. Rimgressy, T. R. Carpenter, H. R. Cobb and R. J. Dean constitute the stockholders, each of whom subscribes to 30 shares of stock at $100 per share.

From Cincinnati to the Lake

The Cincinnati & Lake Erie Railroad, embracing lines of the Indiana, Columbus & Eastern Traction Company, Cincinnati, Hamilton & Dayton Railway, and the Lima & Toledo Railway, will co-ordinate the railway lines from Cincinnati to Lake Erie and from Dayton to Columbus as soon as the federal district court approval is secured, probably early in January.

This announcement followed the purchase of the I. C. & E. properties by the C. H. & D. at a foreclosure sale at Springfield, at which C. H. McClure, president of the C. H. & D., and receiver for the I. C. & E., acted as special master. A deed to the Lima & Toledo property will be made over to the proposed merged line upon receipt of approval from the federal district court at Toledo of the sale transaction consummated at Springfield. The purchase price was $1,000 cash, subject to the assumption of $2,500,000 in obligations of the acquired lines. Cincinnati, Dayton, Springfield, Lima, Toledo and Columbus are among the main points on the new line.

Conspectus of Indexes for November, 1929

Compiled for Publication in ELECTRIC RAILWAY JOURNAL by

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Electric Railway Engineer, Worcester, Mass.

	Latest	Month Ago	Year Ago	Last 5 Years High	Last 5 Years Low
Street Railway Fares* 1913 = 4.84	Nov. 1929 **7.78**	Oct. 1929 **7.76**	Nov. 1928 **7.69**	Nov. 1929 **7.78**	Nov. 1924 **7.24**
Electric Railway Materials* 1913 = 100	Nov. 1929 **145.7**	Oct. 1929 **145.6**	Nov. 1928 **145.1**	Dec. 1926 **159.2**	Feb. 1928 **139.5**
Electric Railway Wages* 1913 = 100	Nov. 1929 **231.1**	Oct. 1929 **231.1**	Nov. 1928 **229.9**	Nov. 1929 **231.1**	Nov. 1924 **220.7**
Am. Elec. Ry. Assn. Construction Cost (Elec. Ry.) 1913 = 100	Nov. 1929 **204.8**	Oct. 1929 **203.0**	Nov. 1928 **205.7**	Nov. 1928 **205.7**	July 1929 **199.0**
Eng. News-Record Construction Cost (General) 1913 = 100	Nov. 1929 **208.5**	Oct. 1929 **206.3**	Nov. 1928 **209.5**	Jan. 1927 **211.5**	Nov. 1927 **202.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1926 = 100	Oct. 1929 **96.3**	Sept. 1929 **97.5**	Oct. 1928 **97.8**	Nov. 1925 **104.5**	April 1927 **93.7**
Bradstreet Wholesale Commodities 1913 = 9.21	Nov. 1929 **12.40**	Oct. 1929 **12.70**	Nov. 1928 **13.01**	Dec. 1925 **14.41**	July 1927 **12.38**
U. S. Bur. Lab. Stat. Retail Food 1913 = 100	Oct. 1929 **160.5**	Sept. 1929 **160.8**	Oct. 1928 **156.8**	Nov. 1925 **167.1**	Nov. 1924 **150.1**
Cost of Living Nat. Ind. Conf. Bd. 1914 = 100	Oct. 1929 **163.4**	Sept. 1929 **163.2**	Oct. 1928 **162.9**	Nov. 1925 **171.8**	April 1929 **159.3**
Industrial Activity Elec. World—Kw.-hr. used 1923-25 = 100	Oct. 1929 **134.6**	Sept. 1929 **135.8**	Oct. 1928 **132.0**	Feb. 1929 **140.4**	Aug. 1925 **94.3**
Bank Clearings Outside N. Y. City 1926 = 100	Oct. 1929 **111.8**	Sept. 1929 **109.8**	Oct. 1928 **105.1**	Oct. 1929 **111.8**	Dec. 1924 **90.07**
Business Failures Number	Oct. 1929 1511	Sept. 1929 1316	Oct. 1928 1689	July 1929 1581	Sept. 1928 1348
Liabilities (Millions)	**29.51**	**27.75**	**43.96**	**102.09**	**23.13**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population. Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen, conductors and operators on 130 of the largest street and interurban railways operated in the United States, weighted according to the number of such men employed on these roads.

Albany, N. Y.—The protective committee, formed by F. J. Lisman and associates to protest the offer of the Associated Gas & Electric Company to exchange the first mortgage gold bonds of the New York State Railways for Associated Gas securities, has retained Coverdale & Colpitts, engineers, to examine the properties as to operation, earning capacity and generally as to the affairs and management of the system. Associated Gas & Electric Company interests, which own and control the stock of the railways, offered on Oct. 25, 1929, to acquire the bonds. It was stated this offer was made "from the standpoint of public good will" pending the solution of what the Associated Gas & Electric Company interests referred to as "a distressing problem."

St. Louis, Mo.—The Missouri Public Service Commission on Dec. 3 will resume the hearing on the petition of the city for an accounting of an $8,369,000 depreciation reserve fund balance which it claims Receiver Rolla Wells of the defunct United Railways turned over to the St. Louis Public Service Company on Dec. 1, 1927. The city contends this sum should be set up on the books of the new company, but company officials say the new company took over the properties on a depreciated basis.

Portsmouth, Ohio—The Portsmouth Public Service Company has asked the state Public Utilities Commission for authority to suspend traffic for one year on its line from Portsmouth to Ironton, a distance of about 20 miles. Only one round trip a day is now made over the line.

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Personal Items

J. G. Holtzclaw in Richmond

Former Gulf States Utilities Official Made President of Virginia Electric & Power Company

JACK G. HOLTZCLAW, retiring president of the Gulf States Utilities Company, of Beaumont, Tex., was elected president of the Virginia Electric & Power Company, Richmond, Va., on Nov. 12, succeeding J. Frank McLaughlin, elected to the presidency of the company on Sept. 26, who becomes vice-president of the Stone & Webster Service Corporation with offices in Boston. The latter retains his identity with the local company as vice-president.

The changes in the administration of the company at Richmond were made at a meeting of the board of directors held in New York, in which a general reorganization of the Stone & Webster Service Corporation was effected.

J. G. Holtzclaw

Tom P. Walker, operating vice-president of the Virginia Electric & Power Company, in Richmond, will succeed Mr. Holtzclaw as president of the Gulf States Utilities Company at Beaumont, Tex.

Joseph Bowes, vice-president of the Virginia Electric & Power Company, in charge of operations at Norfolk, will come to Richmond, succeeding Mr. Walker as operating vice-president.

Robert J. Throckmorton, general manager of the light and power division at Richmond, was elected vice-president and will replace Mr. Bowes at Norfolk. Mr. Throckmorton is a native Virginian, and has been connected with the Virginia Electric & Power Company for a number of years.

The incoming president, Mr. Holtzclaw, comes to Richmond from Beaumont, where he has been president of the Gulf States Utilities Company, serving southeast Texas and southern Louisiana, a territory including more than 100 cities and towns. He is a native of Georgia, born at Perry, and was a classmate of William E. Wood at Georgia Tech, where he was graduated in 1907. He has been with the Stone & Webster organization since shortly after he was graduated from the Georgia School of Technology. Mr. Holtzclaw is widely known in utilities circles throughout the South and Southeastern territory, and is said to be peculiarly fitted to fill the office held by Mr. Wood and Mr. McLaughlin here. He has taken a prominent part in civic affairs in each community in which he has lived and is an active supporter of all constructive moves in the territory in which he is located.

The changes in the administration of the Virginia Electric & Power Company followed within a few weeks after the promotion of W. E. Wood and the appointment of J. Frank McLaughlin. The changes made in the course of the reorganization of the Stone & Webster Service Corporation were decided upon after the election of Mr. McLaughlin and the promotion of Mr. Wood, both of whom remain identified with the local company.

Mr. Holtzclaw assumed his new duties on Nov. 18. His first act was to inspect the shops, power plants and transportation equipment, in company with William E. Wood, chairman of the board of directors, and Frank J. McLaughlin, retiring head of the company. Accompanied by Mr. Wood, Mr. Holtzclaw called on Gov. Harry F. Byrd, and later paid a visit to the state office building, where he met the members of the state Corporation Commission, the regulatory body, and other state officers.

P. H. McCance in New Post

Pressly H. McCance, of the law department of the Philadelphia Company, has assumed the duties of director of personnel of the Philadelphia Company and its affiliated corporations, to which position he was appointed to succeed William G. Marshall, resigned.

Pressly Hodge McCance was graduated from high school in 1911 and from Princeton University in 1915. He entered the University of Pittsburgh law school with the class of 1918 but the war call came and in May, 1917, Mr. McCance joined the first officers training camp at Fort Niagara, going from there to Fortress Monroe, Va., where he received his commission as a lieutenant in the Coast Artillery Corps. He then went to Fort Hancock, N. J., leaving there to sail for France. He served with the A. E. F. in France from May, 1918, to January, 1919. He was personnel officer when mustered out.

Returning to Pittsburgh in March, 1919, Mr. McCance re-entered the law school of the University of Pittsburgh and was admitted to the bar in October of that year, having taken the examination in July. Later he received his LL.B. degree from the university. After a brief period with the law firm of Mehard, Scully & Mehard, he became associated with the legal department of the Transcontinental Oil Company, continuing with that company until December, 1923, when he entered the employ of the Philadelphia Company as an attorney in the law department. In this department he won special distinction for the capable manner in which he handled the legal affairs of the Pittsburgh Railways. He remained in that department until he assumed the duties of his new position as director of personnel.

H. S. Simpson With A.E.R.A.

Engineer with Wide Experience Appointed to Association Post to Succeed Mr. Hecker

HAWLEY S. SIMPSON, traffic engineer in County Engineer Stickel's department in Essex County, N. J., has resigned to become special engineer for the American Electric Railway Association. The resignation was effective Nov. 30. Mr. Simpson went to Essex County from Detroit in July, 1927. As special engineer of the association, Mr. Simpson succeeds Guy C. Hecker, who some time ago was made its general secretary.

When he accepted the post in Essex County at the age of 26, Mr. Simpson was said to be the first county traffic engineer in the United States. What the county needed, he said, was a "go system" of transportation rather than a "stop system." He urged uniform traffic rules in all municipalities. County authorities announced his advice was at the disposal of all Essex municipalities and later observed that virtually all municipalities except Newark availed themselves of such service.

Mr. Simpson, a graduate in civil engineering from the University of Michigan, has devoted himself ever since leaving college to the subject of highway transportation. The results of his observations have appeared from time to time in the form of articles, in the *American City*, the *National Safety News*, the *Annals of the American Academy of Political and Social Science*, *Aera*, the ELECTRIC RAILWAY JOURNAL and other publications. He has been orally articulate as well, having addressed the National Safety Congress the Michigan Safety Congress, the Michigan Motor Bus Association, the University of Michigan Conference on Highway Transport, the Metropolitan Section of the American Electric Railway Association and other bodies.

H. S. Simpson

Before going to Essex County Mr. Simpson had been connected in turn with the Michigan State Highway Department as draftsman to the resident engineer, for two years; with Vernor, Wilhelm Molby & Shreve, Detroit, for two years, in charge of the municipal engineering department; and with the city of Detroit as traffic engineer for two years. Jointly with H. M. Gould be made a traffic survey of Detroit. Between his sophomore and junior years at college he was with the Michigan State Highway Commission.

He is an associate member of the American Society of Civil Engineers, a member of the National Conference on Street and

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Highway Safety, a member of the National Safety Council and honorary vice-president of the National Highway Traffic Association. For the National Conference on Street and Highway Safety he served in 1928 on the committee on municipal traffic ordinances and regulations and at present is serving on the committee on uniform traffic regulations. For the National Safety Council, he served in 1927 on the statistics committee, in 1928 on the program committee, and for 1928, 1929 and 1930 is on the engineering committee.

H. R. Leigh With Union Pacific Stages

Herbert R. Leigh has resigned as superintendent of the North Coast Transportation Company to become general superintendent of the Union Pacific Stages with headquarters at Portland, Ore., where he will have charge of the operation of stage lines reaching from Portland to Salt Lake City and from Portland to Spokane, and the many lines radiating out of Spokane belonging to the Union Pacific. These lines at present operate approximately 13,000 miles a day.

Mr. Leigh has been employed by the Puget Sound Power & Light Company or allied companies since May 22, 1909. On Nov. 15, 1915, he was advanced to the post of superintendent of the Washington Auto Bus Company, which ran the first bus line owned by these companies. This line was sold in 1919 and Mr. Leigh was appointed station betterment engineer in the power department of the Puget Sound System. To fit himself better for the work, he took a course in steam engineering at the Hayes School of Combustion. He continued in this line of work until 1922 when the Puget Sound Power & Light Company bought the Seattle-Everett Union Stage Company, operating between Seattle and Everett, and the Seattle-Tacoma Union Stage Company, operating between Seattle and Tacoma.

At this time the Park Auto Transportation Company was formed with W. H. Grambs as manager and Mr. Leigh was appointed general superintendent, holding this position until Dec. 1, 1924, when the Seattle-Everett division was sold to the Puget Sound International Railway & Power Company, and he was transferred to Tacoma as superintendent of stage operations for the Park Auto Transportation Company and the stage division of the Puget Sound Electric Railway.

On Oct. 1, 1926, the Park Auto Transportation Company purchased the Camas Stage Company, the Northwest Transportation Company and the stage division of the Puget Sound Electric Railway, and consolidated them all into the North Coast Transportation Company. Mr. Leigh was then appointed operating superintendent of the consolidated lines.

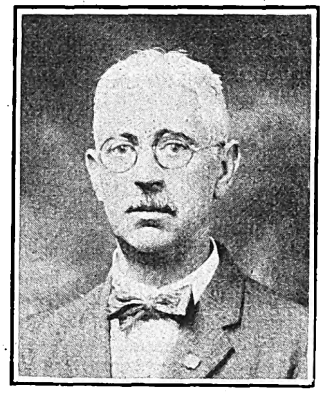
C. O. Sparhawk Advanced at Providence

C. O. Sparhawk has been appointed superintendent of the bus mechanical division of the United Electric Railways, Providence, R. I. The new appointee has had a long career in the work of maintaining buses, dating from the advent of buses at Stevens Point, Wis., with the Stevens Point Transportation Company, pioneer bus operators. Mr. Sparhawk next joined the assembling department of the Fageol Company at Kent, Ohio. He advanced to the service department, occupying the position of operating engineer. Mr. Sparhawk next associated himself with Motor Transit Management, better known as the Greyhound Lines, as superintendent of maintenance and equipment. When the Twin Coach Corporation commenced business in 1927, he joined this company, being placed in charge of chassis construction. Later he was advanced to road engineer with Twin Coach, a position he occupied until his association with the United Electric Railways.

New Metropolitan Section President

William B. Wheeler, Third Avenue Official, Rose From Ranks—Man of Wide Experience

WILLIAM B. WHEELER, the new president of the Metropolitan Section of the American Electric Railway Association, is assistant superintendent of transportation of the system of the Third Avenue Railway, New York. After long service on the surface lines in Manhattan Mr. Wheeler was recommended to the receiver of the Westchester Electric Railroad and secured an appointment in 1908 as general superintendent of that property, continuing in that position after the receiver was discharged and the company absorbed by the Third Avenue Railway System. In 1919 he was brought in to headquarters as superintendent of schedules, and in January, 1925, was appointed assistant superintendnet of transportation of the system.



W. B. Wheeler

Mr. Wheeler entered railway work as conductor on the Atlantic Avenue Railroad in Brooklyn. This was in 1894, and his first run was on the West End line to Coney Island. He took the railway job with no thought of continuing in the business, but presently he became interested and determined to work for promotion and make railroading his life vocation.

When the Atlantic Avenue Railroad was absorbed by the Nassau Electric Railroad Mr. Wheeler became dissatisfied and, inspired by an article in one of the trade journals about the Metropoliton Street Railway System, determined to cast his lot with that organization. He was successful in getting placed as conductor on the Broadway cable line. This was in 1897, and in the following year he was transferred to the Lenox Avenue depot, where he was shortly afterward advanced to the position of starter. When the Lexington Avenue line was changed over from cable to electric conduit operation in 1901 Mr. Wheeler was transferred to the 99th Street depot, and in 1903 upon the occasion of the change from horse-drawn to electric operation of all except the Avenue B line, he was again transferred, this time to the Avenue B depot.

A day's work at that time was from 5 a.m. to 5 p.m., but Mr. Wheeler decided to supplement his previous education by taking a course in elementary electricity at the East Side branch of the Y.M.C.A. At the same time, in order to gain practical experience and further his knowledge, he secured permission from the electrical engineer to work in the 96th Street power house from 6 to 10 p.m. Training of this kind, common enough among many of the old timers in the industry, is facetiously referred to as the school of hard knocks.

Mr. Wheeler was born in Brooklyn, Oct 13, 1873. He received his early education in the public schools of that city. His school days were short, however, as due to the death of his father he was obliged to go to work at the age of twelve to help support his younger sisters and brothers.

Despite the exactions of his regular work Mr. Wheeler has found time to participate to a limited degree in outside activities, notably the affairs of the Metropolitan Section. He is vice-president of a real estate company; he has for many years been a member of the board of fire commissioners of New Rochelle, where he makes his home, and is at present chairman of that body. He is president of the Fire Insurance Fund, and is treasurer of the Republican Club of New Rochelle.

A. T. Warner on Committee on Uniform Traffic Regulation

Secretary of Commerce Robert P. Lamont has appointed Arthur T. Warner, general manager in charge of traffic, Public Service Co-ordinated Transport, Newark, N. J., a member of the committee on uniform traffic regulation. The committee will consider the experience with the uniform vehicle code, model municipal traffic ordinance and standardization of traffic signs, signals and markings and recommend what further action should be taken. William E. Metzger, Detroit, is the chairman of the committee.

C. C. Brown Appointed to Commission Engineering Post

Claude C. Brown, natural gas administrator for California since July, 1927, has been appointed gas and electric engineer by the Railroad Commission to succeed Charles Grunsky, resigned. Mr. Brown will continue for the present to act as natural gas administrator.

Mr. Brown has been connected with the engineering activities of the commission since November, 1922, when he was appointed assistant valuation engineer. In 1923 he was appointed gas engineer for the commission, with headquarters at Los Angeles; due to his thorough grasp of the natural gas situation he was appointed natural gas administrator in July, 1927, under an agreement with the companies in the Los Angeles area. Since the inception of the plan to bring natural gas to the San Francisco Bay area he has been devoting a major portion of his time to the problems

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involving rates and service of the natural product in the bay area.

Mr. Brown was graduated from the University of California, Engineering School, receiving his degree of Bachelor of Science in electrical and mechanical engineering in 1914. Prior to his affiliation with the commission he engaged in engineering work for the J. G. White Engineering Company, New York, and a number of utilities.

W. C. Howard Assistant Superintendent of Transportation

W. C. Howard, supervisor for the last nine years, has been appointed assistant superintendent of transportation of the Gary Railways, Gary, Ind. He will supervise train movements on the Valparaiso, Hobart, Crown Point, Hammond and Indiana Harbor divisions. Mr. Howard started with the company as a train dispatcher in 1917. W. R. Rucker, who started as trainman in January, 1926, has been made third trick dispatcher.

E. W. Fowler Succeeds Late M. L. Harry

E. W. Fowler, connected since 1906 with the Illinois Power & Light Corporation and the McKinley utilities, from which the Illinois Power & Light Corporation was developed, has been appointed general manager of the Central Illinois group of that company with headquarters at Decatur. He succeeds the late M. L. Harry. Mr. Fowler was first identified with utility service in the office of the general manager of the Illinois Traction Company at Ottawa and Peoria, Ill., and with the organization of the Illinois Power & Light Corporation he acted as assistant vice-president with headquarters in Chicago until the summer of 1928. Then he was appointed general manager of the northern division of the Illinois Power & Light Corporation with headquarters at Ottawa, the position he held until his recent appointment.

N. T. Brown Heads Philadelphia Automotive Department

N. T. Brown is transportation manager of the newly established automotive department of Mitten Management, Inc., Philadelphia, Pa., and R. B. Hewitt, superintendent of rolling stock and shops, heads the mechanical division of this new department, composed of the Philedalphia Rural Transit Company, operating the intracity bus service, and the Yellow Cab Company, with its fleet of taxicabs. As indicated in the issue of Electric Railway Journal News for Nov. 2, page 180, prior to the time the amalgamation program went into effect, both the bus company and the cab company were operated as separate units. Each had its transportation manager and its superintendent of rolling stock and shops.

Charles Grunsky With Pacific Public Service

Charles Grunsky, gas and electric engineer of the California Railroad Commission, has resigned to become supervising engineer with the management and engineering company which will direct the activities of the Pacific Public Service Corporation.

Among the more important features of Mr. Grunsky's work with the commission were appraisals made of the Key Route and the Oakland Traction Companies in 1914 and 1920; appraisals of the Los Angeles properties of the Southern California Edison Company in 1915, and the entire system of that company in 1920; valuation of the Pacific Gas & Electric Company's electric system in 1921-22, the gas and electric properties of the Western States Gas & Electric Company in 1922, and numerous other companies.

He was graduated from the University of California, School of Electrical Engineering, in 1913. He was engaged in construction work during 1913 and 1914 on reinforced concrete dams. Mr. Grunsky entered the employ of the Railroad Commission in 1914 as assistant engineer, and after serving with the army overseas he returned to the Railroad Commission in 1919 as assistant engineer, engaged in rate and valuation work.

Laurence Wingerter in Des Moines

Laurence Wingerter, for the past ten months editor of *The Treadle*, published by the Gary Railways, Gary, Ind., has been appointed to take charge of publicity and business promotion for the Des Moines Railway, Des Moines, Iowa. He is associated there with C. W. Gifford, former general superintendent of the Gary Railways.

While in Gary, in addition to editing *The Treadle*, Mr. Wingerter also was editor of *Sho-li-mo-co News*, employee publication of the Shore Line Motor Coach Company, and handled advertising and publicity for that company as well as for the Gary Railways.

Mr. Wingerter was graduated from Notre Dame in 1928. He was for a time with the publicity department of the Westinghouse Electric & Manufacturing Company in East Pittsburgh, and later was employed in a similar capacity by the Midland United Company in Chicago.

He has been succeeded at Gary by Gilbert McClelland, also of the Chicago office of Midland.

Allyn B. Tunis, of Richmond, for the past two years secretary of the Public Utilities Association of Virginia, has resigned to join the staff of the American Gas Association, New York City, as secretary of its advertising and publicity section and editor of that organization's monthly magazine. He will be associated with Alexander Forward, also a former Virginia newspaperman, secretary to Gov. Henry Carter Stuart, and a member of the Virginia State Corporation Commission, from which body he resigned to become managing director of the American Gas Association. Mr. Tunis is a former newspaperman of Richmond and Norfolk.

Lawrence Palk, assistant general manager of the Winnipeg Electric Company, Winnipeg, Man., in charge of executive matters, completed 25 years with the company on Oct. 4. He was presented with a bouquet of 25 roses by President Anderson and officials of the company, with the sincere hope that he will have many more years with the company. Mr. Palk is well known in the city. He is president of the Winnipeg Branch of the Royal Society of St. George.

Joseph W. Morris, former Kentucky Congressman and later state revenue agent, has taken charge of the Louisville Union Bus Station Company, operating terminals in the Brown Garage Building, Louisville, as treasurer and general manager, succeeding J. W. Barnes, former president of Barnes Brothers Bus Company, which was purchased a few weeks ago by the Consolidated Coach Corporation. Guy Huguelet, of Consolidated, has been elected president of the station company, George A. Watson, Indianapolis, vice-president; J. P. Pope, Lexington, secretary.

Michael J. Loftis, superintendent of transportation of the Pittsburgh Railways, Pittsburgh, Pa., was presented with a loving cup at the opening session of the National Safety Council in Chicago recently. The cup was given as a testimonial by H. O. Allison, chairman of the trainmen's safety committee of the Pittsburgh Railways. It is inscribed, "For the Love of Mike." As noted previously in the Electric Railway Journal, "For the Love of Mike—Be Careful," was the slogan adopted by the Pittsburgh Railways trainmen in their recent safety week observance. In addition to Messrs. Loftis and Allison, Elmer Hallibaugh, assistant chairman of the safety committee, and nineteen chairmen of the safety committees of the nineteen carhouses of the company attended the sessions in Chicago, as well as nine trainmen who were sent to the congress by the committee for their ideas on safety.

John W. Bricker has been appointed to the Ohio Public Utilities Commission to fill the vacancy caused by the resignation of Roscoe C. McCulloch, who was recently appointed United States Senator by Governor Cooper. Mr. Bricker served as assistant attorney general of Ohio, assigned to the utilities commission, from 1923 to 1927. More recently he has been a member of the law firm of Postelwaite & Bricker, Columbus. Judge F. W. Geiger, a member of the commission since February, has been appointed chairman, succeeding Mr. McCulloch. For thirteen years Judge Geiger served as probate and juvenile judge of Clark County and for seven years presided in the common pleas court of the county.

George B. Sanford, for the past three years secretary and assistant treasurer of the Grays Harbor Railway & Light Company, Aberdeen, Wash., sailed on Nov. 16 for Rio de Janeiro, where he will be associated with the Emprezas Electricas Brazileiras, an American & Foreign Power Company property. Mr. Sanford formerly was associated with the Denver Gas & Electric Company and the Great Western Power Company of California.

H. J. Brown has been appointed supervisor in charge of the Montclair carhouse and Great Notch garage of Public Service Co-ordinated Transport, Newark, N. J., succeeding Joseph Stauffer, now connected with the Electric Railway Journal.

Pat M. Neff, former Governor of Texas and former member of the federal board of mediation, has been appointed chairman of the State Railroad Commission of Texas. Mr. Neff succeeds the late Clarence E. Gilmore.

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Obituary

J. J. Mahoney

John J. Mahoney, superintendent of the Michigan Electric Railway at Battle Creek from 1919 until illness forced his retirement last February, died on Nov. 18 at his home in Indianapolis, Ind. He was 62 years old.

Mr. Mahoney came into intimate contact with the lives of scores of employees, and was interested in any civic endeavors, especially that of improving traffic conditions and promoting traffic safety measures.

Ill health was responsible for his leaving his strenuous duties as general superintendent of the Indianapolis Street Railway in 1919 to come to Battle Creek.

His death was the effect of a stroke suffered three weeks ago, although a previous stroke suffered at Battle Creek in February of this year had incapacitated him for further work, and was responsible for the decision of the family to return to Indianapolis. He was succeeded as superintendent by L. E. Hollar, and shortly afterwards the name of the concern was changed to Battle Creek Transportation Company.

Mr. Mahoney was a pioneer in the electric railway field in Indiana. Starting with the Indianapolis Street Railway in 1903, he worked his way to the superintendency. His health first failed about 1919. Mr. Mahoney is survived by his widow and six children.

M. J. Curtin

M. J. Curtin, supervisor of stores and yards of the Boston Elevated Railway, Boston, Mass., is dead. He was appointed to that post in 1926, after having served the company as tie and timber expert.

Mr. Curtin has been connected with the Boston Elevated Railway for sixteen years. He went to work for the company as a sub-foreman on track construction. Later he was construction foreman at the carhouses and on building work. He had been tie and timber agent for six years.

Mr. Curtin's experience covered a wide range of work in the contracting field. He was a high school graduate, and did his first work in engineering in the drafting room of a contracting firm. He entered railway work with the old Bay State Street Railway, now the Eastern Massachusetts Street Railway. Eventually he became civil engineer of that company. His experience in this line of work also covered a period during which he was foreman for contractors engaged in carrying out important street construction.

He was a member of the committee on wood preservation of the American Electric Railway Engineering Association for several years.

Charles A. Ufford

Charles A. Ufford, Boston, Mass., died at his home in Dorchester on Oct. 9. While he never was connected with a transportation company, having been a manufacturer of corsets before his retirement several years ago, he was an ardent and untiring champion of rapid transit. More than ten years ago he conceived the idea of the Dorchester tunnel extension of the Boston Elevated Railway and was unremitting in his efforts to have it constructed. He prepared many maps and figures in his attempts to prove the necessity of the development. Among his cherished souvenirs were the pen used by Calvin Coolidge, then Governor of Massachusetts, in signing a bill for investigation of Dorchester transit possibilities, and the pen used by Mayor Curley of Boston in signing the Dorchester rapid transit bill.

Col. Fred W. Fleming

Col. Fred W. Fleming, receiver of the Kansas City Railways, Kansas City, Mo., the predecessor of the Kansas City Public Service Company, from 1920 to 1926 and president of the Central Surety & Insurance Corporation, died on Nov. 14 in Chicago. He was 63 years old.

In 1917, while chairman of the war finance committee in Kansas City, he was critically ill. In 1918 he resigned as vice-president of the Kansas City Life Insurance Company because his physicians had given him only a year to live, but he recovered his health, served six years as railway receiver and also organized the insurance company he headed at his death.

For many years he was active in politics, beginning as president of a democratic club in 1888. From 1894 to 1897 he was state coal oil inspector. He was a delegate to the Democratic national conventions in 1904, 1908 and 1912. In 1900 he was chairman of the committee that brought the Democratic national convention to Kansas City.

Colonel Fleming started as a bookkeeper and accountant in Kansas City, establishing, in 1887, a realty and loan business of his own. In 1894 he became a job printer and publisher. In 1900 he turned to insurance. Besides having held the positions mentioned previously, he had been president of the Trans-Mississippi Commercial Congress, first vice-president of the National Irrigation Congress, president of the Navy League of Kansas City and campaign chairman of the Red Cross War Fund.

Colonel Fleming won his title just after the Spanish-American War, when he became commander of the old Third Missouri Regiment. He had served the National Guard in every position from enlisted man to colonel.

J. W. Nicholson

Joseph W. Nicholson, secretary of the Cincinnati Street Railway, Cincinnati, Ohio, died suddenly on Nov. 20. He was born in Cincinnati 41 years ago. Mr. Nicholson started with the Ohio Traction Company in 1911 as a stenographer. The Ohio Traction Company owned the Cincinnati Traction Company at that time. In 1920 Mr. Nicholson was made secretary of the Ohio Traction Company, succeeding Walter A. Draper, who then became vice-president. In 1922 he was elected secretary of the Cincinnati Traction Company in recognition of talent which he was quick to display and in 1926 succeeded A. J. Becht as secretary of the Cincinnati Street Railway, Mr. Brecht resigning to devote himself to the interests of the Kilgour-Cunningham estate.

Abraham K. Detwiler, retired capitalist and railroad builder, died at Los Angeles, Cal., on Oct. 17, after a prolonged illness. He was born in Birdsboro, Pa., 81 years ago, and began his colorful business career in Toledo, Ohio, where in 1899 he became president of the Toledo & Maumee Valley Railroad.

Joseph Derett Crafton, for 25 years superintendent of employment for the St. Louis Public Service Company, St. Louis, Mo., and its predecessor, the United Railways, is dead. For some time he had been on the company's pension roll. Mr. Crafton was 75 years old.

Clinton Elliott, a pioneer in New York street car advertising, died on Sept. 1 at Thompson, Conn., where he was born 63 years ago. Mr. Elliott was president of the Eastern Advertising Company and a director of the Street Railway Advertising Company, having been associated with Barron G. Collier in the development of the latter corporation.

Lewis J. Dickey, in the service of the Boston Elevated Railway, Boston, Mass., for 30 years, died recently. For the last 24 years he had been receiving cashier in charge of collections.

William Spencer Ballenger, division superintendent for the Washington Railway & Electric Company, Washington, D. C., by which he had been employed for the past 44 years, is dead. Mr. Ballenger was born in Washington 65 years ago.

Louis Schlayer, engineer of the Connecticut Company in Hartford, Conn., died on Oct. 19 following a brief illness. Mr. Schlayer was 71 years old. He had been connected with the railway for many years.

Col. Joseph A. Corby, Civil and Spanish-American War veteran and retired financier, who helped to build the first street car line in St. Joseph, Mo., and operated the first telephone exchange there, is dead. He was 82 years old.

Hiram Roswell Steele, former judge and also district attorney at one time in Kings County, in which Brooklyn is located, is dead. He was a director of the New York Life Insurance Company and had long been a director of the Brooklyn City Railroad, now included in the Brooklyn & Queens Transit Corporation, a part of the Brooklyn-Manhattan Transit Corporation.

Alfred Baker, formerly general manager of the Birmingham Corporation Tramways and Omnibus Department, Birmingham, England, is dead. Mr. Baker started as a tram conductor and rose to control one of the largest and most progressive undertakings in the country. His interest in municipal transport was indicated by his active connection with the Municipal Tramways and Transport Association; he was a member of the council from its inception. Mr. Baker retired about two years ago, being succeeded at Birmingham by his son, A. C. Baker.

Frank L. Fuller, president of the Binghamton Railway, Binghamton, N. Y., for nearly fifteen years, died on Sept. 27 at the age of 71 years. The Binghamton Railway is now included in the system of the Triple Cities Traction Company.

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Industry Market and Trade News

Simplified Practice Making Progress

Simplification has played a significant part in the past and will play a major part in the future development of electric railways, according to the United States Department of Commerce. It can be applied to four of the most important subjects discussed at the recent annual convention, of the American Electric Railway Association, namely: (1) Lighter weight cars; (2) quicker acceleration; (3) less noise; (4) standardization of equipment.

The association has always been active in supporting simplified practice recommendations and has consistently urged the electric railway industry to apply the principles of simplified practice both to methods and to materials used. It has officially accepted the following simplified practice recommendations:

Number	Item
16	Lumber
26	Steel reinforcing bars
28	Sheet steel
35	Steel lockers
36	Milling cutters
45	Grinding wheels
47	Cut tacks and small cut nails
48	Shovels, spades and scoops
49	Sidewalk lights
53	Steel reinforcing spirals
56	Carbon brushes and brush shunts
57	Wrought-iron and wrought-iron steel pipe, valves, and pipe fittings
58	Classification of iron and steel scrap
60	Packing of carriage, machine and lag bolts
63	Metal spools
71	Turnbuckles
73	One-piece porcelain insulators
76	Ash handles
90	Hack-saw blades
95	Skid platforms
100	Welded chain

It is pointed out that when intelligently applied many benefits and advantages result, among which may be listed lower inventory investment, higher rate of turnover, quicker deliveries, released storage space, lower operating costs, lower overhead expense, ease of installation, decreased inventory discrepancies, less obsolete material, less depreciation charges, and less misunderstanding and delay due to simplified nomenclature of materials.

The Division of Simplified Practice has studied the needs of purchasing agents, storekeepers, engineers, foremen, accountants, etc., for a practical form of the simplified schedules of commodities. For the recommendations listed above it has prepared a sheet form which can be obtained free of charge.

The American Electric Railway Association has made arrangements with the Division of Simplified Practice to supply its members with complimentary sheet form copies of any recommendations requested. A letter from association headquarters has been sent to the membership together with the complete list of over 100 simplified practice recommendations from which those of interest can be selected.

Members of other public utility associations, including the American Railway Association, American Gas Association and American Water Works Association, are utilizing these simplified schedules to advantage. Over $300,000,000 has been saved already and the division states that over 20,000 acceptances to recommendations have been received.

The Division of Simplified Practice has volunteered to give careful consideration to any questions relative to simplified practice or recommendations which electric railways may care to ask. Those interested may address George A. Cooper, Division of Simplified Practice, Bureau of Standards, Washington, D. C.

Switching Locomotive for Springfield, Ohio

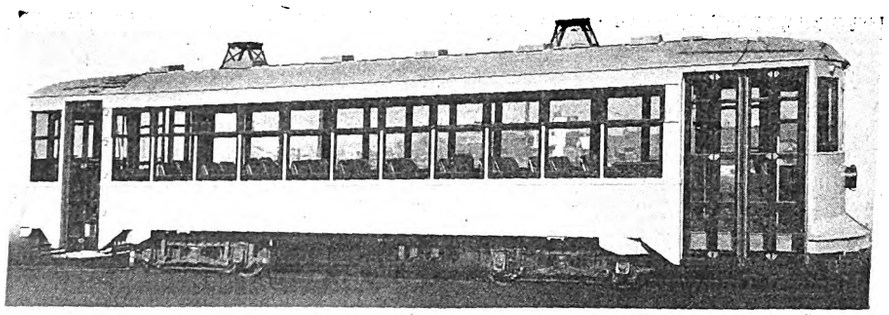
The Cincinnati Car Corporation reports the delivery of a 40-ton double-end electric locomotive for switching purposes to the Springfield Suburban Railroad, Springfield, Ohio, which property engages in a general switching business between certain industries and the various steam railroads and interurban railways entering Springfield.

Recent Bus Sales to Electric Railways

Recent deliveries of motor buses to electric railway companies by the White Company include two 54A six-cylinder buses to the Eastern Texas Electric Corporation at Beaumont, Tex., and seven Model 65 six-cylinder buses to the Pittsburgh Motor Coach Company. American Car & Foundry Motors Company has delivered a 27-passenger parlor car coach to the Capital Traction Company, Washington, D. C.

Twin Coach Corporation, Kent, Ohio, reports delivery of three 40-passenger urban type coaches to the Aronimink Transportation Company, Upper Darby, Pa., and three buses of similar type to the Milwaukee Electric Railway & Light Company. This property now has 23 ACF buses in service. The

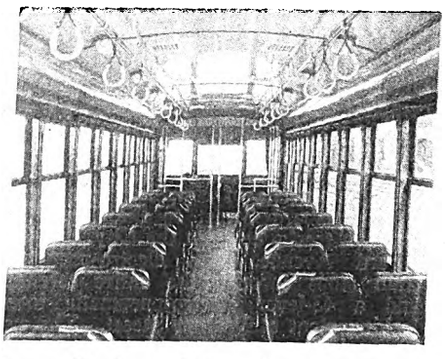
New Cars for Sacramento



Ample window space and attractive lines characterize new Sacramento street cars

Twelve all-steel double-truck double-end motor cars for city service were recently delivered to the Pacific Gas & Electric Company for service in Sacramento, Cal., by the American Car Company of St. Louis, Mo. The cars have a length, over all, of 41 ft. 6½ in., an over-all width of 8 ft. 2½ in., and a height from rail to trolley base of 10 ft. 8 in. Length over the body posts is 28 ft. 8½ in., and the estimated weight is put at 30,000 lb. Other specifications follow:

Name of Railway	Pacific Gas & Electric Company
City and State	Sacramento, Cal.
Number of units	12
Type of unit	One-man, motor, passenger, city, double-end, double truck
Number of seats	22
Builder of car body	American Car Company
City and state	St. Louis, Mo.
Date of order	June 1, 1929
Date of delivery	Oct. 18, 1929
Air brakes	Westinghouse Traction Brake Company
Armature bearings	Ball
Axles	Forged open hearth steel
Car signal system	Faraday
Compressors	DH-16
Conduit	Flexible
Control	Double end K-63
Curtain fixtures	National Lock Washer Company
Curtain material	Pantasote No. 74-18-L-blue
Destination signs	Hunter type No. 126
Door mechanism	National Pneumatic Company
Doors	Folding
Energy saving device	None
Fare boxes	Johnson D.M.-3
Floor covering	Battleship linoleum-green
Gears and pinions	Spur
Glass	Plate
Hand brakes	American Car Company's drop handle
Hand straps	Leather
Heaters	None
Headlights	Golden Glow SM-95
Headlining	Agasote
Interior trim	Mahogany



Forward-facing upholstered seats and wide aisles make for passenger comfort

Journal bearings	Plain
Journal boxes	Brill friction type
Lamp fixtures	Electric Service Supply Company's type T, No. 27903 dome
Motors	GE-247 Form A, inside hung
Painting scheme (color used), Cars painted by railway	
Registers	None
Roof type	Arch
Roof material	Canvas covered
Safety car devices, Westinghouse Traction Brake Co.	
Sash fixtures	Dayton
Seats	Hale & Kilburn No. 392-A
Seat spacing	2'6"
Seating material	Leather
Slack adjusters	None
Steps	Stationary, well type
Step treads	Feralun
Trolley catchers	Keystone
Trolley base	Furnished by railway company
Trolley wheels	Furnished by railway company
Trucks	Brill 177-E-1-X type
Ventilators	Brill exhaust
Wheels, type	Griffin, diameter 26 in.
Wheelguards or fenders	H. B. type

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Capitol District Transportation Company, Albany, N. Y., has added three 40-passenger urban type coaches to its fleet. The Cincinnati Street Railway received one 40-passenger urban coach, and the Houston Electric Company added one 21-passenger urban coach. The American Car & Foundry Motors Corporation also reports the delivery of a 42-passenger trackless trolley to the New Orleans Public Service Corporation.

General Motors Truck Company has delivered a Type W observation coach to the Wheeling & Parkersburg Motor Company, Sisterville, W. Va., and three Type W city service buses to the Johnstown Traction Company, Johnstown, Pa. Other Yellow Coach deliveries include two Type W buses to the Erie Railways, Erie, Pa., one Type W city service bus to the North Carolina Public Service, Greensboro, N. C., two Type W buses to the Pacific Gas & Electric Company for service in Sacramento, Cal., one Type W city service bus to the Knoxville Power & Light Company, Knoxville, Tenn., two observation buses to the Wisconsin Power & Light Company, Madison, Wis., three Type Z 29-passenger buses to the Delaware Bus Company, Philadelphia, Pa., and two Type Z 29-passenger buses to the Southern Pennsylvania Bus Company, of Philadelphia.

Boston Elevated Railway has accepted delivery of one Mack Model BK six-cylinder 37-passenger city type bus. Other recent deliveries by the Mack International Motor Truck Corporation include six Model BO 29-passenger city type buses to the St. Joseph Railway, Light, Heat & Power Company, of St. Joseph, Mo., two Model BO six-cylinder 29-passenger city type buses to the Tri-City Railway, of Davenport, Iowa, and one 29-passenger city service bus to the Montreal Tramways.

PRT Contracts for Signal Equipment

The city of Philadelphia, Department of City Transit, has contracted with the Union Switch and Signal Company for the complete installation of an automatic block signaling and electro-pneumatic interlocking system in the new South Broad Street Subway, Philadelphia. The automatic blocking consists of signaling four tracks from Lombard Street to the City Hall, and two tracks between the City Hall and Girard Avenue, with electro-pneumatic train stops through the entire territory and a 43-lever electro-pneumatic interlocking plant at Walnut Street. The system, when completed, will be hooked up with the existing signal system of the same type in the North Broad Street Subway, and the necessary additions and modifications to tie in this new work with the original installation are also provided for under this contract.

$1,000,000 Program for Springfield

The program of expansion and improvement contemplated by the Illinois Power Company for 1930 will require an expenditure of approximately $1,000,000. According to A. D. Mackie, general manager, "the tentative program covers additional boiler and generating equipment, pole and wire line extensions, undergrounding of electric wires and removal of wooden poles, rehabilitation and replacement of car tracks and rolling stock, extension and enlargements of gas mains and heating mains." Mr. Mackie also said:

"The railway budget covers new track in streets to be paved, shop equipment necessary to replace all present wheels on street cars with steel wheels, which will do away with the flat wheel disturbance and annoyance, wire trolley poles to replace wooden poles in the business district, which are presently to be removed as electric wires go underground."

ELECTRIC RAILWAY MATERIAL PRICES—NOVEMBER 23, 1929

Metals—New York

Copper, electrolytic, delivered, cents per lb.	18.00
Lead, cents per lb.	6.10
Nickel, cents per lb., ingot	35.00
Zinc, cents per lb.	6.24
Tin, Straits, cents per lb.	39.583
Aluminum, 98 to 99 per cent, cents per lb.	24.30
Babbitt metal, warehouse, cents per lb.:	
Commercial grade	42.00
General service	31.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.75
Somerset mine run, f.o.b. mines, net ton	2.15
Pittsburgh mine run, Pittsburgh, net ton	1.70
Franklin, Ill., screenings, Chicago	3.35
Central, Ill., screenings, Chicago	2.20
Kansas crushed mine run	1.50

Track Materials—Pittsburgh

Standard steel rails, gross ton	$43.00
Railroad spikes, drive 5/16 in. and larger, cents per lb.	2.80
Tie plates (flat type), cents per lb.	2.15
Angle bars, cents per lb.	2.75
Rail bolts and nuts, cents per lb.	3.90
Steel bars, cents per lb.	1.95
Ties, white oak, Chicago, 6 in. x 8 in. x 8 ft.	$1.40

Hardware—Pittsburgh

Wire nails, base per keg	$2.45
Sheet iron (24 gage), cents per lb.	2.75
Sheet iron, galvanized (24 gage), cents per lb.	3.50
Galvanized barbed wire, cents per lb.	3.10
Galvanized wire, ordinary, cents per lb.	3.05

Waste—New York

Waste, wool, cents per lb.	13.00
Waste, cotton (100 lb. bale), cents per lb.:	
White	13.00
Colored	9.5

Paints, Putty and Glass—New York

Linseed oil (5 bbl. lots), cents per lb.	15.7
White lead in oil (100 lb. keg), cents per lb.	14.25
Turpentine (bbl. lots), per gal.	$0.57
Putty, 100 lb. tins, cents per lb.	5.725

Wire—New York

Copper wire, cents per lb.	19.875
Rubber-covered wire, No. 14, per 1,000 ft.	6.15
Weatherproof wire base, cents per lb.	20.875

Paving Materials

Paving stone, granite, 5 in., f.o.b.:	
New York—Grade 1, per thousand	$150.
Wood block paving 3½, 16 lb. treatment, N. Y., per sq.yd., f.o.b.	2.70
Paving brick 3½x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	51.00
Paving brick 3x8½x4, N. Y., per 1,000 in carload lots, f.o.b.	45.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd., delivered	3.25
Cement, Chicago, in carload lots, without bags, f.o.b.	1.85
Gravel, ¾-in., cu.yd., delivered New York	3.25
Sand, cu.yd., delivered New York	2.00

Old Metals—New York and Chicago

Heavy copper, cents per lb.	13.0
Light copper, cents per lb.	11.75
Heavy yellow brass, cents per lb.	7.75
Zinc, old scrap, cents per lb.	2.75
Lead, cents per lb. (heavy)	4.50
Steel car axles, Chicago, net ton	$16.25
Cast iron car wheels, Chicago, gross ton	18.00
Rails (short), Chicago, gross ton	18.75
Rails (relaying), Chicago, gross ton (65 lb. and heavier)	28.50
Machine turnings, Chicago, gross ton	7.25

Atlanta Track Reconstruction Will Total $365,000 for Year

During the year 1929 the Georgia Power Company will have spent approximately $365,000 for track reconstruction in Atlanta. This figure does not include any extensions but only the rebuilding of existing lines. A total of 25,617 ft. of single track has been rebuilt on nine major projects completed during the year. On a large percentage of this the company paid for the paving.

In addition to this work the company built 1,871 ft. of new track of 80-lb. A.S.C.E. rail on its College Park line, rebuilt the special work on Whitehall at Hunter Street, installed concrete beam construction under 6,896 ft. of single track and paid for the concrete paving in the track foundation, and installed a new double track branchoff and granite block paving reset.

Great Northern Orders Additional Electric Locomotives

Increased passenger travel following the opening of the Great Northern's 8-mile tunnel under the Cascades is reflected by the purchase from the General Electric Company of four additional 3,000-hp. electric locomotives for use on the electrified division.

The new locomotives will cost about $250,000 each.

Coincident with the completion of the 8-mile Cascade tunnel last January, the railway's entire route through the Cascades was changed from steam to electrical operation. The saving in time afforded by these and other improvements enabled the Great Northern to cut nearly seven hours from the time of its transcontinental trains.

The new locomotives will be of the same type as those now handling the railway's passenger trains. They weigh approximately 530,000 lb. each and are 75 ft. long. They are built so that they can be operated in multiples, each unit being capable of handling a 1,000-ton train on any of the grades. Each locomotive has six traction motors which deliver power to six axles. The driving wheels are nearly 5 ft. in diameter.

International Railway Completes Extensive Rehabilitation Program

In furtherance of its desire to cooperate in every way with the city the International Railway of Buffalo, N. Y., agreed last January upon a program of street improvements to be made during the current year at an expense to the company of $1,000,000. This work has now been completed, and included the rebuilding and repaving of about 11 miles of single track. The program also included a considerable amount of maintenance work on other thoroughfares, including the rehabilitation of Seneca Street from Main Street to the city line. Not only did the company rebuild its tracks on Seneca Street, but it also paid for the paving of 19 ft. in the center of the street, the cost to the company of paving the adjoining areas being greater than the cost to the city.

Within the last three years the company has spent $2,500,000 for track and paving.

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ELECTRIC RAILWAY JOURNAL

raw-Hill Publishing Company, Inc. DECEMBER, 1929 Thirty-five Cents Per Copy

Profitable Passenger Transportation

TIMKEN BEARING EQUIPPED

In buses, reliability, safety, economy of operation and low maintenance costs are all assured by the exclusive combination of Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken steel—in front and rear wheels, transmission, pinion and differential.

In electric railway cars these same exclusive Timken advantages are obtained by the use of Timken Bearings in motor armatures and car journals.

THE TIMKEN ROLLER BEARING COMPANY
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SEND for this interesting 44-page book entitled Westinghouse Electric Railway Equipment for Speedy and Comfortable Transportation Service.

In addition to a description of modern street car equipment, data are included on the latest practices and apparatus for train operation, rapid transit, higher speed interurban service, trolley and gas-electric busses, and electric locomotives for freight haulage.

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Electric Railway Journal

Consolidation of
Street Railway Journal and Electric Railway Review

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GEORGE J. MACMURRAY
CLIFFORD A. FAUST
J. W. MCCLOY

JOHN A. MILLER, JR., *Managing Editor*

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that show the

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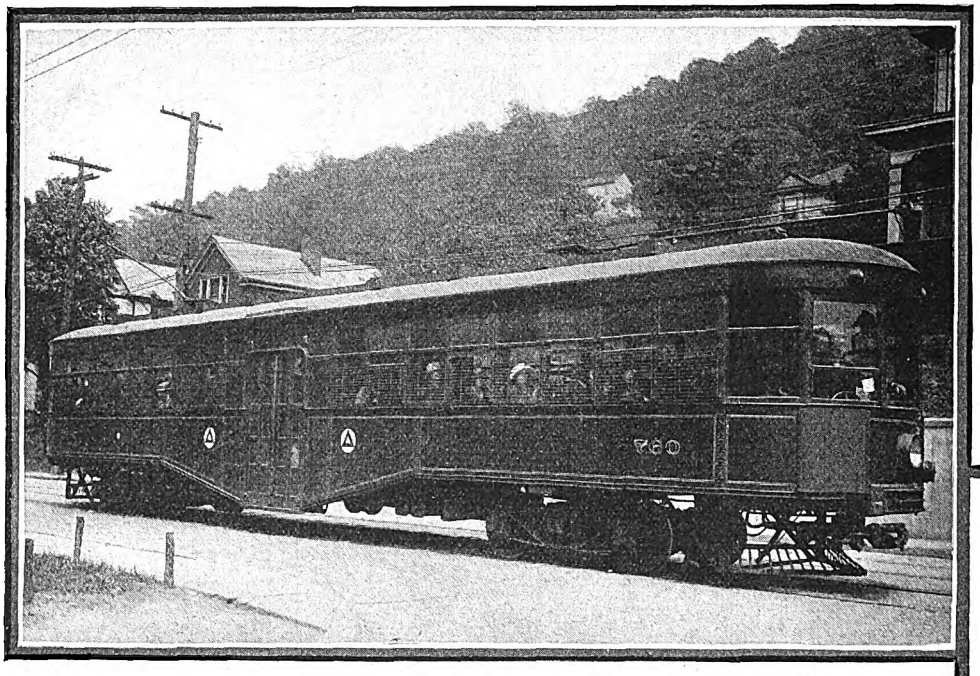
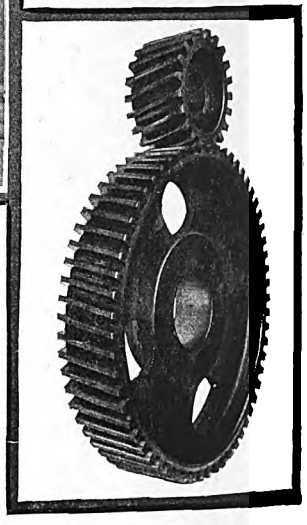
680,000 MILES IN 14 YEARS .... AND STILL GOING



The first Westinghouse-Nuttall Helical Gear and Pinion as it appeared after 632,000 miles of service.



ON February 25, 1915, the first Westinghouse-Nuttall BP grade helical gear and pinion was installed on a car for the West Penn Railways.

Today, after more than 680,000 car-miles of service, this same gear and pinion is still in operation.

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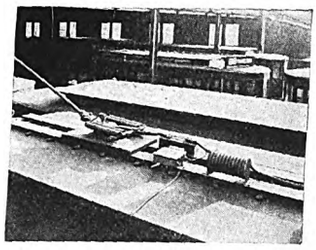

Typical K-3 Arrester Installation

Without maintenance

Type K-3 Lightning Arrester

Typical MP Arrester Mounting

Type MP Lightning Arrester

K-3 and MP arresters give full protection

THE K-3 arrester gives full protection against severe surges induced by lightning.

It is designed for line, car, and station protection on 100 to 1500-volt direct-current circuits.

It requires no maintenance, only infrequent inspection, as it contains no liquids to freeze or plates to deteriorate.

Its operation is simple and effective, consisting chiefly of a condenser with or without a spark gap.

The MP arrester is designed for pole and car protection on circuits up to 750 volts.

It requires no maintenance, and is low priced.

It has a free discharge path to ground when the arrester operates, and there is no noticeable surge after the discharge.

Years of field service with thousands of installations prove these arresters have never been surpassed.

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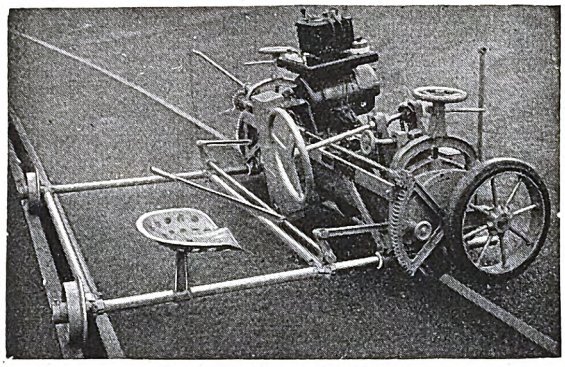
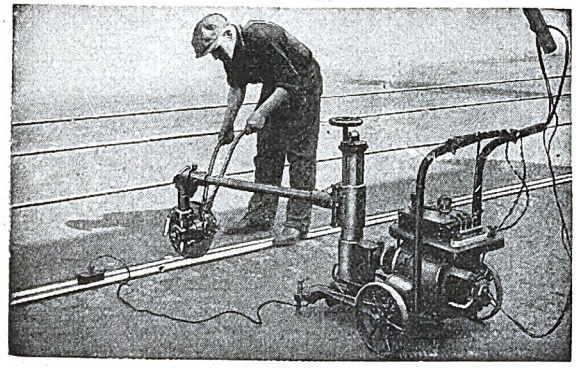
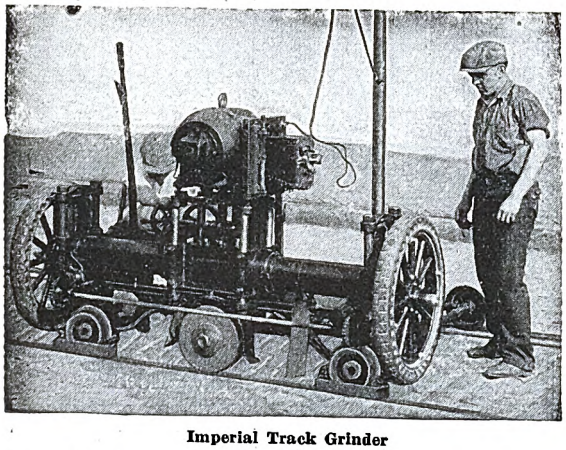


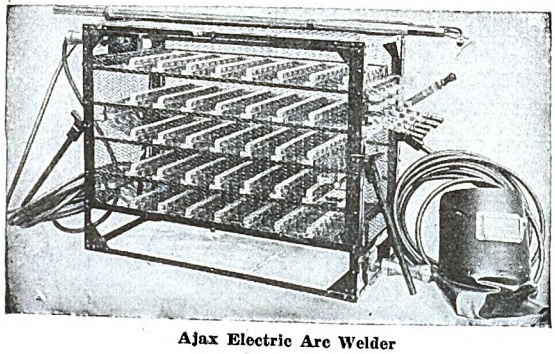
Improved Atlas Rail Grinder



Eureka Radial Rail Grinder



Imperial Track Grinder



Ajax Electric Arc Welder

Folks that wouldn't give you a nickel will gladly pay a dime

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It all depends on what you sell. A rough ride in a new car is still a rough ride and doesn't sell even at a nickel. Smooth track makes smooth riding—makes good service. It sells at a dime—in sufficient volume to make street car operation pay.

Smooth track is the basis of smooth riding—and here's the equipment to make and keep track smooth economically.

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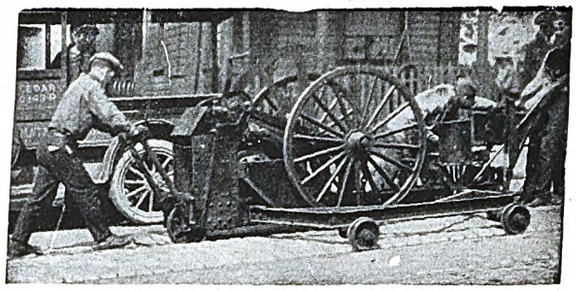
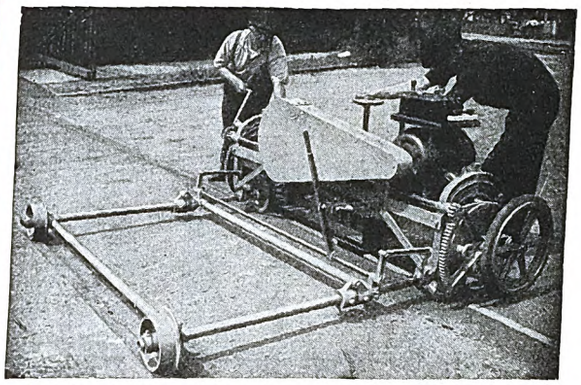
H. F. McDermott, 208 S. LaSalle St., Chicago
F. F. Bodler, San Francisco, Cal.
H. E. Burns Co., Pittsburgh, Pa.
Equipment & Engineering Co., London

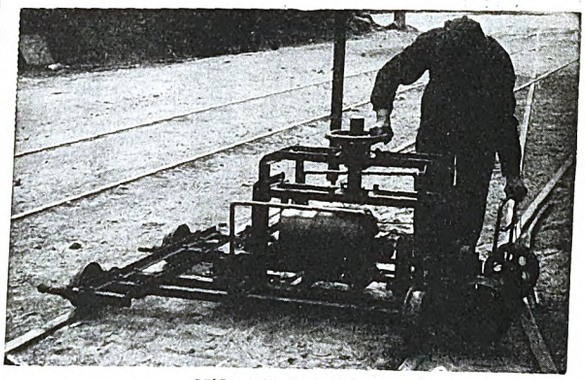
4025



Reciprocating Track Grinder



Vulcan Rail Grinder



Midget Rail Grinder

RTW Curve Oiler

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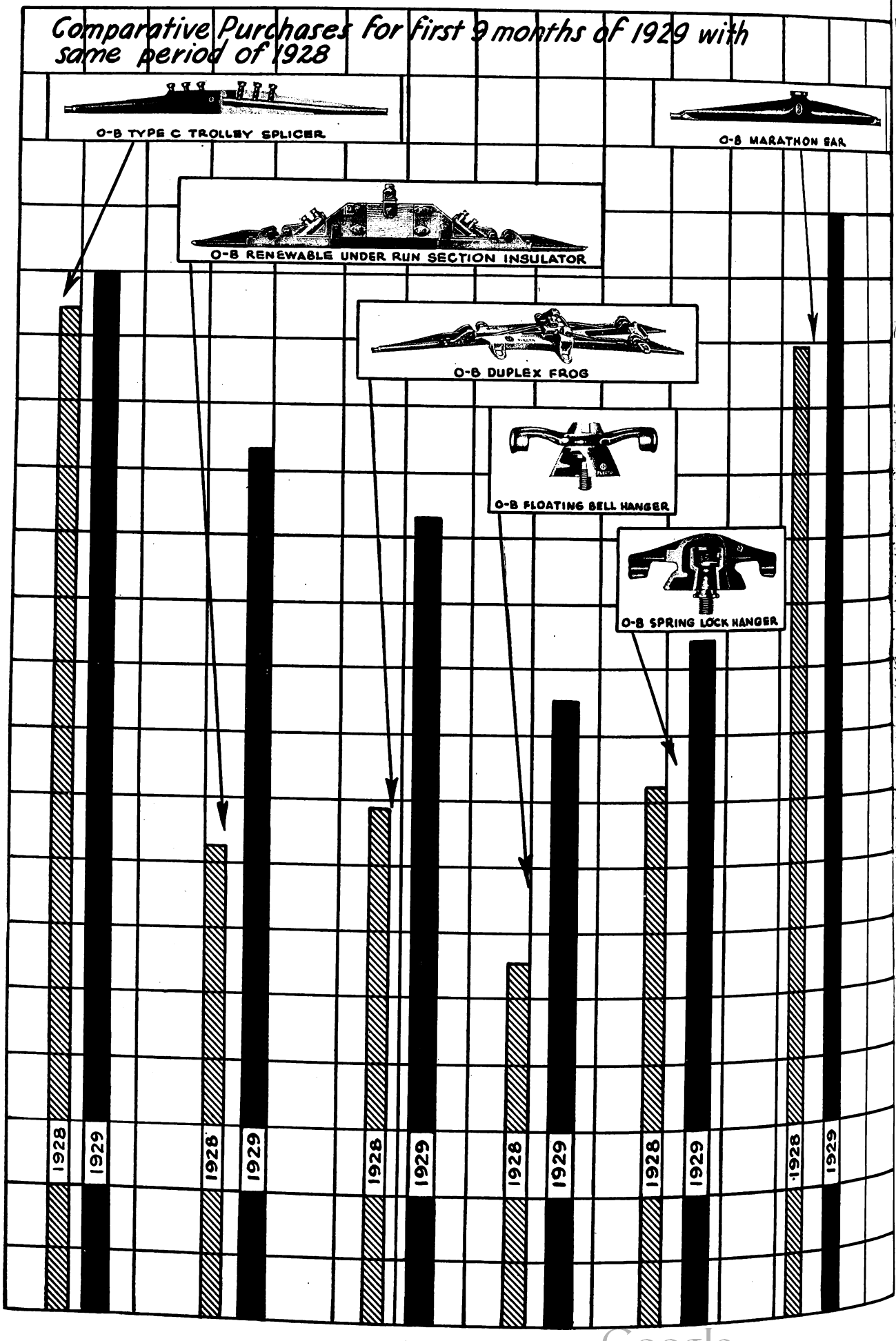

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What Does This Growing Preference Mean?

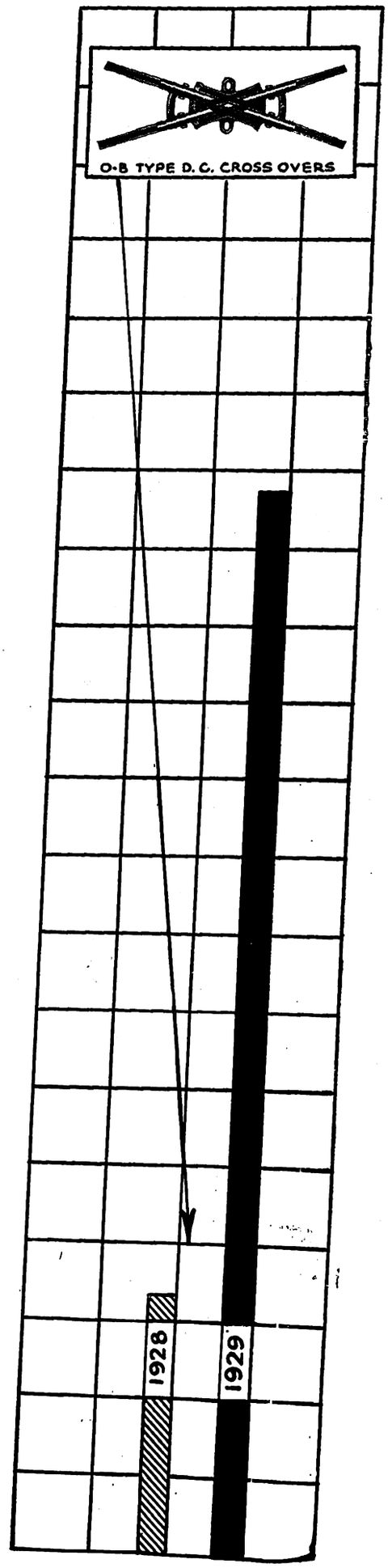
Graphic comparisons of 1928 and 1929 purchases indicate growing preference for O-B Line Materials.

THE proof of the pudding is the eating thereof" goes the old saying. Similarly, the growing preference for O-B Line Material Fittings, as shown in the graphs on the opposite page, indicates that more and more railway operators like the taste of the service they have experienced.

Purchases of overhead materials for any one electric railway do not vary to any great degree from year to year. Orders are mostly for maintenance of existing lines, occasionally for new construction. Consequently, increase in the amount of O-B Line Material Fittings used from year to year is due to a wider-spread choice of these outstanding fittings.

Users for a new or improved product are not won overnight. Electric railways are unwilling to adopt a different product until they know, by test and actual performance, that improved service or lower cost of operation, or both, will be their gain.

The fact that purchases of these O-B products during the first nine months of 1929 exceed those for the same period of 1928 by 25% and more, is conclusive evidence that more and more properties are more fully recognizing the labor-savings and maintenance-reductions which are available.



Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Limited
Niagara Falls, Canada
1149L

Ohio Brass Co.

NEW YORK PITTSBURGH PHILADELPHIA BOSTON CHICAGO CLEVELAND ST. LOUIS ATLANTA SAN FRANCISCO LOS ANGELES DALLAS

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

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COSTS ARE LOW—

DODGE BROTHERS

SOLD AND SERVICED BY

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E LOW RIDER APPEAL IS CERTAIN WITH DODGE COACHES

PROVED ECONOMY, DEPENDABILITY, COMFORT AND FINE APPEARANCE SATISFY OPERATORS AND GAIN PATRONAGE

You can buy a Dodge Motor Coach with definite assurance of its ability to attract riders and carry them at low cost. » » Operators in small cities and large have proved decisively that these practical coaches—the 21-passenger Street Car Coach and the 16-passenger Parlor Car—are dependable, comfortable, attractive and economical. And operators the world over agree that those basic motor coach qualities definitely assure sustained rider appeal and remarkably low operating costs. » » The story about Dodge Motor Coaches is worth hearing. Your Dodge Brothers dealer can tell it and back his statement with strong proof.

MOTOR COACHES

DODGE BROTHERS DEALERS EVERYWHERE

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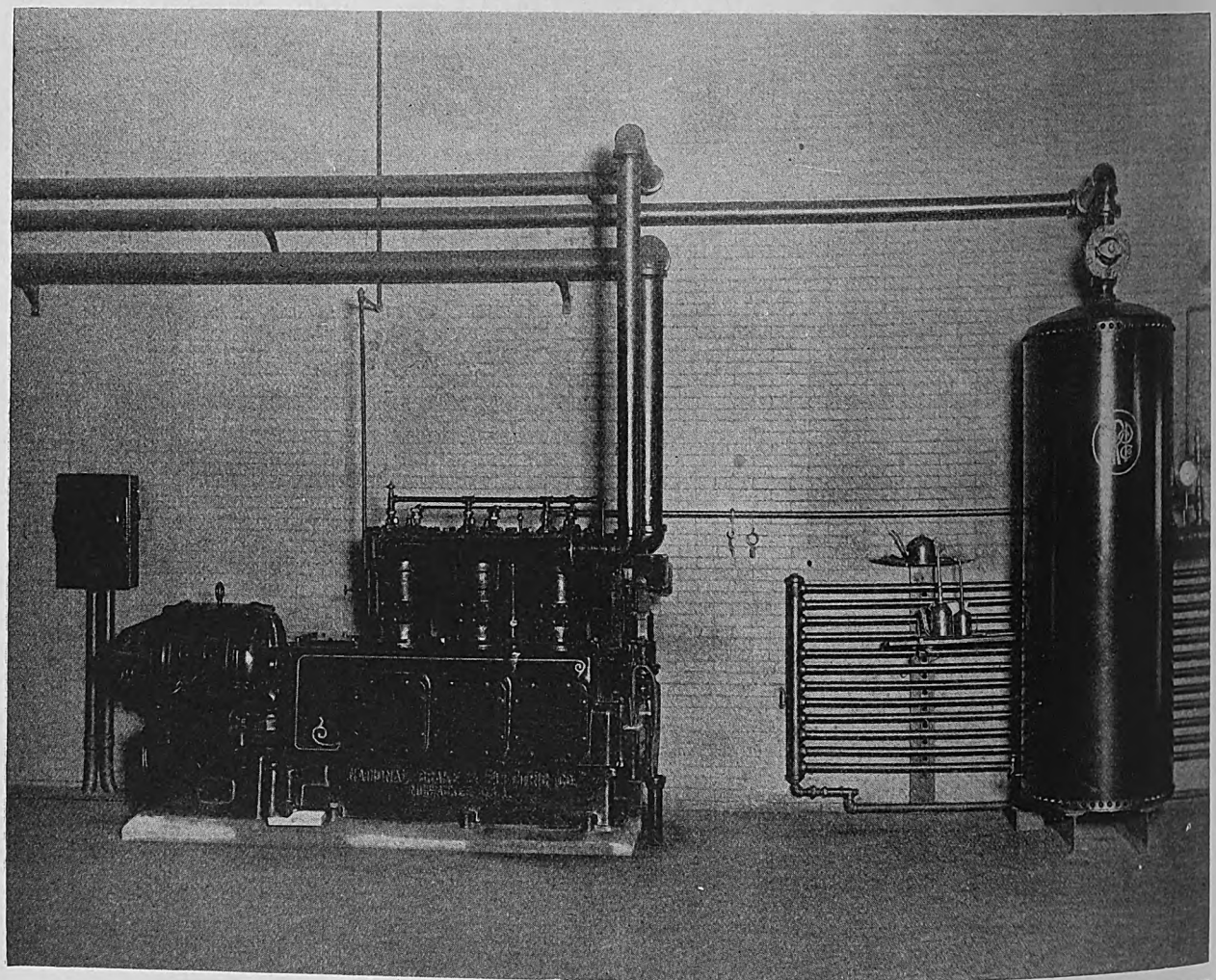
For Efficient, Reliable, Lasting Service

WESTINGHOUSE-NATIONAL Air Compressors, embodying distinctive features developed from three score years of experience, and constructed to manufacturing standards that place ultimate service above the all-too-often consideration of first cost, have won a reputation for high efficiency, dependable action, economical operation, and long life.



We make a complete line of air compressors ranging in size from 3 to 700 cu. ft. displacement—steam driven, motor driven, belt driven. They are being used for a great variety of purposes in car barns, power houses, and shops.

Westinghouse Traction Brake Co.
General Office and Works
Wilmerding, Pa.

WESTINGHOUSE-NATIONAL Air Compressors

"Quality Machines for Quality Service"

Digitized by Google

DEPENDABLE!

When every other form of urban transportation is tied up, the dependable trolley plugs along doing its job. ¶Even under the worst weather conditions,

TREADLE-IZATION is The Easiest Way Out

NATIONAL PNEUMATIC COMPANY

Executive Office: Graybar Building, New York

General Works: Rahway, New Jersey

CHICAGO
518 McCormick Building

MANUFACTURED IN TORONTO, CANADA, BY
Railway & Power Engineering Corp., Ltd.

PHILADELPHIA
1010 Colonial Trust Building

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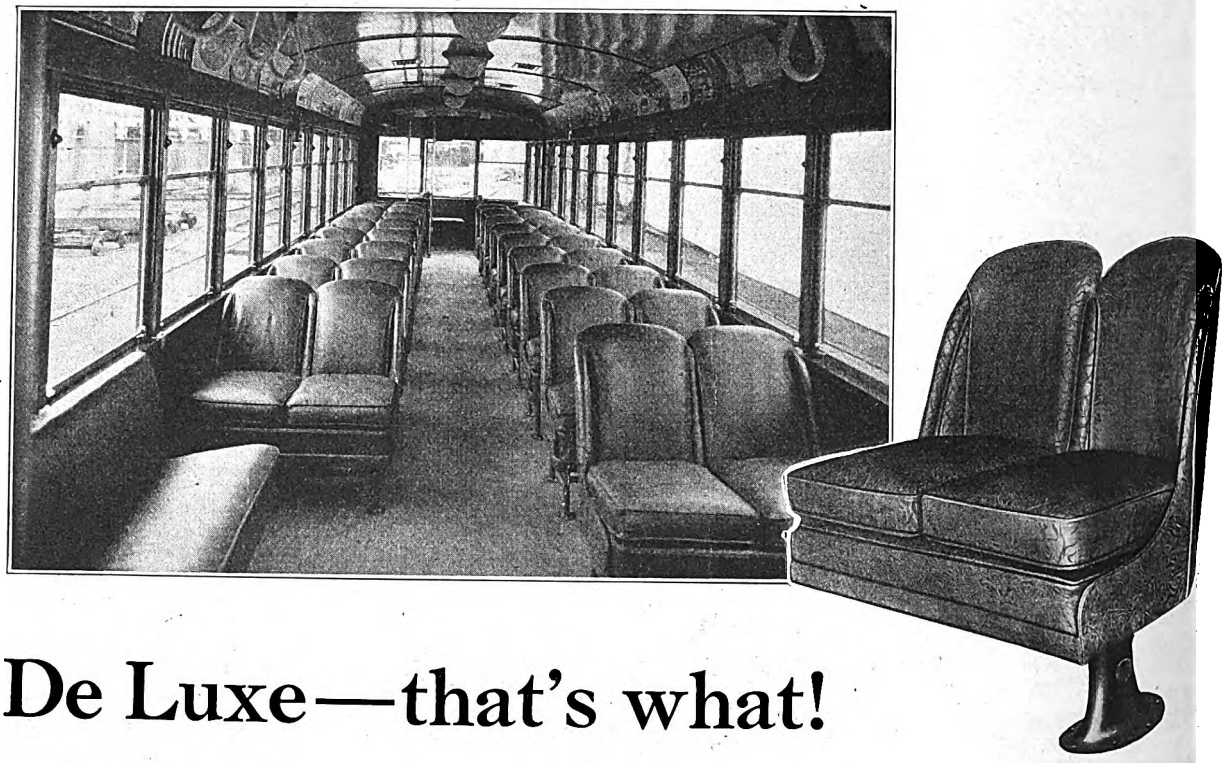

De Luxe—that's what!

NOBODY can enter such a car as this one of the ten on the lines of the Cincinnati, Hamilton and Dayton interurban line without feeling "Here's where I get a nice rest."

De Luxe equipment such as this invites passengers. It increases income. It costs no more to operate and it certainly improves public relations.

The fundamental of such equipment is comfort—the kind of comfort that Hale and Kilburn builds into car seats—the comfort that rests a passenger during his ride and drops him at his destination with a pleasant word to the conductor or motorman. Think it over. It is worthy of your closest investigation.

HALE & KILBURN SEATS

"A BETTER SEAT FOR EVERY TYPE OF MODERN TRANSPORTATION"

HALE & KILBURN CO.

General Office and Works: 1800 Lehigh Avenue, Philadelphia

SALES OFFICES:

Hale & Kilburn Co., Graybar Bldg., New York
Hale & Kilburn Co., McCormick Bldg., Chicago
Frank F. Bodler, 903 Monadnock Bldg., San Francisco
E. A. Thornwell, Candler Bldg., Atlanta
W. L. Jefferies, Jr., Mutual Bldg., Richmond
W. D. Jenkins, Praetorian Bldg., Dallas, Texas
H. M. Euler, 146 N. Sixth St., Portland, Oregon

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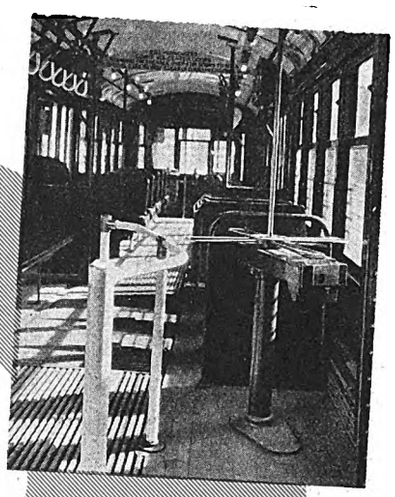
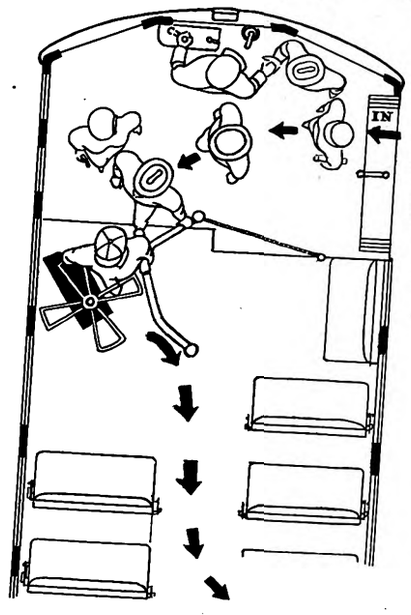


WHY THE PEREY STREET CAR COINPASSOR



1. Makes one-man operation practical on cars of every size and type.
2. One-man operator can handle larger crowds without delay.
3. No rider can evade fare by slipping past the operator—the Coinpassor forces all to pay.
4. Relieves operator of responsibilities for collection and registration of fares —he only has to make change and issue transfers.
5. Platform entrance well can be as large as desired.
6. Front, center or rear exit can be used with treadle operator.
7. Utilizes available platform space effectively.
8. Fast as the movement of passengers.

Every practical street car man who knows anything about fare collection and car loading problems, will recognize at a glance, the possibilities of this equipment installed on the car. The unquestioned success of the prepayment fare area with mechanical collection and registration of fares, as used at subway stations, parks, etc., is now available on every piece of rolling stock. It speeds up loading and assures collection of every fare. It is equally adapted to street cars. Old style or modern cars can be equipped successfully with the PEREY COINPASSOR.

Your inquiry involves no obligation. We will gladly give you the details and let you be the judge.

PEREY MFG. CO.

101 Park Avenue, New York City

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A NEW SYSTEM OF LUBRICATION

TEXACO

REG.U.S.PAT.OFF.

The sensation of the A.E.R.A. Convention!

Railroad men are still talking about this remarkable Texaco exhibit. It was one of the outstanding features at the 48th annual A.E.R.A. convention, held at Atlantic City, September 28th to October 4th, 1929.

The *new* Texaco Power-saving System of Electric Railway Lubrication, the *new* Texaco Lovis Oil and the *new* Texaco Oil Seal were shown to operating officials from every section of the country.

The exhibit, and the wonderful results that have been accomplished through the application of the new Texaco System, the oil and the oil seal aroused widespread interest.

It is a development of great importance to the industry and to every operating official.

If you were unable to attend, or see this exhibit, write The Texas Company for information. A Texaco representative will gladly call on your request and present the facts, or arrange for convincing tests on your own lines. Write today.

TEXACO LUBRICANTS

The Texas Company

17 Battery Place, New York City

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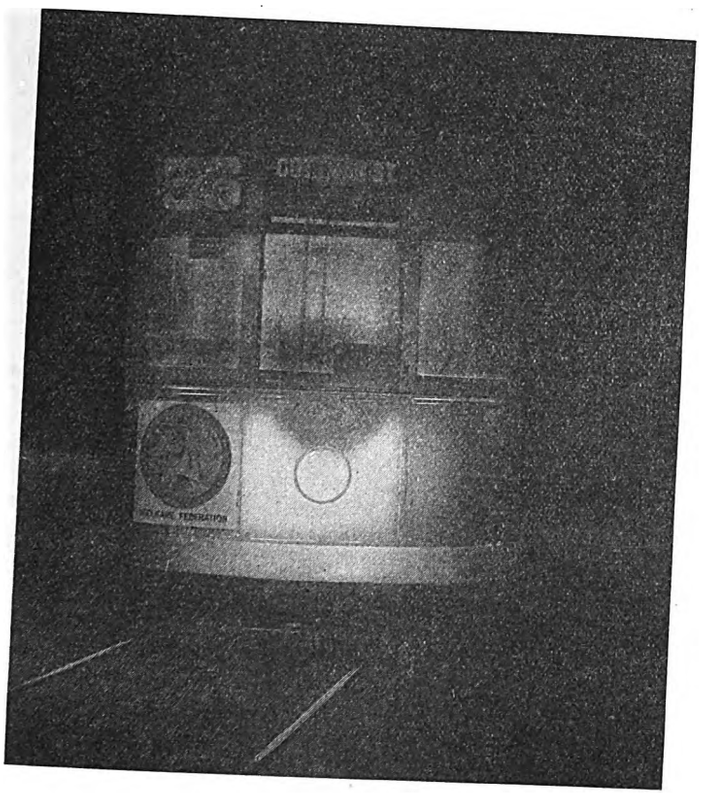
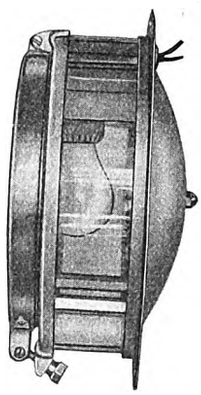
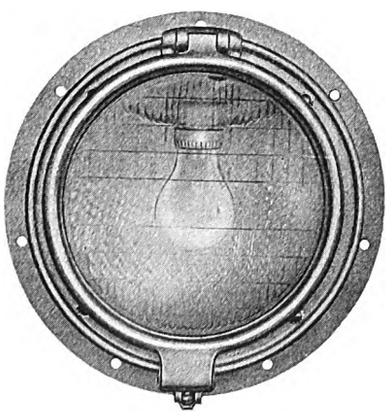
The Golden Glow Flood-Headlight has created much interest among operators





Side view of type FH-916 Flood-Headlight showing circular side lens.



Front view of type FH-916 Flood-Headlight which is equipped with a 9-inch diameter crystal prismatic glass reflector, in combination with a refracting lens.

In order to better meet conditions imposed by the ever increasing traffic on our main highways, and to make it easier for automobile drivers to immediately identify railway cars as cars, it is found desirable in many instances to provide more light on the dash. The Golden Glow Flood-Headlight was designed to fulfill this need by providing a well diffused beam for illumination of the track ahead, at the same time to floodlight the dash of the car. The illumination of the dash is sufficient to make easy the reading of advertising posters at night.

This headlight is ordinarily supplied to accommodate one lamp but is also supplied with two extra sockets where greater intensity of illumination on the dash is desired.

If you have not already received complete information on this headlight, please request same.

ELECTRIC SERVICE SUPPLIES CO.

MANUFACTURER OF RAILWAY, POWER AND INDUSTRIAL ELECTRICAL MATERIAL

Home office and manufacturing plant located at 17th and Cambria Streets, Philadelphia, Pa.; District offices are located at 111 North Canal Street, Chicago, Ill., and 50 Church Street, New York City.

Branches—Bessemer Bldg., Pittsburgh; 88 Broad Street, Boston; General Motors Bldg., Detroit; 316 N. Washington Ave., Scranton. Canadian Agents—Lyman Tube & Supply Company, Ltd., Montreal, Toronto, Vancouver.

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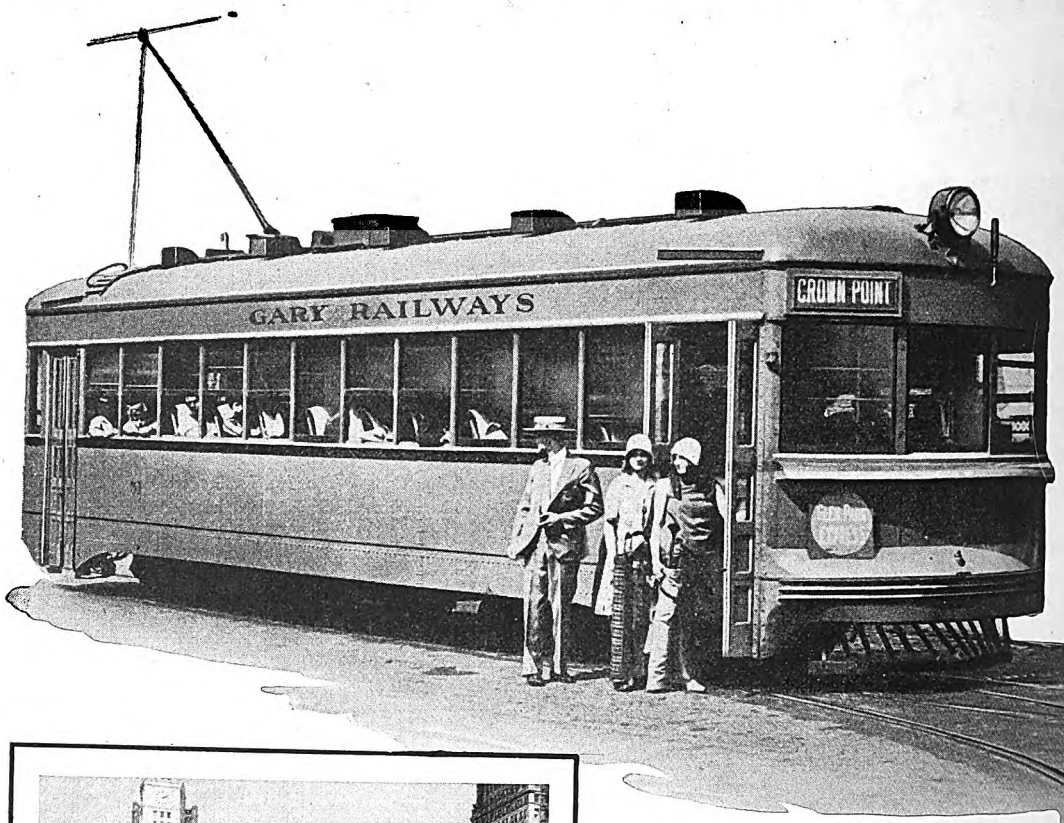
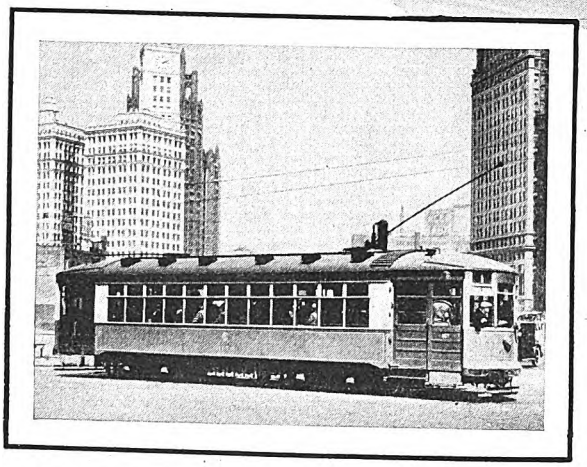
Coördinated



The Gary Railways Company of Gary, Ind., operates 72 G-E equipped street cars. Many of these are of the modern type with G-E motors, G-E control, and G-E air brakes.



The Chicago Surface Lines specified G-E air brakes and PCM control for 100 new cars. Forty are equipped with GE-301, low-wheel motors.

G-E equipped trolley buses are operating economically in Salt Lake City, Utah, Philadelphia, Pa., Cohoes, N. Y., Rochester, N. Y., and Manila, P. I.

PCM control, a recent development of the General Electric Company, provides automatically smoother and faster acceleration. For complete information, address the nearest G-E sales office.

GENERAL

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

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Service . . . .

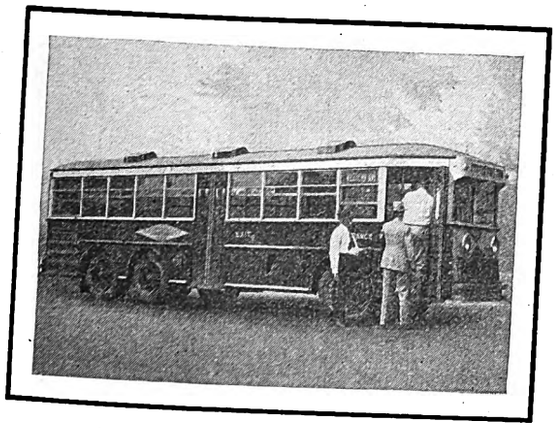
Increases Patronage
Reduces Operating Costs

THE MODERN STREET CAR, trolley bus, and gas-electric bus are equally important in their ability to attract riders, to serve them well, and to serve them economically. Each type of vehicle has its essential place in the modern coördinated system.

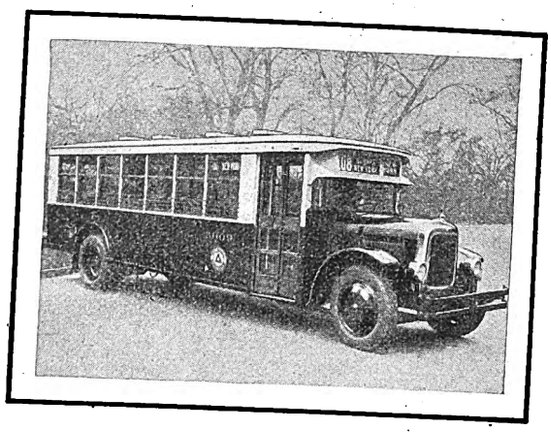
THE STREET CAR continues to be the most efficient carrier of crowds. For heavy traffic in large cities, it is the basis of an economical transportation system.

THE TROLLEY BUS is rapidly winning favor in the service of light-traffic areas. This trackless vehicle is quiet and powerful. It retains all the economies of electric power and it effects a substantial reduction in paving charges.

THE GAS-ELECTRIC has demonstrated its ability to conform to changing traffic demands. The public appreciates its fast schedule speeds. Operators profit from its long life and availability.



The Capitol District Transportation Company operates a fleet of 76 gas-electric buses in Troy and Albany, N. Y., where the routes are characterized by steep grades and heavy traffic. All the electric-drive equipment is of G-E design and manufacture.



The Public Service Coördinated Transport of Newark, N. J., operates more than 1000 gas-electric buses equipped with G-E electric drive. In the design and manufacture of this type of equipment, General Electric has consistently led the field.

GENERAL ELECTRIC

330-140

SALES OFFICES IN PRINCIPAL CITIES

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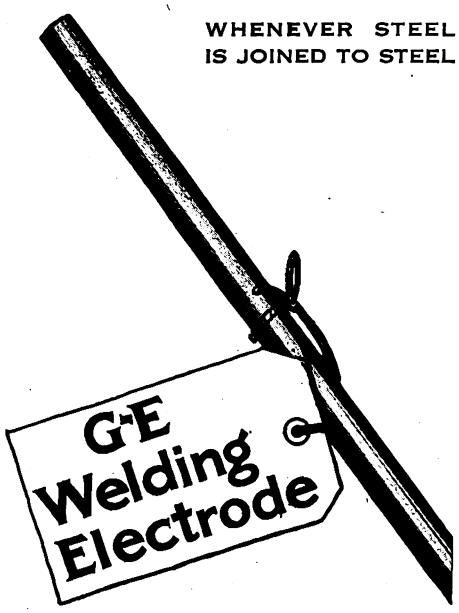
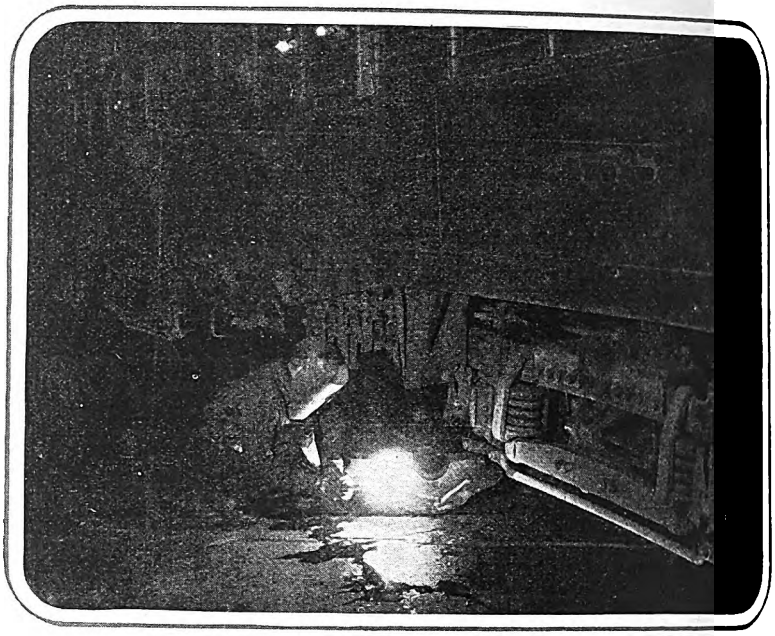
WHENEVER STEEL
IS JOINED TO STEEL





—preferred by railways

No single quality explains the reason why G-E Type "F" welding electrode is used by a large number of the traction companies in the country. Its general excellence for all kinds of *steel welding* makes it the favorite.

Few welding operations save more money than the building up of worn motor-armature shafts. Machinability, characteristic of Type "F", makes this welding application successful. Gear casings, motor casings, and bearing heads are other parts commonly welded with this electrode. Operators apply it from any angle. Its exceptional stability makes it possible to strike and hold an arc even on dirty surfaces. These characteristics make Type "F" electrode most desirable for repair work.

Learn more about G-E welding electrodes from the G-E Welding Electrode Distributor near you or write to Section E-5012, Merchandise Department, General Electric Company, Bridgeport, Connecticut.

For simplicity, reliability, and ease of operation, G-E arc-welding sets are unequalled. They are available in all sizes, all types—for either hand or automatic operation—for one or more operators.

550-515

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

MERCHANDISE DEPARTMENT, BRIDGEPORT, CONNECTICUT

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DON'T BREAK THE MOTORMAN'S SPIRIT

...*brake the car*

PEACOCK STAFFLESS BRAKES

Unreliable brakes place mental hazards on your operators.

Put yourself in the position of one of your motormen who is driving a car with inadequate braking equipment.

How efficiently could you meet schedules with such a handicap?

NATIONAL BRAKE COMPANY, Inc.

888 Ellicott Square, Buffalo, N. Y.

General Sales Office: 50 Church St., New York

Canadian Representative: Lyman Tube & Supply Co., Ltd., Montreal, Can.

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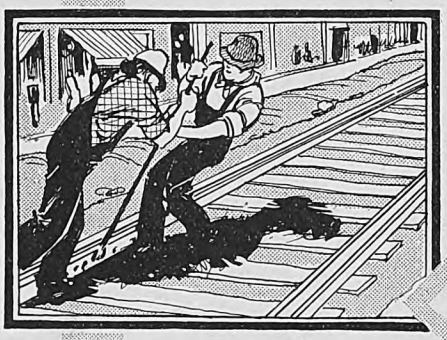
Which proves that it

THERMIT

1909 1914



Condition of joint 5 years after new rails were laid

It took only five years to produce the result shown above. And that was on brand new rails. The company could easily have patched this joint and smoothed it off. Then it would have been as good as new—for another brief period. But the "easiest way out" is not the cheapest in the long run.

Rather than patch this joint, the company wisely decided to Thermit Weld. That was fifteen years ago. Now observe the picture and story of the same joint on the opposite page.

METAL & THERMIT

PITTSBURGH CHICAGO BOSTON 120 BROADWAY

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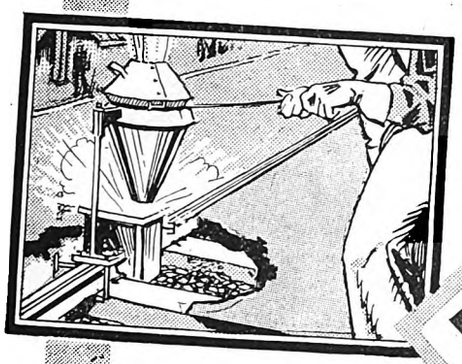
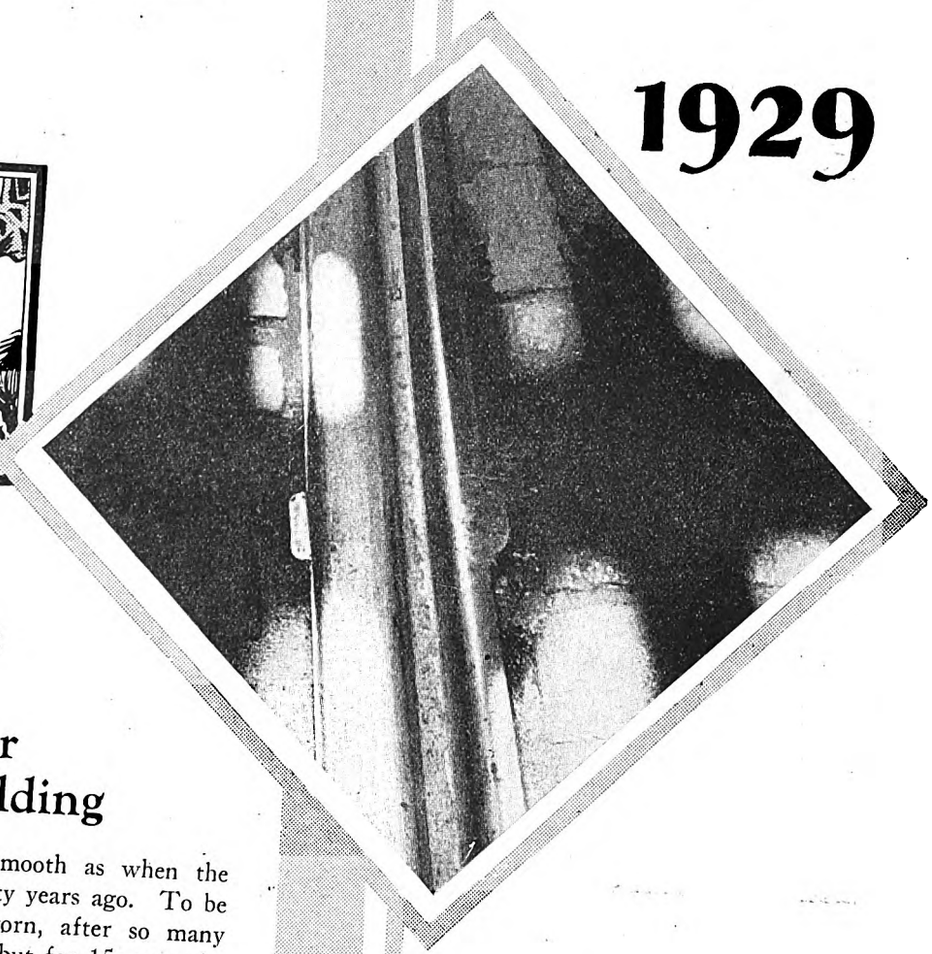
s tha pays to RM WELD

19 1914



1929



Condition of that same rail joint 15 years after Thermit Welding

Today the joint is smooth as when the tracks were laid twenty years ago. To be sure, the rails are worn, after so many years of heavy traffic, but for 15 years the pavement had been undisturbed,—the slight extra cost of Thermit Welding has been absorbed,—and what is more, the life of the rails has been extended many years to come.

Consider these facts when you are laying new rails or repairing worn joints. In either case, you'll find *it pays to Thermit Weld.*

Include a program of Thermit Welding in the

1930 BUDGET

CORPORATION

NEW YORK, N.Y. SOUTH SAN FRANCISCO TORONTO

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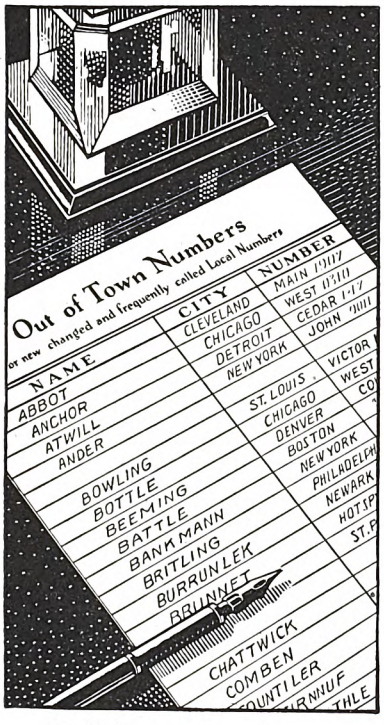
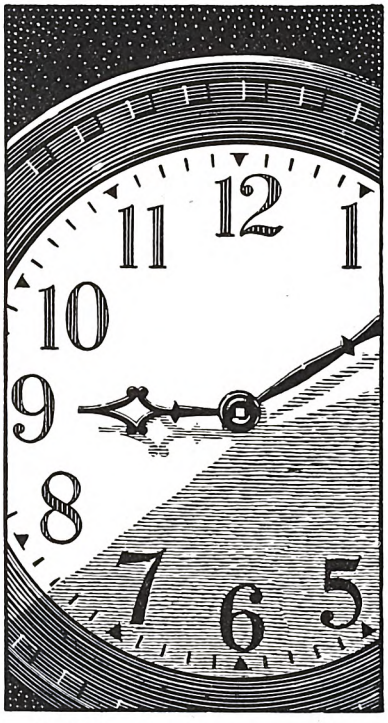
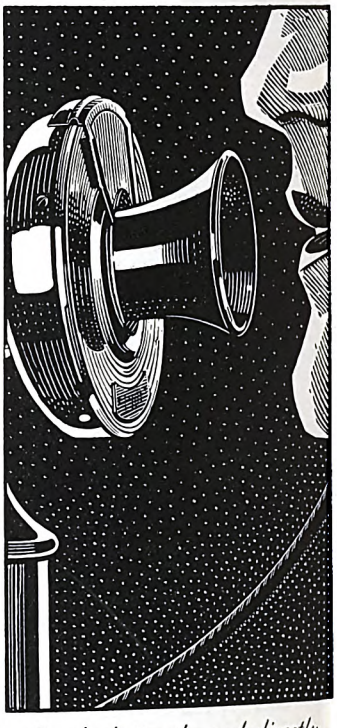
3 simple Suggestions for Telephoning between Cities



Call by number, whenever you can



Call during the less crowded hours of the business day



Speak distinctly and directly into the mouthpiece

Here are three simple suggestions that are almost sure to help you in getting the most out of your telephone calls between near and distant towns.

Call by number, whenever you can; it will save your time. It is useful to know the number, especially for calls that you may make frequently. "Information" will gladly give you the number of any person or concern you wish, so that you can make a note of it for the future. It is a convenience to your customers to print your own telephone number on your letterhead.

Make your calls when the men you want to reach are likely to be less busy. Try calling before 9.30 in the morning, between noon and 2, or shortly after 4.

Third, speak distinctly into the telephone, keeping your lips close to the mouthpiece. A natural speaking voice such as you use in talking to a man across your desk makes distant calls as clear as local calls.

Remembering these three points will make your telephone service easier and better than ever.

Inter-city calls are ideal for making appointments. Following up visits. Clearing away misunderstandings. Completing buying and selling transactions. Bell Telephone Service is *Convenient . . . Economical . . . Universal.*

AMERICAN TELEPHONE & TELEGRAPH CO. AND ASSOCIATED COMPANIES BELL SYSTEM

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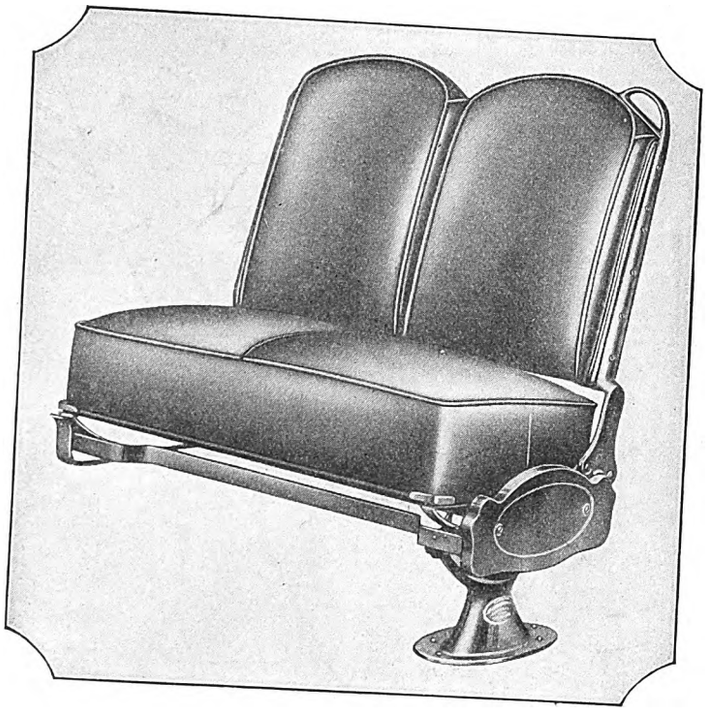
102 YEARS OF MANUFACTURING EXPERIENCE



Rattan car seat webbing may be ordered through any H-W sales office

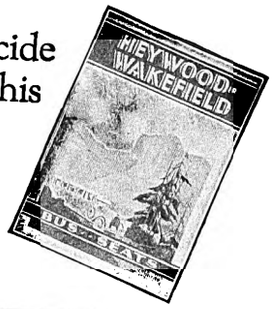
No. 327-M

FOR INTERURBAN NEEDS

THIS Heywood-Wakefield seat is designed for the modern type of interurban service where comfort is now so important. It has been selected for both new cars and for replacement use.

It has deep, double spring cushions shaped to allow more leg freedom. Mechanism rails are set in. The individual backs are properly pitched for comfort.

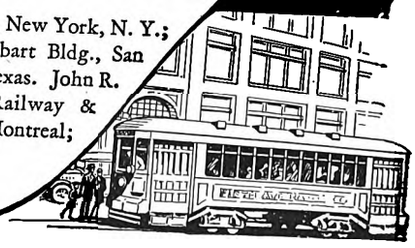
Our car seating experts will be glad to help you decide on the best seating equipment for your needs. This service is free through any H-W sales office.



If you have not received a copy of our new Bus Seat Catalogue, write for it.

Heywood-Wakefield
REG. U.S. PAT. OFF.

Heywood-Wakefield Company, Wakefield, Mass.; 516 West 34th St., New York, N. Y.; 439 Railway Exchange Bldg., Chicago, Ill. H. G. Cook, Hobart Bldg., San Francisco, Cal. The G. F. Cotter Supply Company, Houston, Texas. John R. Hayward, Liberty Trust Building, Roanoke, Va. The Railway & Power Engineering Corp., 133 Eastern Ave., Toronto; Montreal; Winnipeg, Canada.



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SAFETY

with GOODYEAR Type "K" Rims

IF at the critical moment, at high speed, *a front tire goes suddenly flat*—Goodyear Type "K" Rims stay locked to tire and wheel.

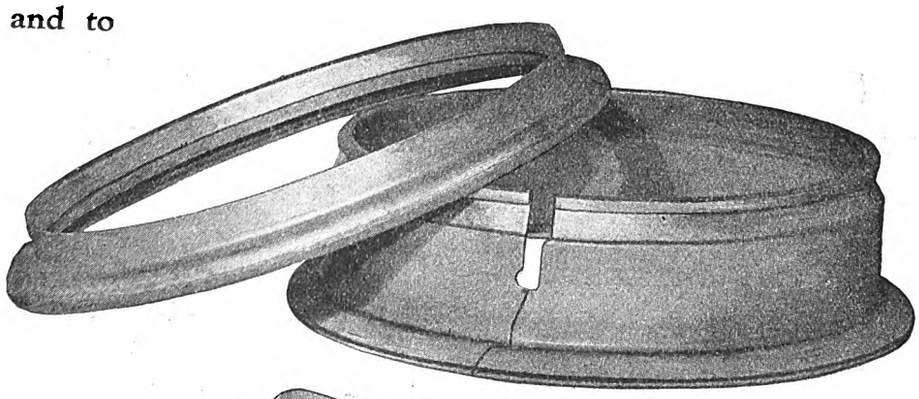
The tire remains on the rim under all conditions. The rim stays on the wheel. There are no loose parts or tires rolling away to do costly damage. With Type "K" Rims your trucks are *safe!*

The two sturdy rim members are locked positively together and to the wheel.

But when you *want* the rim apart, the rim collapses and the tire is off *in three minutes or less!*

Goodyear Type "K" Rims are strong, light, cool-running, easily operated, and *supremely safe* wheel equipment.

Write today to Goodyear, Akron, Ohio, or Los Angeles, California, for detailed information.



GOODYEAR

Copyright 1929, by The Goodyear Tire & Rubber Co., Inc.

TYPE "K" TRUCK AND BUS RIM EQUIPMENT

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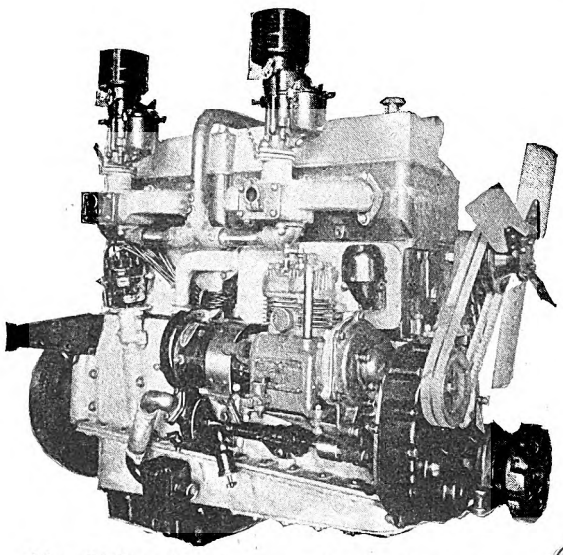
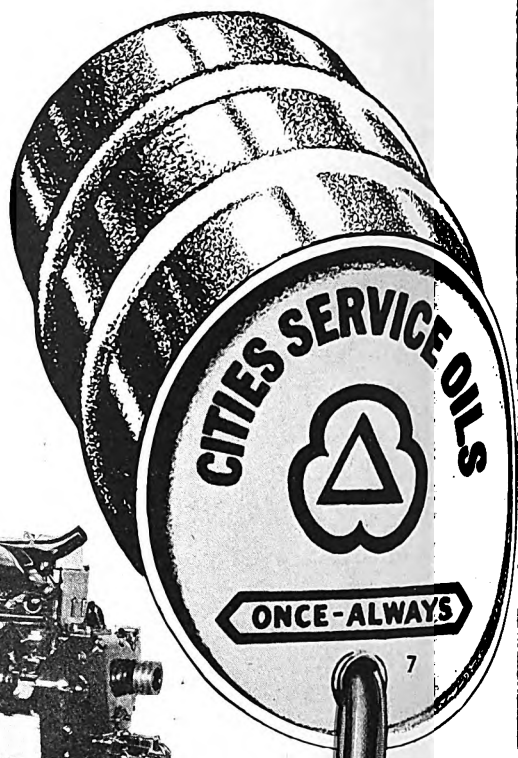
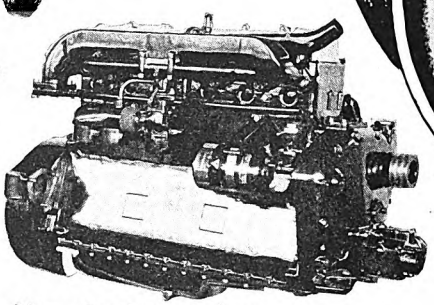
New Demands require greater

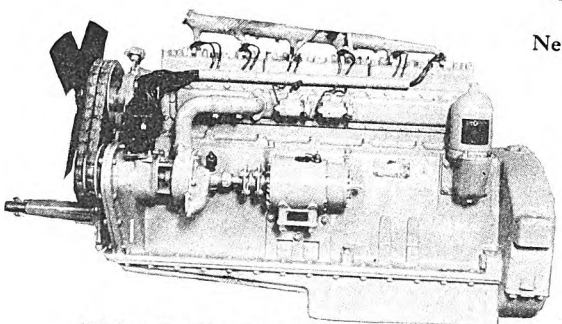


New Yellow 616 cu. in. overhead valve engine

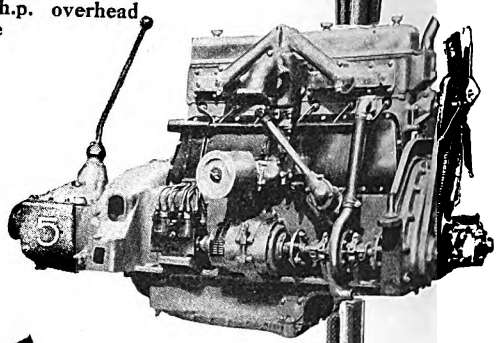




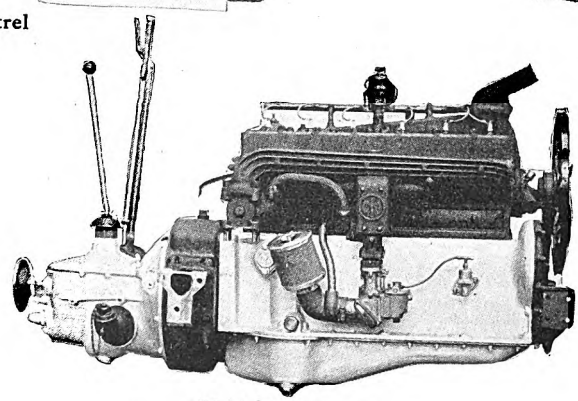
New Continental 150-h.p. overhead valve engine



150-h.p. Sterling Petrel



Model 54A White



Mack B C engine

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emaof Power Plants
greaOil Protection

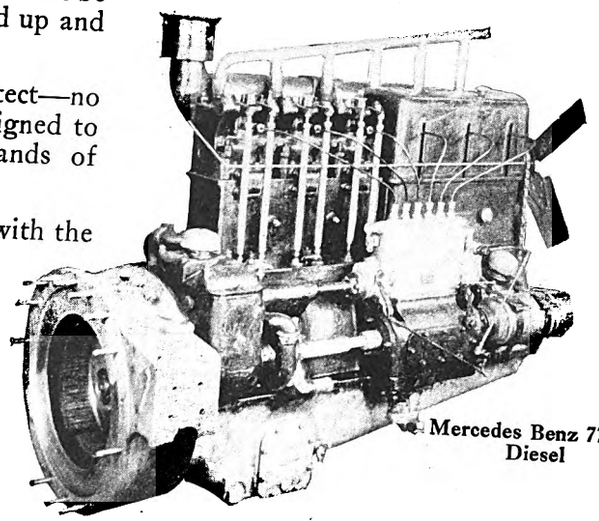
New heavy duty bus engines are designed to deliver 175 hp. in actual service.

When these tremendous power plants are called upon to deliver full power during long periods of operation, an abnormal strain is put upon the oil in use. The oil must be right—it must be rich, full bodied and able to stand up and protect under this gruelling service test.

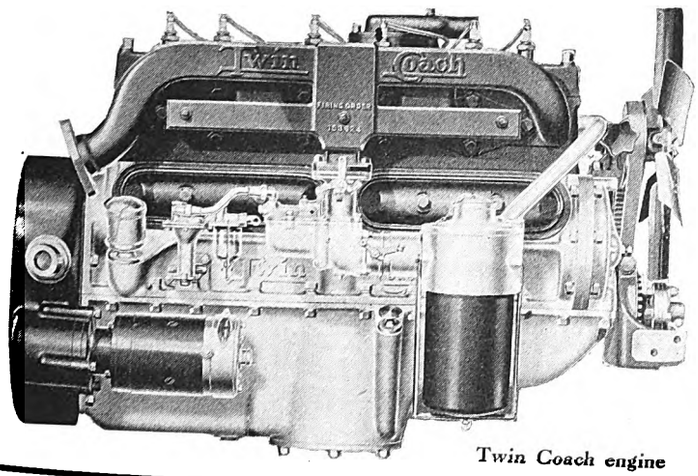
Koolmotor Bus Oils do stand up—they do protect—no matter how severe the requirement. They are designed to take punishment—to meet scientifically the demands of heavy duty bus engines.

Cities Service experts have kept in constant contact with the trend to larger and more powerful engines. As the need required, they have built into Koolmotor Bus Oils the extra quality required to meet the extra demands of service. Cities Service experts are authorities on bus problems.

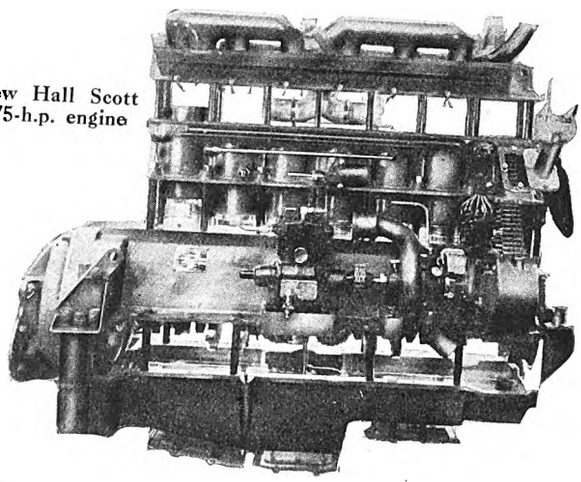
Expert advice on bus lubrication and operation is available to any operator who will request the consultation of a Cities Service engineering expert.



Mercedes Benz 77-h.p. Diesel



Twin Coach engine



New Hall Scott 175-h.p. engine

CITIES SERVICE COMPANY

60 Wall Street *New York City*

CITIES SERVICE OILS — ONCE · ALWAYS

KOOLMOTOR PRODUCTS

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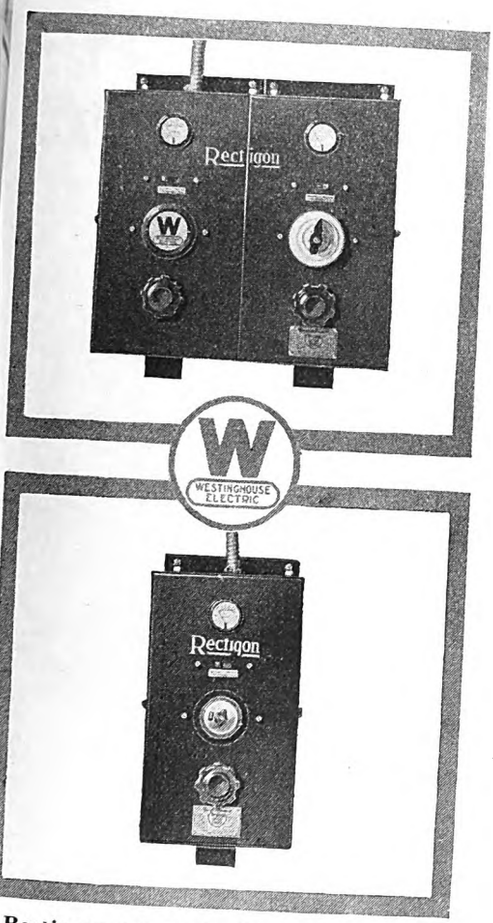
Lifetime costs determine profits



Rectigons are made in two sizes, 15 and 30 battery capacity, at $75 net and $135 net, respectively.

In the Rectigon, low first cost, low installation and maintenance costs, and low operating costs combine with high efficiency and long bulb life to keep lifetime costs at a minimum.

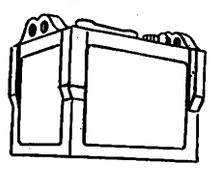
The Rectigon does not wear out, does not deteriorate, does not lose efficiency. The bulb, only, needs to be replaced at long intervals.

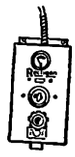
Let us tell you about the Rectigon. Let us show you the facts that prove that the longer you use a Rectigon the less you pay per hour for its operation. You will recognize that the features of the Rectigon make it the most economical method for battery charging. You will be interested in the booklet, "More Power to the Battery," explaining these features. Write for a copy.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
East Pittsburgh, Pennsylvania
Sales Offices and Service Shops in All Principal Cities

Westinghouse

Use only genuine Westinghouse Bulbs for replacements

. . . . each battery 

charged with this rectigon 

and this bulb gives you a lower charging cost

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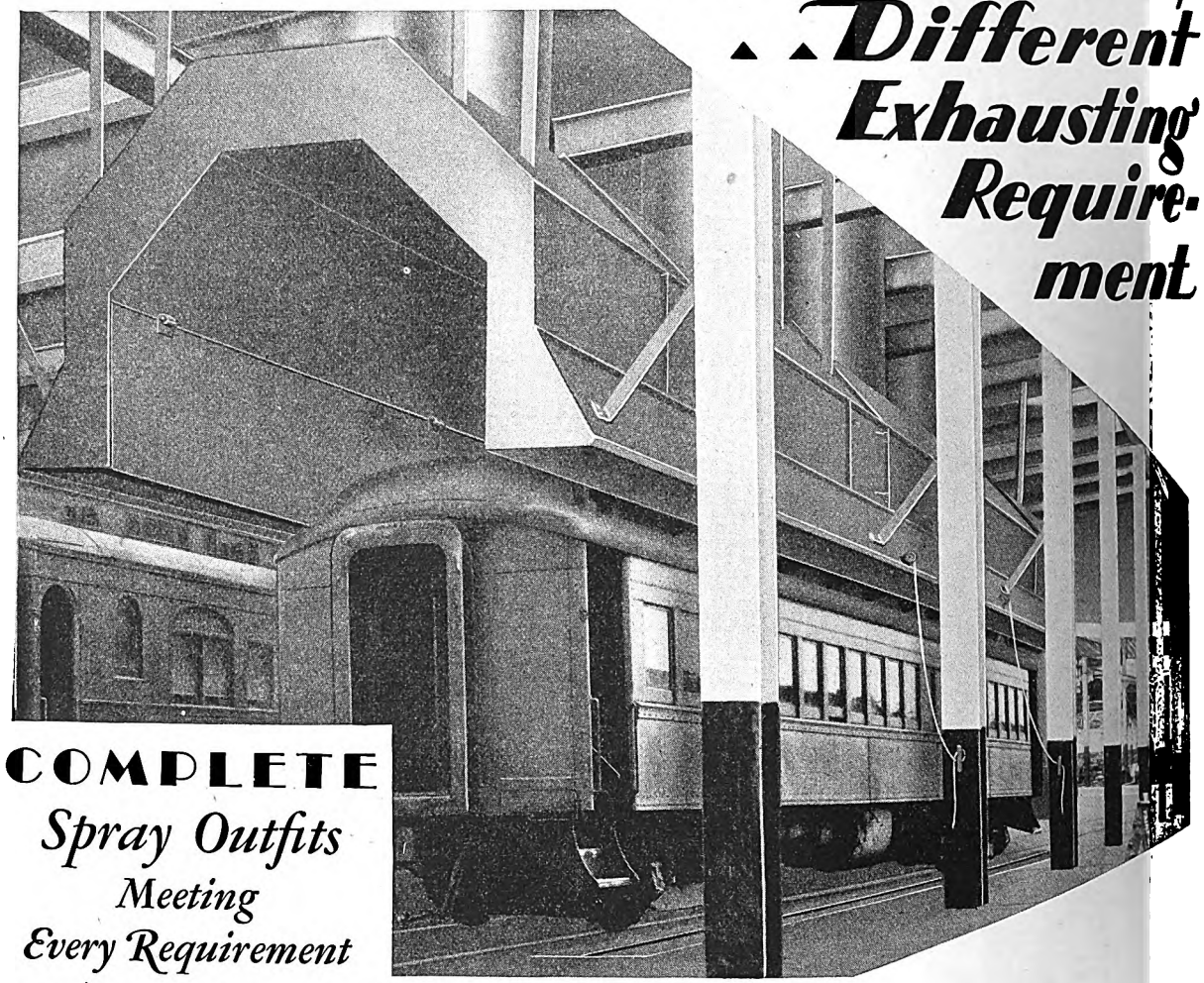
DeVilbiss Meets Every Different Exhausting Requirement



COMPLETE *Spray Outfits Meeting Every Requirement*

EVERY painting and finishing operation is served by specialized DeVilbiss spray outfits which are designed and built to do the particular work for which they are intended with the maximum economy of labor and materials.

Whatever may be your painting or finishing operation, look to DeVilbiss for:

Spray guns of various types and sizes.

Pressure feed paint tanks and containers.

Spray booths, exhaust fans, and approved lighting fixtures.

Air compressing equipment.

Air transformers and accessories.

Air and fluid hose and connections.

Complete outfits from the smallest hand-operated units to the largest industrial installations.

Write for catalog of the DeVilbiss spray equipment that fits your individual need.

EVERY different operation and industry engaged in spray-painting and spray-finishing presents different exhausting problems—often different plants or departments of the same general character demand highly individualized installations of exhausting equipment.

Specialized engineering ability, a long and vast experience with exhausting equipment in all industries, and an intimate, proved knowledge of the essential needs of every separate exhausting problem make it easy for DeVilbiss to provide maximum efficiency with the minimum of cost no matter how large or small, peculiar or different the exhausting requirement may be. It costs you nothing to learn how DeVilbiss can serve you in this particular. It may save you much.

DeVilbiss Spray-PAINTING FINISHING System

THE DEVILBISS COMPANY , 272 PHILLIPS AVENUE , TOLEDO, OHIO

Sales and Service Branches:

NEW YORK PHILADELPHIA CLEVELAND DETROIT INDIANAPOLIS CHICAGO
ST. LOUIS SAN FRANCISCO WINDSOR, ONT.

Direct factory representatives in all other territories

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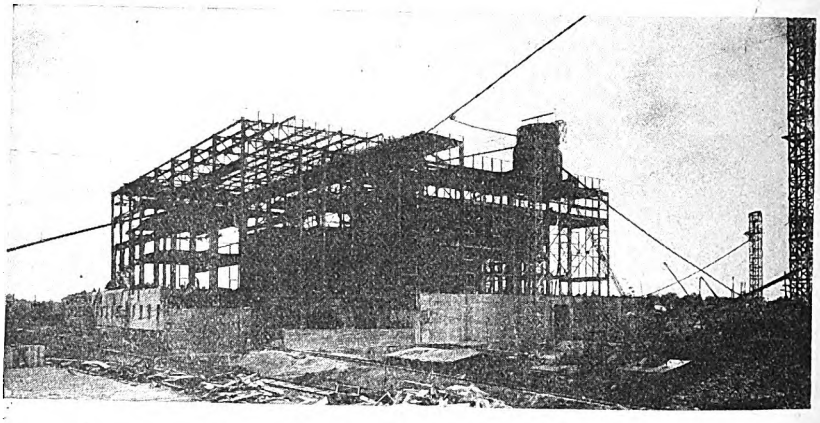
STRUCTURAL STEEL

Fabricated STEEL STRUCTURES

for every purpose



Progress Picture, Power Station

Fabricated Structural Steel by

AMERICAN BRIDGE COMPANY

Subsidiary of United States Steel Corporation

Manufacturers of STEEL STRUCTURES
of all classes, particularly

BRIDGES AND BUILDINGS

Roof Trusses, Columns, Girders, Towers and Poles, etc.

General Office . . . . . 71 BROADWAY, NEW YORK, N. Y.

Contracting Offices in Principal Cities

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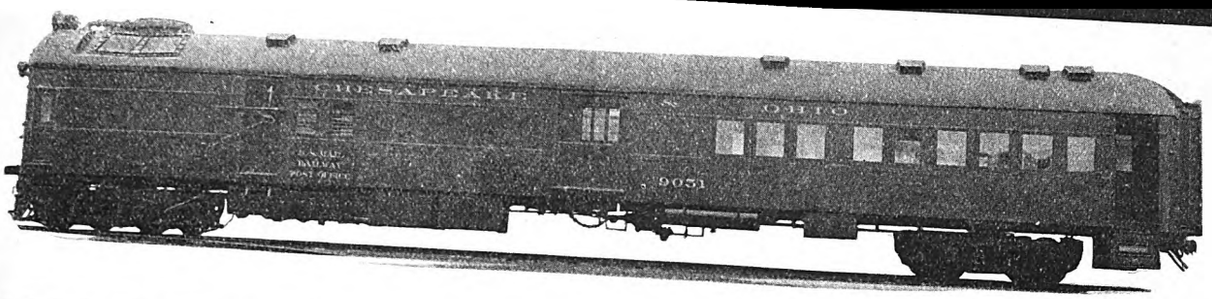

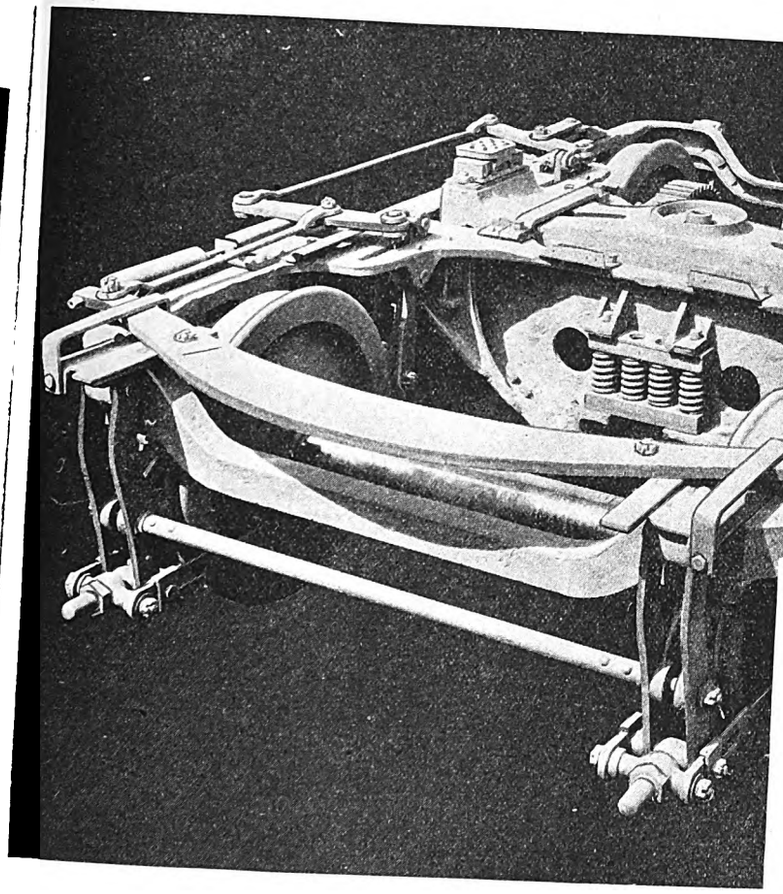

SIMPLEX CLASP BRAKES for GAS - ELECTRIC CARS

RAILROADS of the country are using American Steel Foundries Clasp Brakes for passenger equipment.

Greater retardation; reduction in brake shoe wear; desirable balancing of braking forces—all have proved the value of Clasp Brakes.

Gas-electric cars have increased in weight and size until they now are frequently larger than standard passenger cars. For these reasons, they, too, need Simplex Clasp Brakes. Clasp Brakes are applicable to Gas-Electric Car Trucks and should be included in your specifications.

AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

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LEADERSHIP

After Competitive Tests

The Delaware, Lackawanna & Western R.R. Company's order for 12,126 Electric Car Heaters (G. E. Enclosed Element) *with* Thermostatic Control To equip all of their cars for electric service with

3000 Volt Car Heaters

WAS AWARDED

Consolidated Car Heating Co., Inc.

This will be the first installation of 3000 volt D.C. Car Heaters, and is the LARGEST ORDER EVER PLACED for ELECTRIC CAR HEATERS.

Consolidated Car Heating Co.
INCORPORATED
New York Albany Chicago

Digitized by Google

SHELL oils and greases are not sold on price. Yet, measured by performance, they are probably the least expensive lubricants you can buy.

Shell lubricants are *exactly* suited for the work they must do. Shell engineers do not have to recommend stock oils—which at best only *approximate* specific lubrication requirements.

This policy of suiting lubricant to machine is possible because of the vast resources and unlimited facilities of the Shell organization. It accounts for the widespread and growing use of Shell oils* and greases in transportation as well as every other industrial service.

Talking over your needs with the Shell representative when he calls places you under no obligation . . . and more than likely will result in measurable operating and maintenance economies for you.

SHELL PETROLEUM CORPORATION
SHELL BUILDING , , , ST. LOUIS

*Shell Motor Oil is made in correct grades for every bus, truck and automobile engine. It is the one oil which possesses all 4 essentials of complete and proper lubrication.

1. Ideal Body at All Operating Temperatures
2. Low Carbon Content
3. Non-Fouling Carbon
4. Low Pour Point

OILS FOR EVERY INDUSTRIAL AND TRANSPORTATION SERVICE

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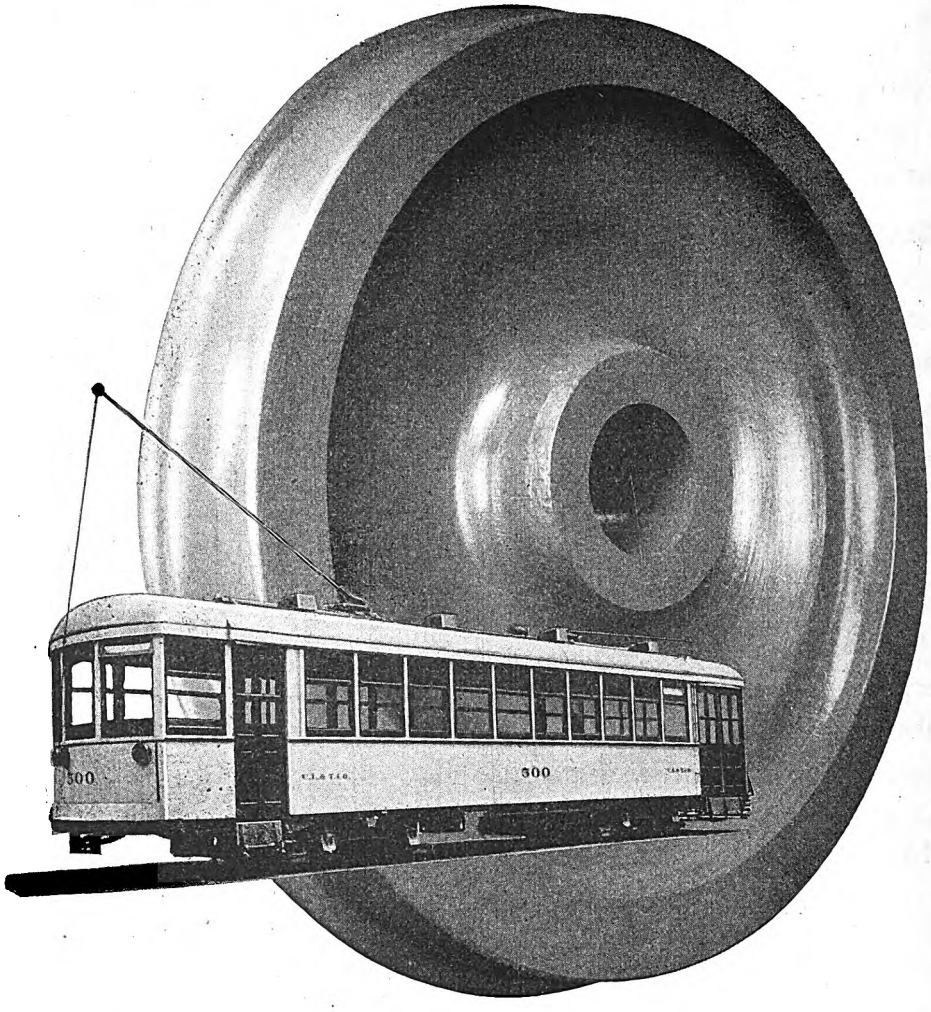

THE speeds and loads of modern street railway traffic bring out the advantages of "Standard" steel parts.

PRODUCTS

Rolled Steel Wheels

Armature Shafts

Axles and Springs

STANDARD STEEL WORKS COMPANY

CHICAGO
NEW YORK
RICHMOND

PHILADELPHIA, PA.
WORKS: BURNHAM, PA.

ST. LOUIS
PORTLAND
SAN FRANCISCO

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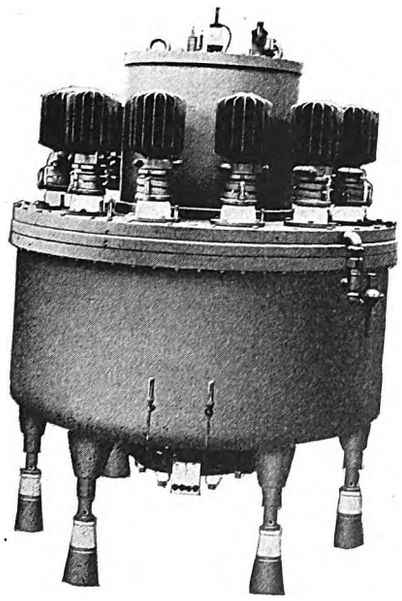
The "DIE-HARDS" stuck to the pen—

Not for them the clatter and fuss of the typewriter and the adding machine. They had learned their Spencerian hands too laboriously. Penmanship was their asset, their investment. Die-hards have always believed that whatever is—is right.

To the "DIE-HARDS" in the electric railway industry—



The American Brown Boveri mercury arc power rectifier is the modern equipment for converting current just as the typewriter is the modern implement for writing. It converts current without noise, without vibration, without rotating parts, without special buildings, and without special foundations.

Its operation may be completely automatic and it may be controlled from a distance. At our Camden plant are engineers who figured prominently in the early development of the rectifier. Their services are at your disposal.

ABB

American Brown Boveri Co., Inc.
Camden, N. J.

AMERICAN BROWN BOVERI

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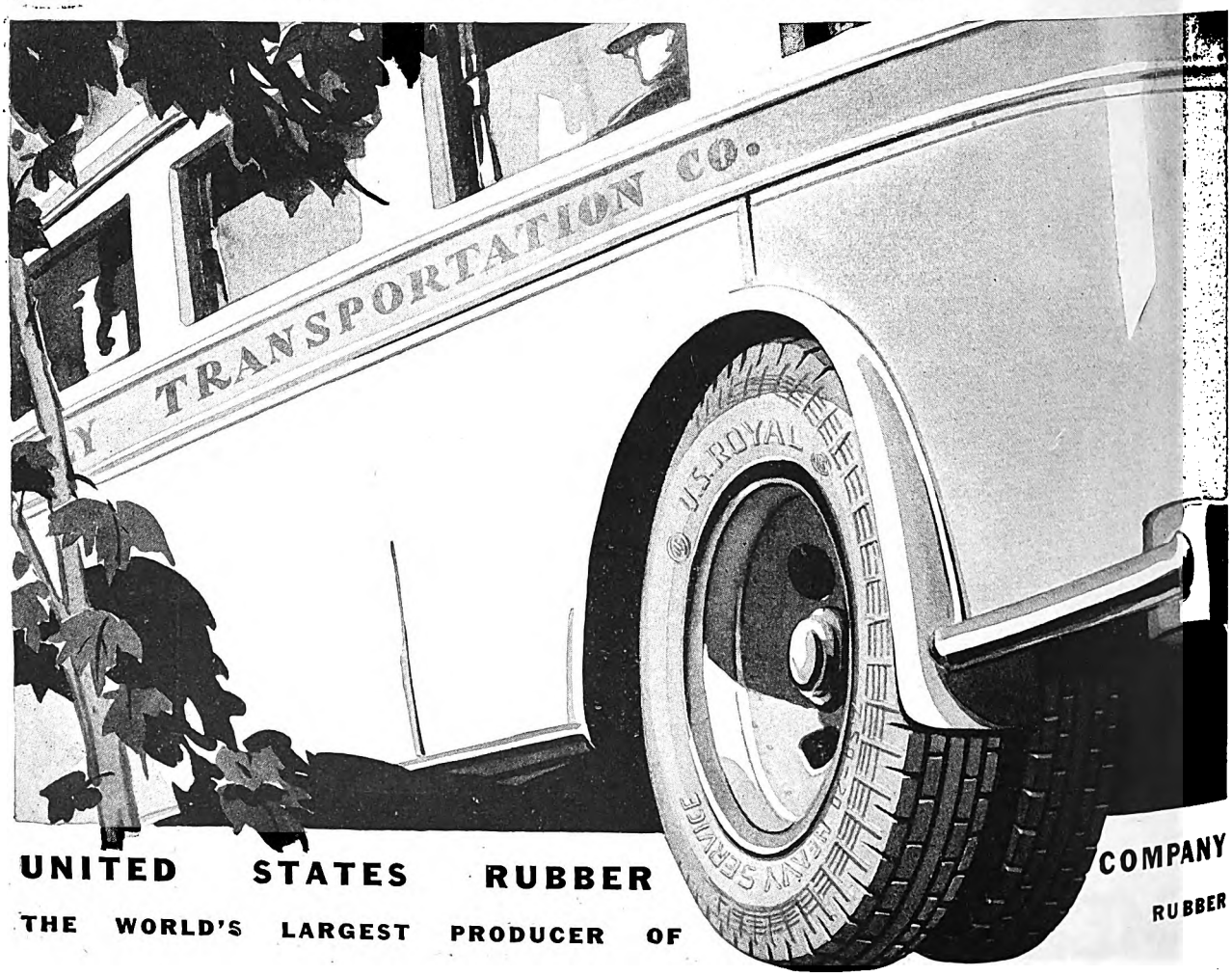
REGULAR EQUIPMENT ON AMERICA'S FINEST, AND FASTEST TRUCK AND BUS FLEETS . . .

Truck and bus fleet operators are hard to convince. They believe only what they prove — by exhaustive tests. Then they stand by the facts revealed. That is why these new U. S. Heavy Service Tires are regular equipment on America's finest, fastest fleets of trucks and buses. For these tires always come through with colors flying! If you have a tire problem, call the local U. S. dealer. He not only has a complete line of balloons and high pressure tires to show you, but he has a wealth of information to impart to you.

U. S. ROYAL HEAVY SERVICE TIRES



UNITED STATES RUBBER COMPANY

THE WORLD'S LARGEST PRODUCER OF RUBBER

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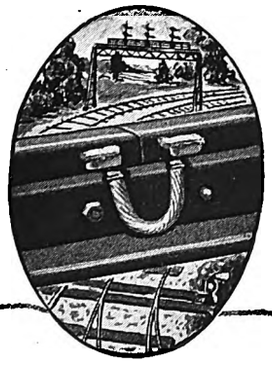
Greetings

from

American Steel & Wire Company

Again the Yuletide, with its inspirations of good cheer is with us—the New Year approaches—and we sincerely extend to you our very best wishes for a very MERRY CHRISTMAS and a HAPPY, PROSPEROUS NINETEEN THIRTY»»»

Rail Bonds



American Steel & Wire Company

SUBSIDIARY UNITED STATES STEEL CORPORATION

208 S. La Salle Street, Chicago

30 Church Street, New York

Other Sales Offices: Atlanta Baltimore Birmingham Boston Buffalo Cincinnati Cleveland Dallas Denver Detroit Kansas City Memphis Milwaukee Minneapolis-St. Paul Oklahoma City Philadelphia Pittsburgh Salt Lake City St. Louis Wilkes-Barre Worcester

U. S. Steel Products Co.: San Francisco, Los Angeles, Portland, Seattle, Honolulu

Export Distributors: United States Steel Products Co., 30 Church St., New York City

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Insure Against Faulty Lubrication

TULC LUBRICANT made especially for lubrication of electric railway equipment, gives the assurance of good lubricating results.

TULC—reduces number of hot bearings

saves in the cost of maintenance

lengthens the oiling periods

Lubrication is as important as equipment and the use of TULC LUBRICANT is productive of ultimate lubricating results.

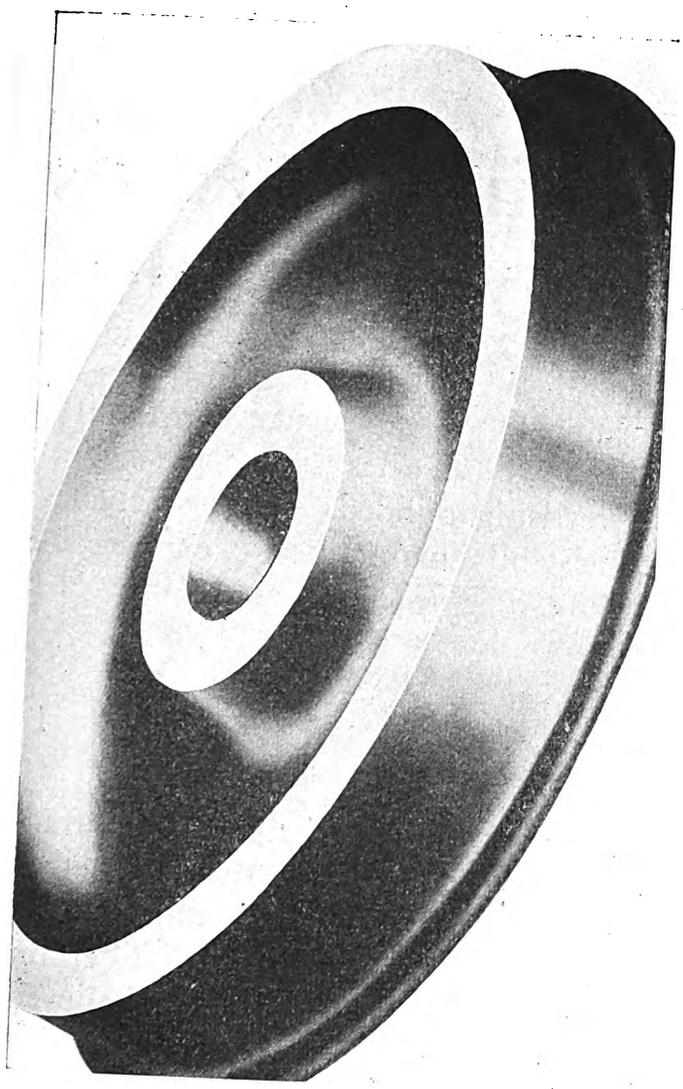
The UNIVERSAL LUBRICATING CO.
CLEVELAND, OHIO

MAKE A TEST OF

TULC

Digitized by Google

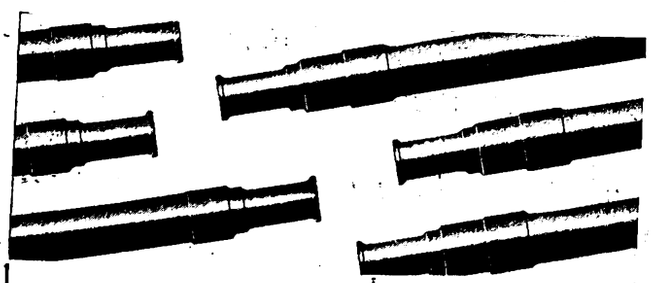
Modern wheels for modern traffic



In this day of heavy, congested traffic, wheels on electric railway cars are naturally subjected to increasingly severe service, greatly reducing the life of wheels made by ordinary methods.

The Bethlehem Wrought Steel Wheel has the strength, endurance and wear resistance to stand up and deliver exceptional mileage under these severe traffic conditions. Five distinct forging and rolling operations are required to make a Bethlehem Wheel. The forging gives the metal toughness and density; the rolling establishes a uniform grain structure throughout the wheel, virtually eliminating crystallization in the flange and tread and reducing the possibility of breakage.

In addition to the liberal margin of safety, due to their great strength, Bethlehem Wrought Steel Wheels cost less per mile because of the far greater mileage that they give. Write for descriptive literature.



FORGED AXLES

Extreme care is exercised in the manufacture of Bethlehem Axles. Special heat treatment gives them ductility and a high elastic limit. They give excellent service under severe torsional stresses.

BETHLEHEM STEEL COMPANY

General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Detroit, Cincinnati, Chicago, St. Louis, San Francisco, Los Angeles, Seattle, Portland, and Honolulu.

Bethlehem Steel Export Corporation, 25 Broadway, New York City
Sole Exporter of our Commercial Products

BETHLEHEM
Wrought Steel Wheels *and* Forged Axles

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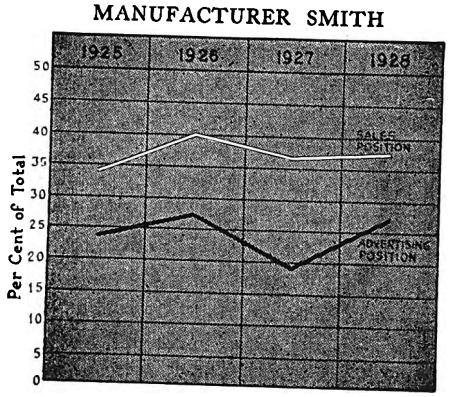
This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

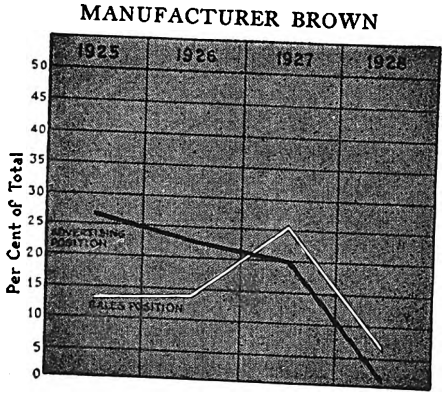
Does advertising schedule have anything to do with sales?

MANUFACTURER SMITH



These charts, compiled by McGraw-Hill, present the sales and advertising history of two competitors making the same kind of product and selling it to the same market through the same two publications.

MANUFACTURER BROWN



The white curve shows each manufacturer's share of total sales in the particular industry. The black curve shows how much of the total competitive advertising (on a page basis) each manufacturer used in this market.

Yes, according to the experience of Manufacturer Smith whose sales staff from top to bottom is advertising minded. Smith's schedule has been consistently maintained over a period of years in every issue of two McGraw-Hill publications.

* * * *

Yes, according to the experience of manufacturer Brown whose sales executives are not so advertising minded. Brown's schedule in the same publications was consistent up to a certain point and then sharply curtailed. He believed that product quality would take care of most of his future sales.

Printers' Ink says succinctly: "The way to make money by using advertising is to use it — not to fiddle with it." Do not these two experiences from the industrial field endorse this as something stronger than theory?

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit St. Louis
Philadelphia Greenville San Francisco
Boston London

F-19

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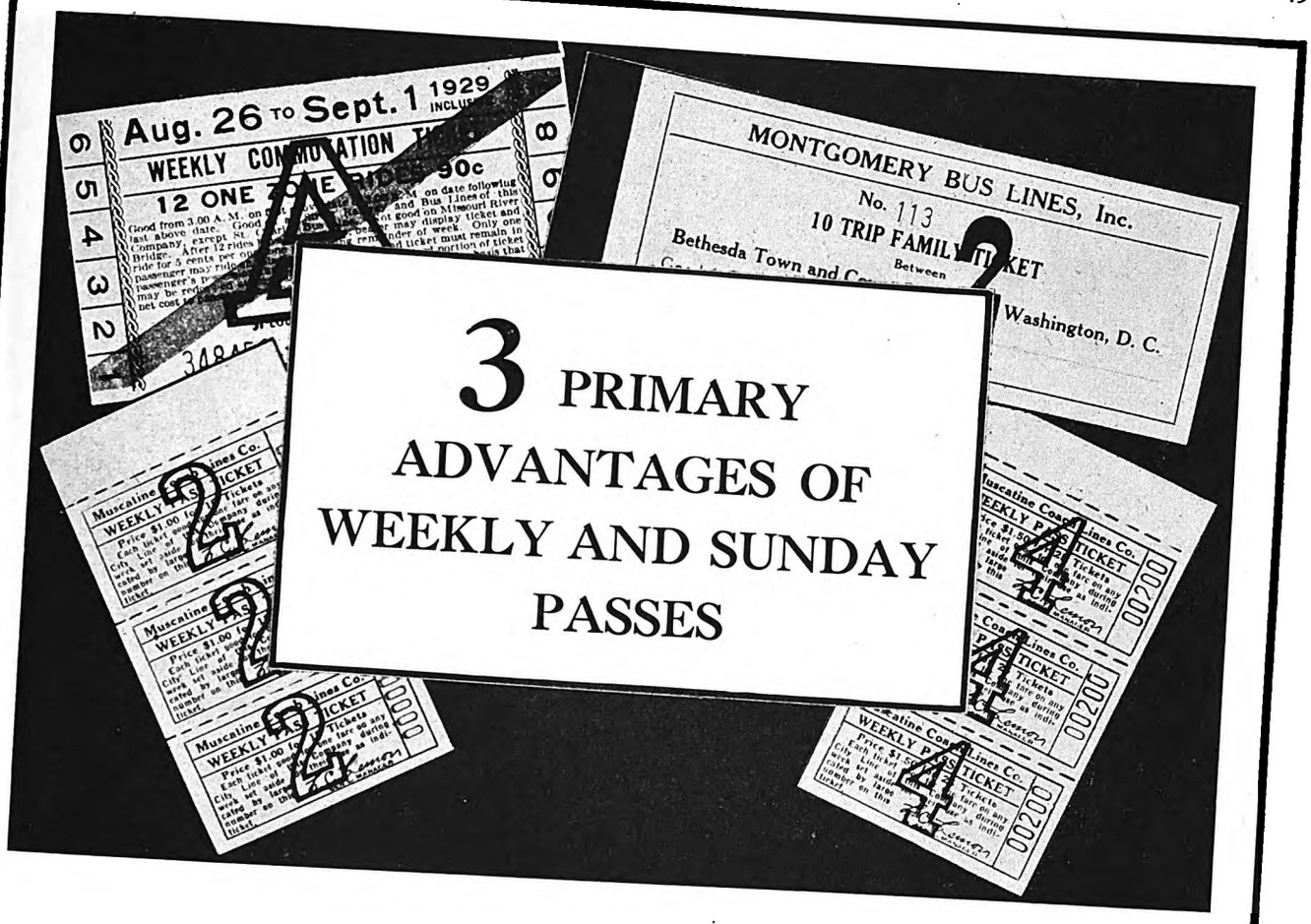

1. Increase riding; especially at off-peak hours—filling those empty seats at no extra cost.

2. Assure revenue whether pass is used or not—and each pass means money in advance.

3. Speed up schedules by faster loading through reduction in change-making. A decided advantage with one-man operation.

One case not so long ago, brought out the seemingly remarkable fact that off-peak riding due to the new weekly-pass had increased over 400%.

On the same property, Sunday Passes increased Sunday riding 600%!

Actually there is nothing amazing about it. It is simply the result of two "complexes" of the riding public—the bargain instinct and the urge to make use of "left-overs." In other words a person with a weekly pass having a few rides left will let his family use the pass or will himself use it up on the last few days during off-peak hours. The Sunday pass, in connection with judicious timely car card suggestions, will increase Sunday riding for the same reason.

Let us give you complete details.

Globe
TICKET COMPANY
PHILADELPHIA

FACTORIES:
Philadelphia, Los Angeles — Boston — New York, Jacksonville — Syracuse, Baltimore

SALES OFFICES:
Cincinnati, Cleveland — Pittsburgh, Springfield, Mass.

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WE STILL RUB IT IN!

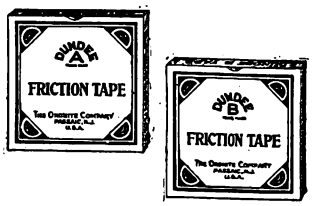
THE rubber adhesive compound of Dundee Tape is vigorously rubbed into the strong cotton fabric. Compound and cotton are thus frictioned into a homogeneous product which is far superior to any tape made by the spreading process.

This frictioning method is old fashioned; in fact it is so old fashioned that friction tape originally took its name from the process. In spite of modern machinery and faster production, frictioning remains the ONLY way thoroughly to impregnate the fabric of friction tape.

The OKONITE Company clings to the reliable friction process to make Dundee Tape. That is the reason Dundee Tape clings to the parts upon which it is wrapped.

Okonite Products
OKONITE INSULATED WIRES AND CABLES
VARNISHED CAMBRIC CABLES
OKONITE INSULATING TAPE
MANSON and DUNDEE FRICTION TAPE
OKONITE CEMENT
OKOCORD
OKOLOOM

Okonite-Callender Products
IMPREGNATED PAPER CABLES
SUPER-TENSION CABLES
SPLICING MATERIALS



THE OKONITE COMPANY

Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC.
Factories: Passaic, N. J. Paterson, N. J.

SALES OFFICES:
NEW YORK CHICAGO PITTSBURGH ST. LOUIS BOSTON ATLANTA
BIRMINGHAM SAN FRANCISCO LOS ANGELES SEATTLE DALLAS

Novelty Electric Co., Philadelphia, Pa.
F. D. Lawrence Electric Co., Cincinnati, O.

Canadian Representatives:
Engineering Materials, Limited, Montreal

Cuban Representatives:
Victor G. Mendoza Co., Havana

OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

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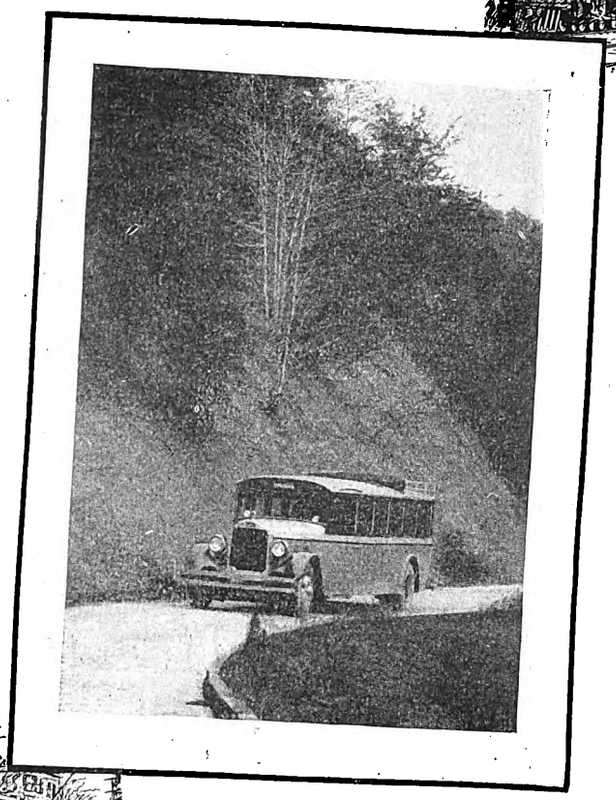
The Goal of Transportation . . . More Passenger-Miles



WESTINGHOUSE AIR BRAKES are *Efficient Helpers*

THAT which stimulated evolution of the wooden coach "two-a-day" train into a high speed all-steel express... that which promoted growth of the "toonerville trolley" to the fleet and comely street car... has in recent years permitted the common "jitney" to metamorphose into a lordly motor coach.

The railroads for three score years, electric railways for two score, and bus systems now for almost a decade, have felt its influence. Their present-day carrying capacity as measured in billions of passenger-miles annually, is due in no small degree to Air Brake control.

Bus operators are in the business to carry more passengers more miles. Their objective is safe, comfortable, and swift miles of transportation. A vital factor in its attainment is the Air Brake.

Ability to make short stops without driver fatigue or rider discomfort, and continued assurance of adequate control, enable even large capacity buses to run at economy-promoting speeds in safety.

That power brakes are necessary to give modern motor coaches the capacity for profitable passenger mileage is gaining recognition from year to year. More operators are wanting Westinghouse Air Brakes—more manufacturers are supplying that want.

WESTINGHOUSE
AUTOMOTIVE AIR BRAKES

WESTINGHOUSE AIR BRAKE COMPANY
AUTOMOTIVE BRAKE DIVISION PITTSBURGH, PENNA.

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Living for and not off the Industry....

This expression, used recently of Electric Railway Journal by a well-known electric railway executive,* expresses exactly the guiding policy of the paper during its more than 40 years of service to the Industry.

In those seven words lies the reason why Electric Railway Journal has always been received in the light of a friend and counselor. Behind them is the spirit which was responsible for the recent presentation to this paper of the first Associated Business Papers' Award established in 1927 for Outstanding Editorial Service.

Electric Railway Journal

*Mr. Walter A. Draper, President,
The Cincinnati Street Railway Company.

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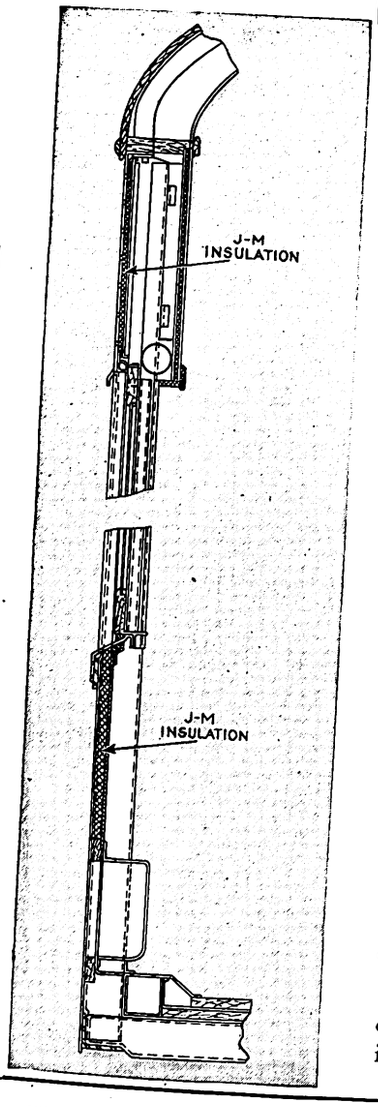
Pittsburgh Railways Company provides comfortable transportation for its passengers in many ways. The principle of car body insulation employed in these cars is in keeping with the spirit of modernity expressed by the comfortable seating arrangement shown here. Below is cross section diagram of J-M Insulation as applied to the body of a car.



Give *your* riders the *quiet comfort* of J-M Body Insulation

Rubber wheels cannot be used on high speed electric cars but the grinding noise of steel wheels, as well as car vibration can be largely excluded from the interior of the car by the use of J-M Insulation. This has been proved in actual operation. On one system alone, nine hundred high speed electric cars insulated by Johns-Manville are providing greater riding comfort for millions of passengers.

This insulation not only affords greater traveling comfort by keeping cars warm during cold weather, at reduced fuel cost, but it provides quieter operation and increased car comfort for passengers all year round.

In all types of electric railway equipment, the reduction of noise is becoming increasingly important. One street railway on the Pacific Coast has found the sound-absorbing quality of J-M Insulation an important asset in attracting passengers to its line.

J-M INSULATION *for* Cars *and* Buses

For many years J-M Insulation has been the standard insulation on steam railroad cars throughout the country. Its adoption by electric railways and bus operators has also grown rapidly to meet the higher standards of today set by a traveling public that demands every reasonable comfort.

J-M Insulation does not rot, pack down, or deteriorate. It retains its high initial insulating value long after inferior insulation has had to be replaced. It is easy to apply. It can be flanged around window posts, braces, carlines, purlins, uprights or any irregularities in sides, ends or roof framing, and can be curved to the radius of the decks.

Johns-Manville Insulation will play an important part in the reduction of excessive noise, and will afford protection during periods of extreme temperatures.

JM JOHNS-MANVILLE CORPORATION

Johns-Manville

SERVICE TO TRANSPORTATION

JOHNS-MANVILLE CORPORATION
New York Chicago Cleveland San Francisco Montreal
(Branches in all large cities)

Please send me full information in regard to steel car insulation.

Name.....

Address.....

TS-115-12

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This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

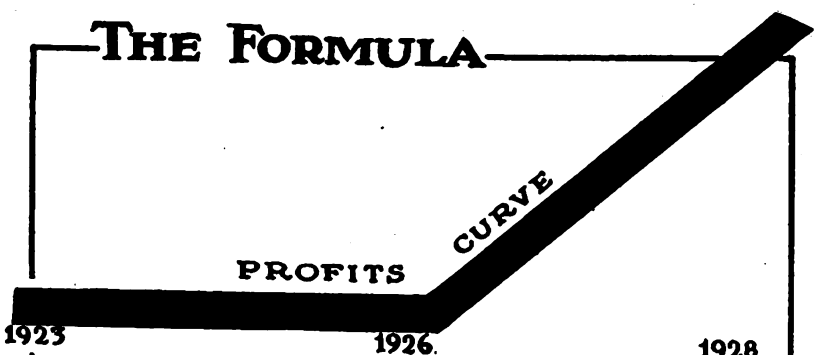
PATENTS EXPIRING!

what'll we do?
what'll <u>others</u> do?

BASIC patents on a machine used extensively by a specific industry were owned by the ABC Corp.

The XYZ Co. also made the machine, along with other products, paying the ABC people a royalty for every machine sold. The XYZ Co. chose to stay in business without making a practical profit on this particular product. *Why?*

Two years or so ago the patents expired. The expected happened. Dozens of manufacturers turned to making the machine. But instead of diminishing sales for the XYZ Co., there came increased sales, pyramiding profits and leadership in the field. This leadership is being maintained today by the same formula that was used steadily for three years before industry-at-large was free to make the machine.



During this three-year period, when XYZ's profits were barely enough to pay the patent owners, XYZ advertised regularly in McGraw-Hill Publications—building recognition for the future—intrenching themselves in a strategic position for the *post-patent period*.

Pyramided effects of continous industrial advertising sent sales and profits constantly upward after patents expired. A sustained advertising program of full and double pages, with pithy, factful copy, is keeping the XYZ Co. in top place. A clear-cut victory—not so much for McGraw-Hill publications but for Industrial Advertising strategically applied.

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St. Louis
Greenville San Francisco Boston London

P-15

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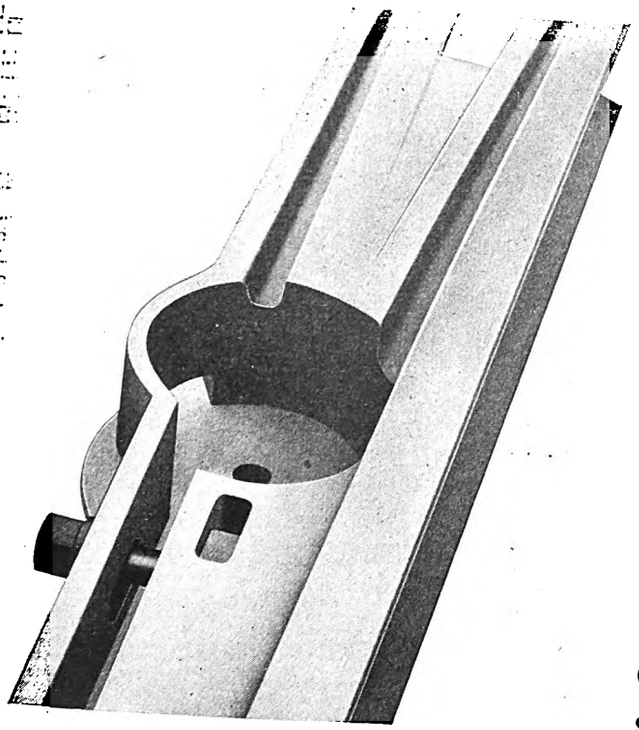
THE NEW WHARTON SWITCH

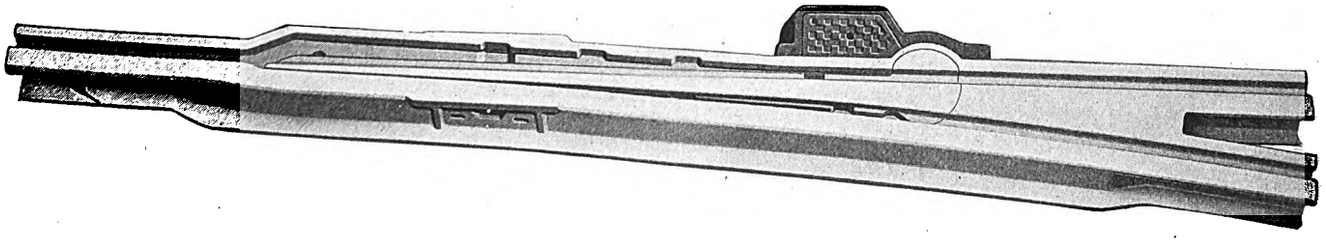
Designed For Minimum Maintenance.

...no kick-up...no moving forward no holding-down device



The Wharton Flexible Wall Switch has a heel tightening device based on the principle of a split collar. By means of a bolt the wall is flexed or drawn in until it hugs the tongue heel; thus all play caused by wear is taken up. The nut of this bolt is located in the drain box and is readily accessible.

The tongue pin is 9½" in diameter and is 6" deep. This construction eliminates a holding-down device, prevents kick-up and forward movement of the tongue.



WM. WHARTON JR. & CO. INC.

EASTON, PA.

NEW YORK
PHILADELPHIA
BOSTON

PITTSBURGH
SAN FRANCISCO
EL PASO HOUSTON

CHICAGO
SCRANTON
MONTREAL

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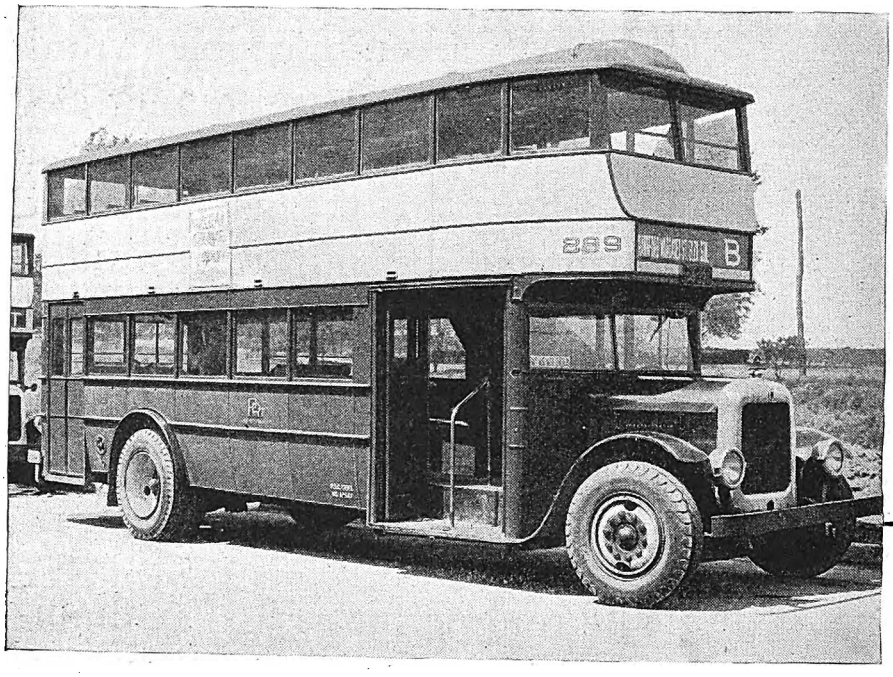
ONE OF THE LARGEST BUS TRANSPORTATION COMPANIES IN THE UNITED STATES

Equips its Busses Exclusively with Goodrich HEAVY DUTY Silvertowns



Stairways forward, one man operation, Goodrich fender flaps and Goodrich Heavy Duty Silvertown pneumatic single tires on fronts and dual pneumatics on rears are some of the operating efficiencies featured on this new P.R.T. Line's (under Mitten Management) Philadelphia, Pa. double deck busses.

"SPEED . . . uninterrupted service . . . comfort"—these are axioms on the P.R.T. And the qualities that make for speed, uninterrupted service and comfort are the qualities that are built into Goodrich Heavy Duty Silvertown Bus Tires.

On the basis of actual mileage delivered the third largest bus line in the United States operates its busses exclusively on Goodrich Heavy Duty Silvertown Tires.

Over six hundred busses used in both city and interurban bus transportation service are Silvertown equipped.

Speed up your own busses. Give your patrons uninterrupted service. Equip your busses with Goodrich Heavy Duty Silvertown Bus Tires . . . for comfort, for efficiency, for economy!

The B. F. Goodrich Rubber Company, Established 1870, Akron, Ohio. Pacific Goodrich Rubber Company, Los Angeles, Calif. In Canada: Canadian Goodrich Company, Kitchener, Ontario.

7 SUPERIOR SPECIFICATIONS

Built Into Every Goodrich Silvertown Bus Balloon Tire

1. Heavily insulated stretch-*matched* cords.
2. Additional *adhesion*—from greater insulation between outside plies.
3. Heavy *twin* beads for better rim seating.
4. Extra gum *fillers* between plies for longer tire life.
5. Heat-*resisting*, interlocking cord *breakers*.
6. Tread designed *correctly* for heavy duty service.
7. The whole tire toughened by the famous Goodrich *"water cure."*

Goodrich HEAVY DUTY Silvertowns

SPECIFY GOODRICH ON YOUR NEXT BUS

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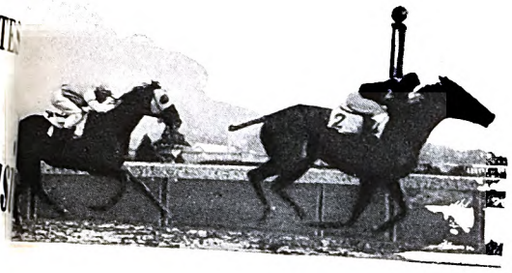

Lexington sets the pace for cities of 60,000

with Yellow Coaches

LEXINGTON, KY., from the local-transportation man's viewpoint faced a most serious problem—the same basic problem that confronts most American cities. Automobile owners were increasing each year at an alarming rate . . . . costs were mounting . . . . riding was decreasing.

An alert management studied the problem, evolved a plan and went to work. Now Lexington has increased riding 43 per cent and revenues 78 per cent despite the competitive conditions. Their experience points the way for other modern transportation merchants.

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Figures that tell a story of Local Transportation Progress in Lexington, Ky.

	1918	1928
Passengers, Trolley	3,992,270	3,898,865
Bus	.....	1,805,807
Total	3,992,270	5,704,672
Revenue per passenger (cents)	5.8	7.6
Population	41,247	60,312
Per cent of Rev. Pass., Trolley	100	68.3
Per cent of Rev. Pass., Bus	0	31.7
Motor vehicles registered	3,800	13,472
People per automobile	10.8	4.48
Yellow Coaches	**0**	**14**
Other makes	0	7

Ten years ago Lexington, Ky., had a population of 41,000. Trolley service exclusively. Revenue per passenger 5.8c. And only 3,800 private automobiles registered, or 10.8 people per automobile.

Then Lexington grew into a city of 60,000. Private automobiles in Lexington increased to nearly 13,500. Instead of 10.8 people per automobile the figure changed to 4.6.

To stem the tide of such conditions, so typical of many other cities of similar size, called for progressive thinking and action on the part of the public transportation company. Old equipment and former policies could not furnish the answer.

And so the street car system was modernized. New and more attractive rail equipment was secured. Then in 1925 motor coach service was added and co-ordinated with the trolleys. Now 14 city service 21-passenger Yellow Coaches give to Lexington the proven benefits of co-ordinated transportation.

The results received from this modernization program have been definite and outstanding. Revenue passengers increased 43 per cent, rate of fare 31 per cent while passenger revenue per capita increased 28.7 per cent, *or nearly equal to the rate of fare increase.* During this period motor

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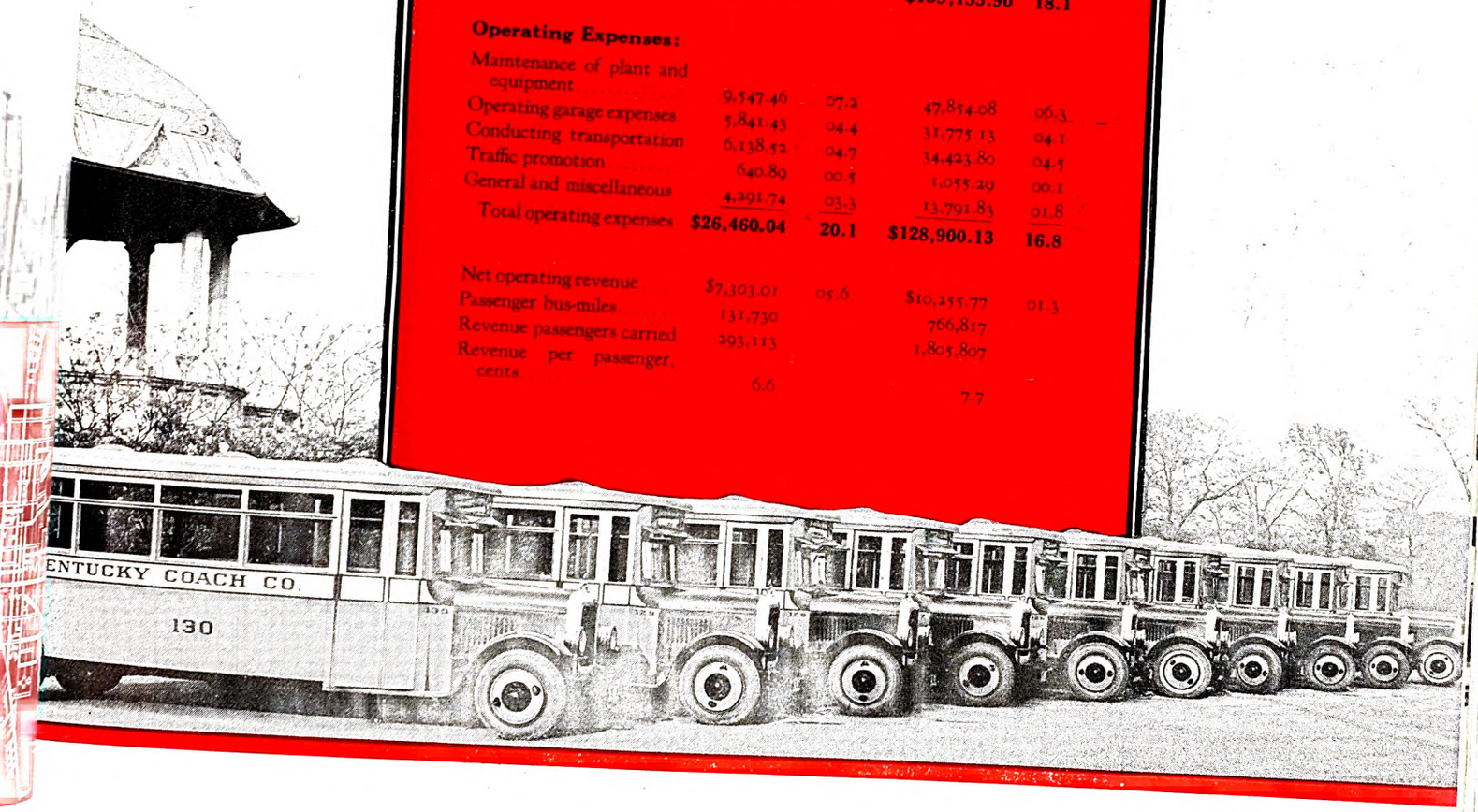
Kentucky Coach Company
Comparative Income Statement
for 1925 and 1928

	Seven Months Dec. 31, 1925		Twelve Months Dec. 31, 1928	
	Amount	Per Bus-Mile (Cents)	Amount	Per Bus-Mile (Cents)
Passenger revenue	**$19,157.03**	**14.5**	**$139,155.90**	**18.1**
Operating Expenses:				
Maintenance of plant and equipment	9,547.46	07.2	47,854.08	06.3
Operating garage expenses	5,841.43	04.4	31,775.13	04.1
Conducting transportation	6,138.52	04.7	34,423.80	04.5
Traffic promotion	640.89	00.5	1,055.29	00.1
General and miscellaneous	4,291.74	03.3	13,791.83	01.8
Total operating expenses	**$26,460.04**	**20.1**	**$128,900.13**	**16.8**
Net operating revenue	$7,303.01	05.6	$10,255.77	01.3
Passenger bus-miles	131,730		766,817	
Revenue passengers carried	293,113		1,805,807	
Revenue per passenger, cents	6.6		7.7	



vehicular registration had increased 92 per cent per 1,000 population.

The motor coaches now carry approximately 30 *per cent of the riding load.* Even in the face of this figure the trolleys show no appreciable loss in number of passengers carried—for Lexington has learned to leave its private automobiles at home and depend more on the dependable form of public transportation offered.

To keep pace with traffic growth on the heaviest through routes and to extend its radius of operation, cars and buses are operated on alternate schedules to give five minutes headway through the heart of the city. Thus through co-ordination of both equipment and schedules, a greater frequency of service is possible—so essential to the continued progress of small city development.

New routes are being covered by the coaches. New residential sections are being developed. More and more people are being served. More and more miles are being operated. Headways are more frequent. Public re-

with Yellow Coaches

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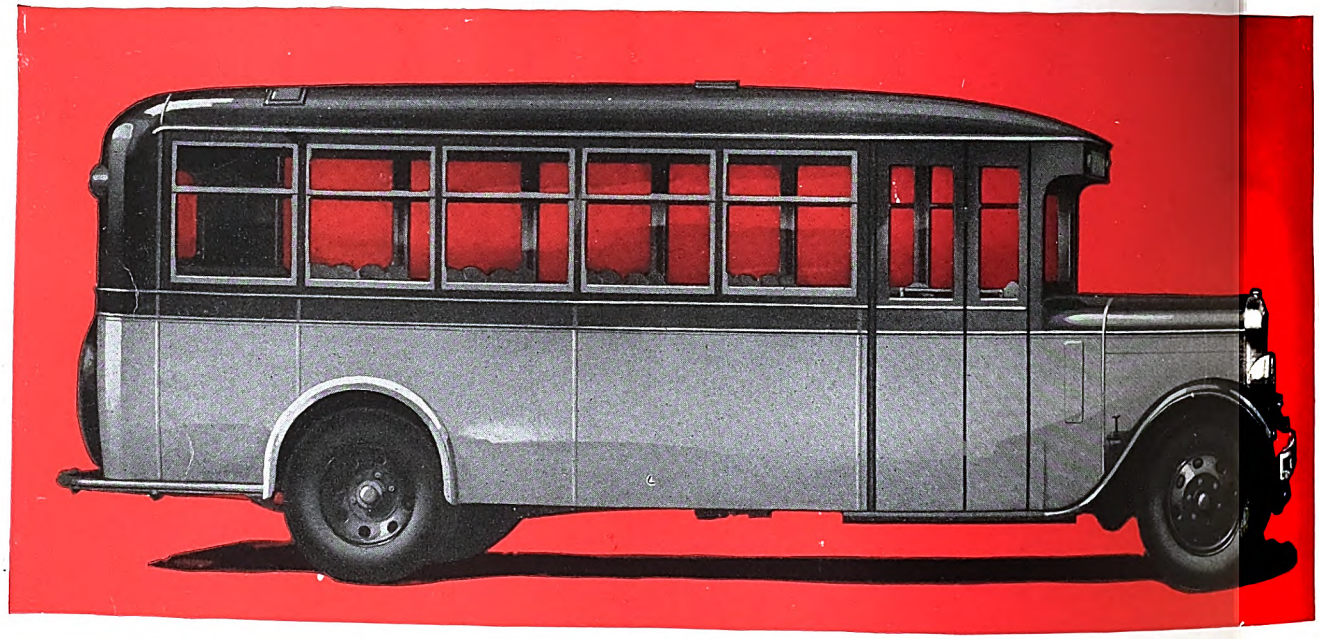
Type W 21-passenger city service coach.

Its rider appeal, performance and low operating cost make it the ideal vehicle for small-city service.



lations could hardly be better and, thanks to efficient management and carefully chosen equipment, *motor coach operating expenses have dropped from 20.1 cents in 1925 to 16.8 cents per coach mile in 1928.*

Lexington is solving its transportation problem and what Lexington is doing proves that there *is a way* for the alert small-city street car system to meet the competition of private automobile ownership, to protect existing investments, and at the same time contribute to the progress and development of the community.

Well planned co-ordinated transportation, utilizing the best of modern equipment, surges forward where experimental haphazard methods fail.

GENERAL MOTORS TRUCK CO., PONTIAC, MICH.

Subsidiary of Yellow Truck & Coach Mfg. Co.

With Yellow Coaches

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The motor coaches of the Fort Dodge, Des Moines & Southern Transportation Company, Boone, Ia., are 100% Goodyear-equipped

3,600 Bus Miles Daily in Iowa

A large motor coach operation in Iowa raises problems more acute than those encountered in many states. First of all, Iowa is rural, with many miles of country roads between its cities. Every type of weather and road condition has to be met. There are snow banks to buck in winter—a constant possibility of mud in any season.

It is a test to show what the famous traction of the Goodyear All-Weather Tread adds to a tire, as well as a test of straightaway mileage.

Consequently, these facts take on special interest. "Our routes cover 475 miles of Central Iowa highways, principally graveled, with a meager percentage of paved roads. The regular scheduled bus mileage throughout the year will average 3,600 miles daily and will be somewhat augmented by special or charter bus operation.

"We have been extremely well impressed with not only the tire mileage obtained from Goodyear Tires, but also with the efficiency of Goodyear service during the past two years in which our thirty-three buses have been exclusively equipped with Goodyear Tires." These words were written by C. H. Crooks, President, Fort Dodge, Des Moines & Southern Transportation Company.

The highest individual distance traveled by a tire in this operation has been 70,601 miles. Another of these Goodyears has run 65,623 miles, and five more have each traveled more than 50,000 miles.

This certainly is an example of fitting the right tire to the hauling duty. Goodyear Truck and Bus Tire Service Station Dealers everywhere are equipped to render the same service to you.

For every Goodyear Cord Bus Tire there is an equally fine Goodyear Tube, built especially to the needs of bus service

GOODYEAR

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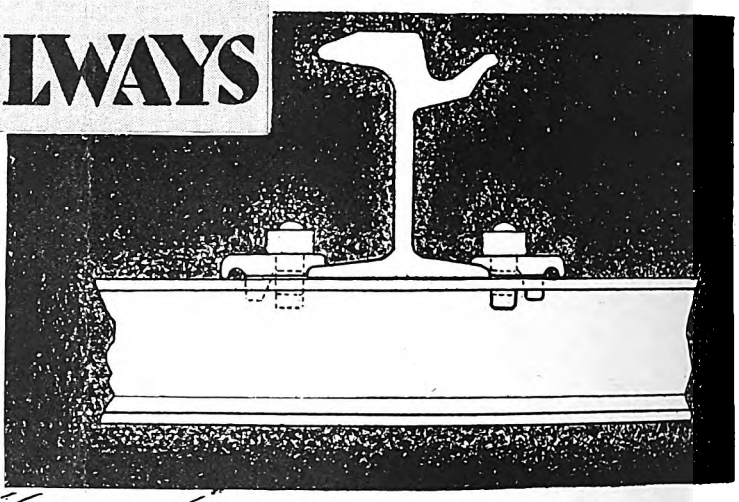
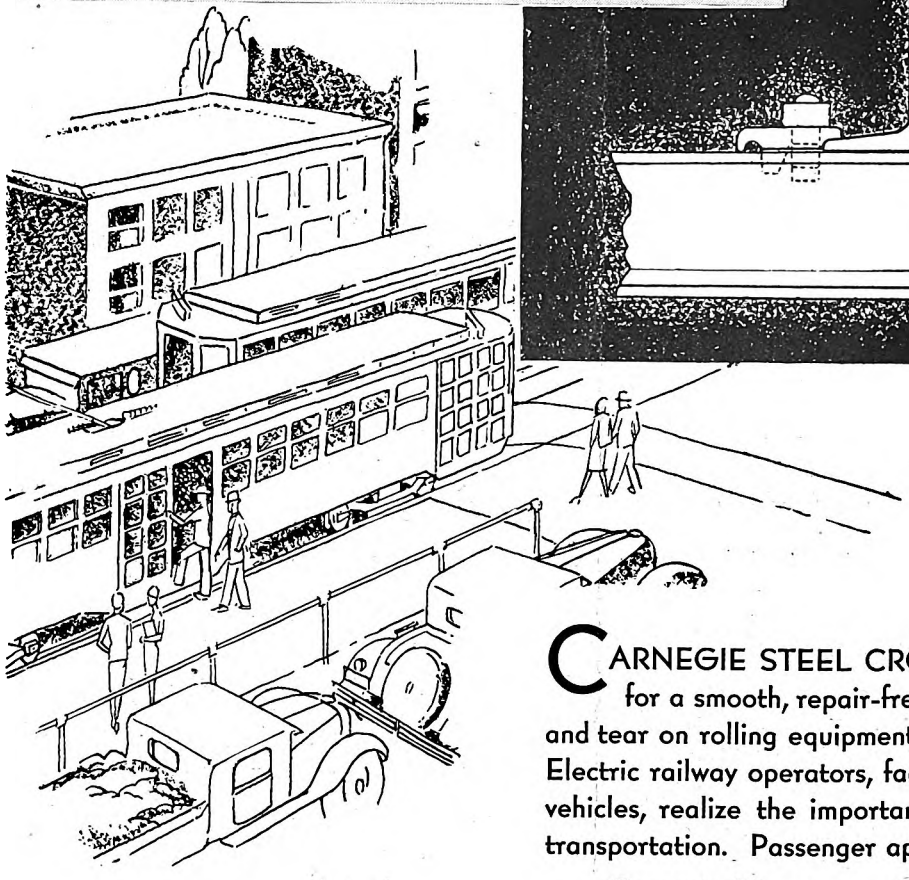
CROSS TIES *for* STREET RAILWAYS





CARNEGIE STEEL CROSS TIES provide the foundation for a smooth, repair-free track — a track that saves wear and tear on rolling equipment and greatly enhances its comfort. Electric railway operators, facing the competition of automotive vehicles, realize the importance of providing safe, comfortable transportation. Passenger appeal begins with the track.

Carnegie Ties are easily installed. The bolt and clip by which the rail is secured are simple and efficient. The unit cost (cost per foot of track per year) is considerably less than for wood ties.

Plan to include Carnegie Steel Cross Ties in your 1930 track construction program. It will prove to be an investment that pays dividends—particularly in passenger satisfaction.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

45

CARNEGIE STEEL CROSS TIES

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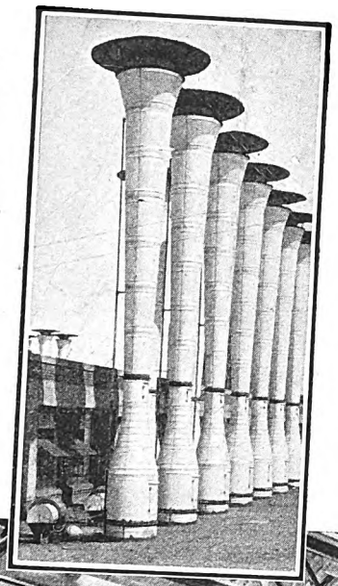
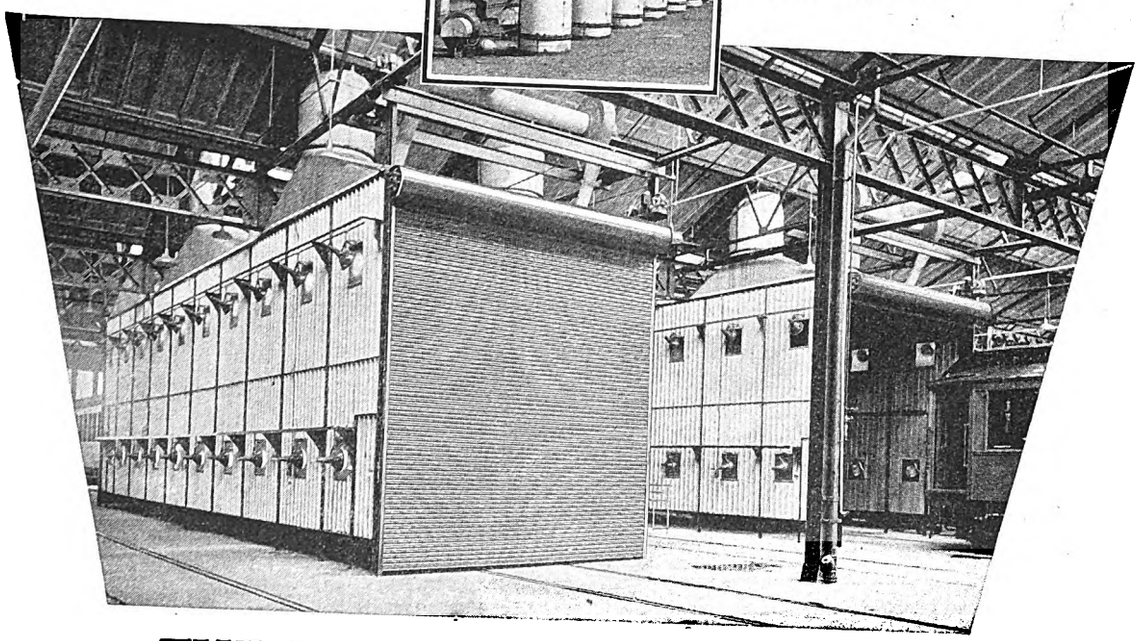
It Costs No More for the Services of These Specialists

In the adoption of lacquer finishes and spray painting methods in paint shops of both Street Railways and Motor Bus operating companies, great strides are being made in the reduction of maintenance costs. ¶Lacquer dries almost instantly, and in shops equipped with Mahon Spray Booths it can be applied in less than half the time with a saving in labor of approximately 75%. This economy reaches still further . . . spray painting facilities, through a reduction in the "out of service time," increases the annual revenue earning capacity of your carrier units. ¶In the selection of Spray Painting equipment it costs no more for the services of Mahon engineers . . . engineers who are recognized the world over as a highly specialized staff of Spray Booth experts. These specialists will lay out your entire paint shop and design a Spray Booth installation coordinated to produce maximum efficiency and economy in operation. Write today . . . consultation with Mahon engineers will not place you under any obligation.





THE R. C. MAHON COMPANY
DETROIT, MICHIGAN
Manufacturers of Spray Booth and Exhaust Stacks, Industrial Drying Ovens and Blow Pipe Systems.

MAHON
SPRAY BOOTHS & EXHAUST STACKS
• DESIGNED FOR FIRE SAFETY •

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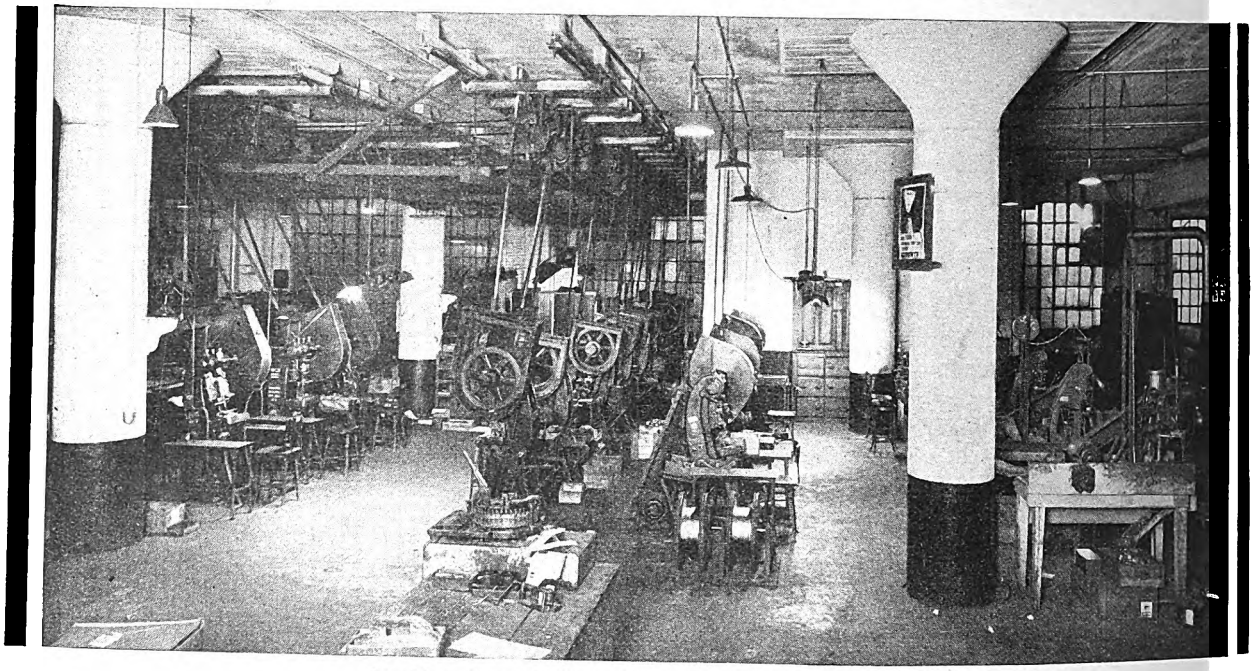
◆◆ BEHIND THE PYRAMIDS—12 ◆◆

N C C

Making BRUSHES exactly to your specifications



Machines for attaching shunts. Plating room in background

MANY National Pyramid Brushes are supplied with shunts, and where necessary are copper plated at the point of attachment to insure a low resistance contact between brush and shunt.

This work is done entirely in our own factories. After the brushes have been sawed and ground to exact size additional special machine operations are performed preparatory to attaching the shunts. Our styles of shunts are standard and meet all requirements of the electrical industry.

The distinguishing visible feature of each shunt is the Silver Strand Cable. This is one of our registered trade-marks, just as much an identification of National Pyramid Brushes as are the letters NCC and the three pyramids. As you pass through power plants, factories, mines and industries the country over, look at the electrical machines. It will not be necessary for you to ask what brushes are being used. The Silver Strand Cable is easily discernible, regardless of how much of the brush itself may be concealed by the brush holder.

The final operation before shipment is a rigid test and inspection. Tests are made for connection resistance, between shunt and brush. Size, angles of bevels, length of shunt and any other special items on the original order, are all checked and verified. Brushes are then carefully wrapped and packed for shipment.

This ends the manufacturing history of National Pyramid Brushes. Over 65 days have been consumed. At least 36 major operations have been performed. Innumerable minor processes have been applied. Scientific tests and controls have been applied constantly. Short cuts have been avoided. And thus the performance of National Pyramid Brushes is safeguarded and the uniformity of grade assured.

An interesting moving picture film illustrating in detail the processes used in the manufacture of carbon brushes will gladly be shown on request to any organization of engineers or students.

NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC *and Carbon Corporation*

Carbon Sales Division

SILVER STRAND CABLE TRADE MARK REGISTERED

Cleveland, Ohio

Branch Offices and Factories

New York Pittsburgh Chicago Birmingham San Francisco

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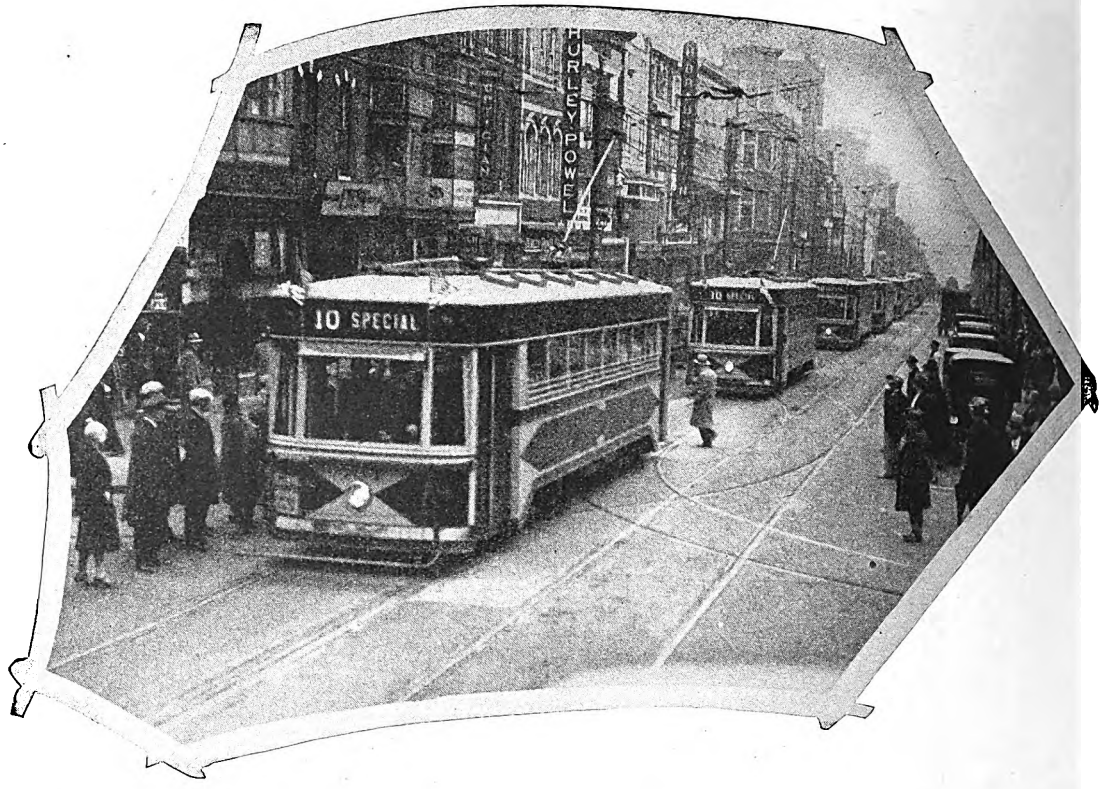


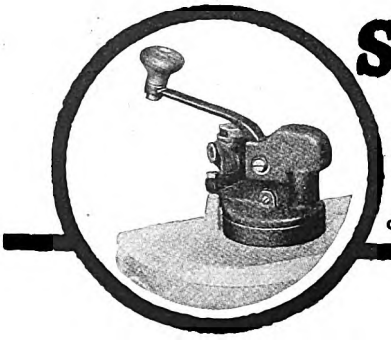
Giving Impetus to Transportation

SPEEDY transportation is vital to present-day conditions. Car riders want it; car owners need it.

An important factor in the realization of this objective is the Safety Car Control Equipment. It brings economic advantages that warrant additional cars . . . assures the quickest possible brake action . . . provides maximum convenience and flexibility in controlling entrance and exit. . . . safeguards operation by interlocking power, brakes, and doors and by centralizing responsibility.

Safety Cars are giving a noteworthy impetus to transportation service on hundreds of traction properties.

MODERN CARS *for* MODERN SERVICE



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.
Postal and Telegraphic Address:
WILMERDING, PA.
CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

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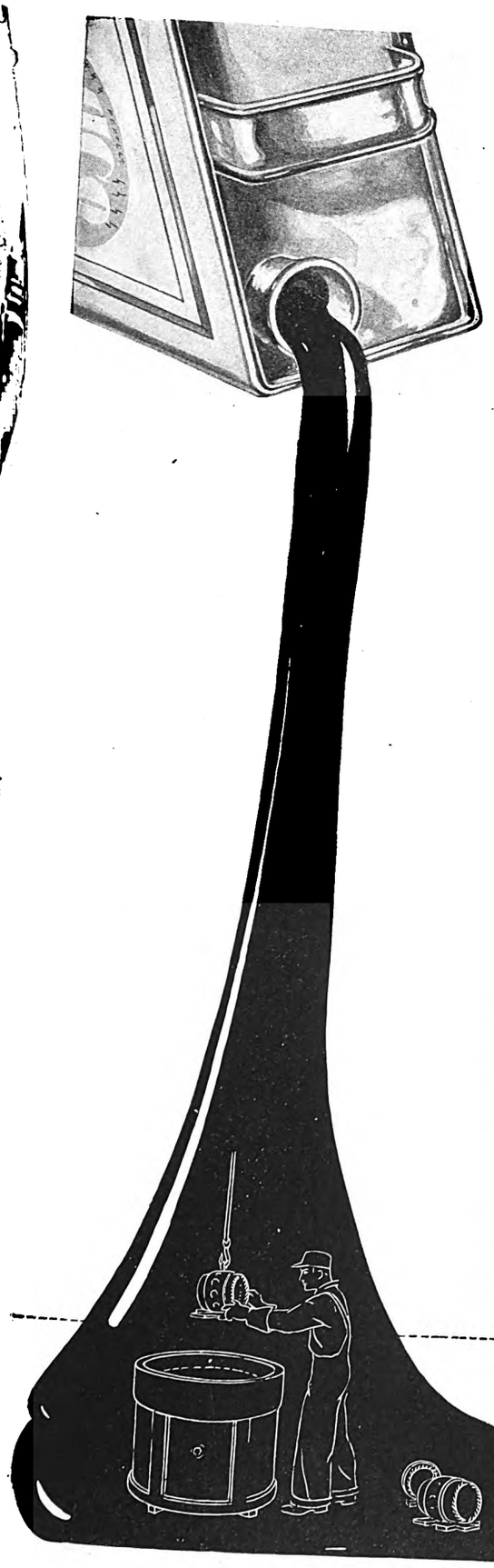

Treat it *with* MICO

Insulating Varnish

for positive protection

Give motors the tough, elastic coating that shuts out moisture and oil—that prolongs motor life...that reduces motor maintenance —treat them with Mico Varnishes.

America's largest electrical and industrial plants use these varnishes exclusively. No substitute is accepted. Experience has proven the outstanding qualities of Mico Varnishes.

No. 151 is a favorite. It's a Black Baking Varnish, ideal for motors, coils, cloth and paper. Try a gallon can. The coupon is for your convenience.

MICA INSULATOR COMPANY

New York: 200 Varick St. Chicago: 542 So. Dearborn St.

Cleveland Pittsburgh Cincinnati Birmingham Seattle San rancisco Los Angeles Toronto Montreal *Works:* Schenectady, N. Y. London, Eng.

Mica Insulator Company, 200 Varick St., New York, N. Y.
Send us 1 gal. of Mico Black Baking Varnish No. 151. We enclose $.....
(Price per gallon F. O. B. New York, $1.30.)

Name.....

Company.....

Address.....

PERFECT MICANITE INSULATOR REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR REG. U.S. PAT. OFF.

MICA INSULATION OILED CLOTH INSULATION

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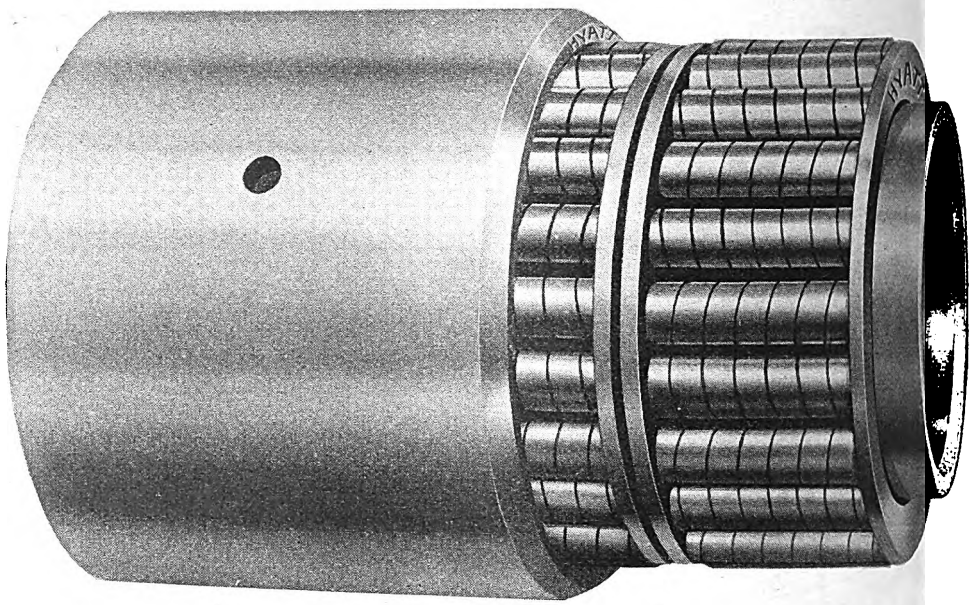
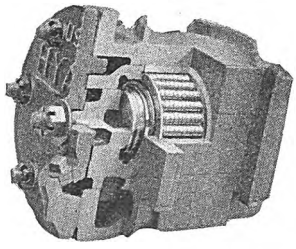
SAVING and SERVING —*the Hyattway*

THE many annoyances and power-waste of friction bearings may be banished forever with Hyatt Roller Bearings in your car journals.

Smooth starts, rapid pickups, quiet and easy running are further Hyatt contributions to greater passenger comfort, punctual service and economical operation.

In Hyattized journal boxes the sturdy Hyatt bearings rotate with the wheels in a natural, easy motion and, by reducing friction and drag, they cut power costs appreciably.





The Hyatt Roller Bearing Journal Box for Railway service—sectioned to show construction.

The only attention Hyatts ever require is an occasional oil inspection and replenishment at infrequent intervals. Hyatt journal boxes are installed to keep the cars busy earning profits instead of wasting time in repair shops.

The many advantages and economies to be derived from the application of Hyatt Roller Bearings are worth investigating. Every A. E. R. A. requirement for standard equipment or replacement is met.

HYATT ROLLER BEARING COMPANY

Newark Detroit Chicago Pittsburgh Oakland

HYATT

ROLLER BEARINGS

PRODUCT OF GENERAL MOTORS

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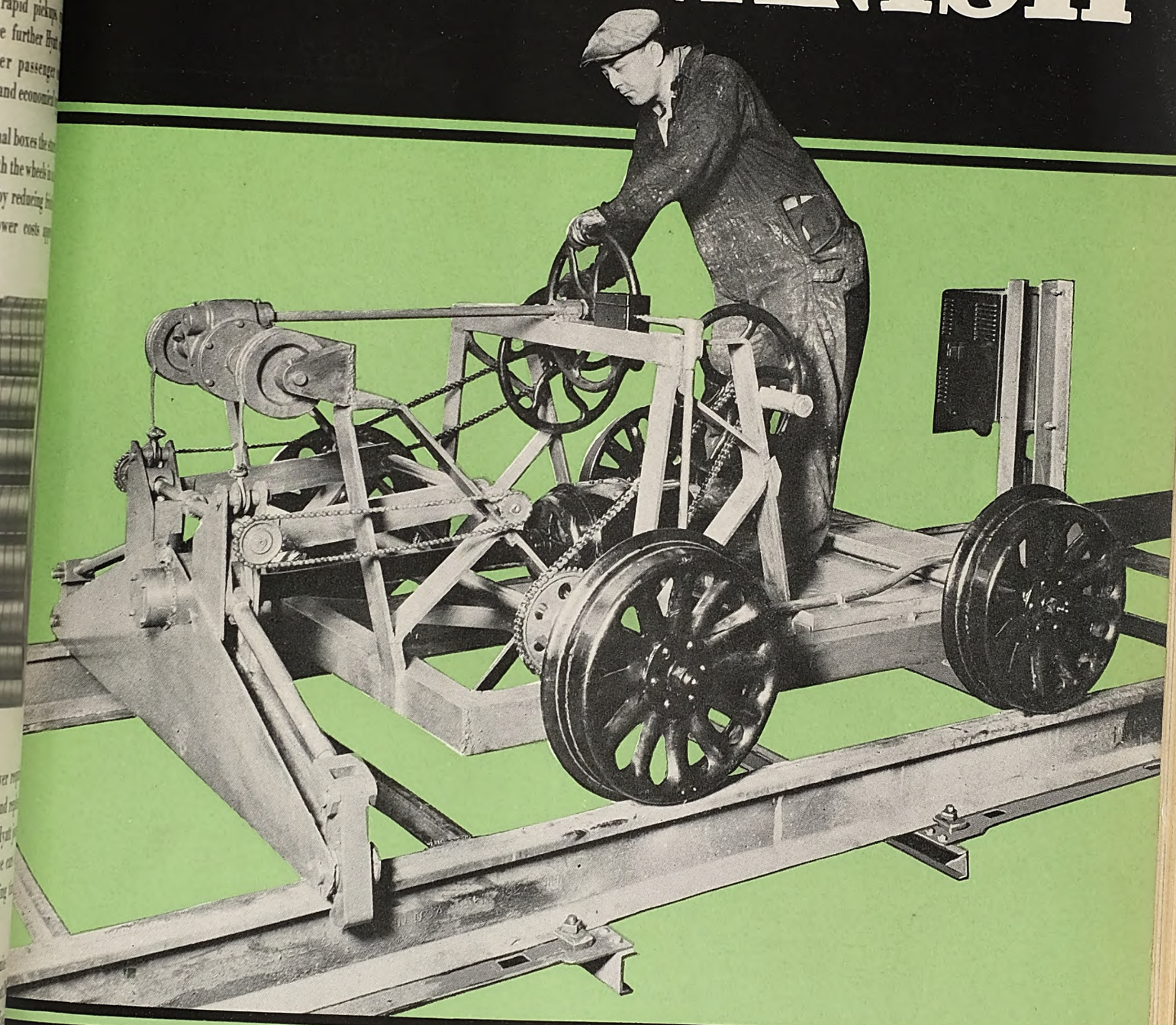
VOIDS *In Concrete* VANISH



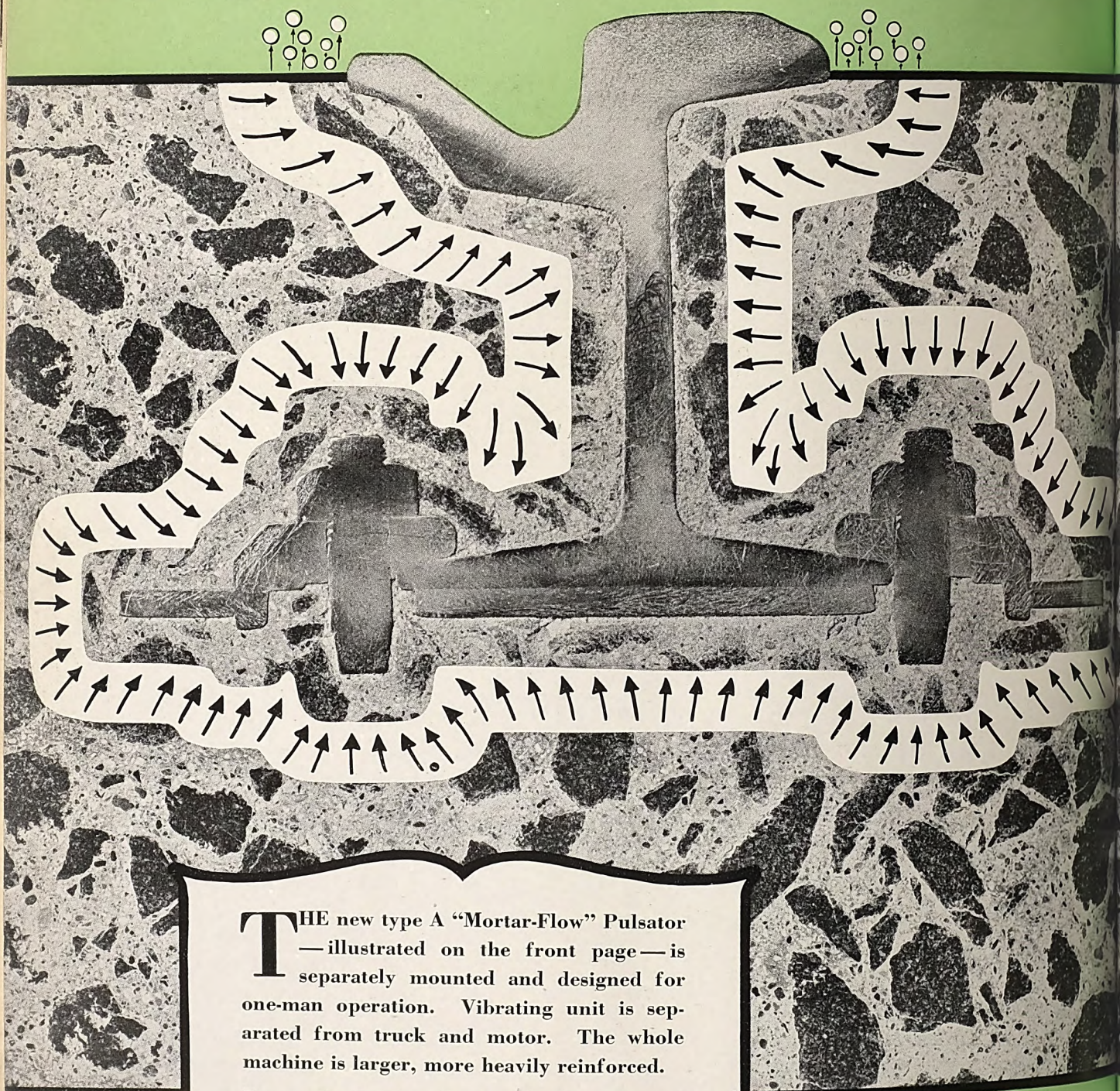
INTERNATIONAL

Improved Field Tested

"MORTAR-FLOW" PULSATOR

Pulsator's Vibrating Action

ALL VOIDS
"A 300% BETTER BOND



THE new type A "Mortar-Flow" Pulsator — illustrated on the front page — is separately mounted and designed for one-man operation. Vibrating unit is separated from truck and motor. The whole machine is larger, more heavily reinforced.

Force of vibration is regulated by a speed control on the motor. Operating control is automatic push-button type starter. An interval timer is supplied so that the "Mortar-Flow" treatment may be more uniformly applied.

The "Mortar-Flow" principle combined with the D. S. R. Track Layer, the Mechanical Tamper and the new International "Uniform Tension" Bolt Tightener, produces a track construction unapproached—for durability and economy — by any other track laying method.

THE STEEL

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VANISH

BETWEEN STEEL AND CONCRETE

CAUSE:

Graphically is presented the action that takes place when rails are vibrated and concrete is agitated by the new International "Mortar-Flow" Pulsator. Follow the arrows. Observe how water comes to top of slab, and air bubbles are driven out, how mortar is forced to flow downward, how it covers and bonds the steel of rails and tie.

EFFECT:

The finished result obtained by the use of the "Mortar-Flow" Pulsator has no counterpart in paved track construction. Voids vanish, a dense water free concrete clings tenaciously to rail and tie; completely seals the entire structure from end to end with a 300% better bond that makes every-foot-of-track-just-like-every-other-foot.

In the unretouched photograph of the test section, observe the manner in which the dense, waterfree concrete fills every minute crevice around the rail and tie. There are no voids when the "Mortar-Flow" principle is used in paved track construction.

To obtain delivered prices for ties, and terms on machine equipment, write—

INTERNATIONAL TIE COMPANY CLEVELAND OHIO

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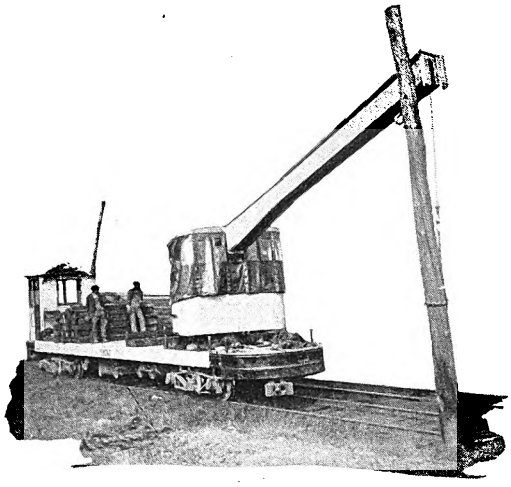
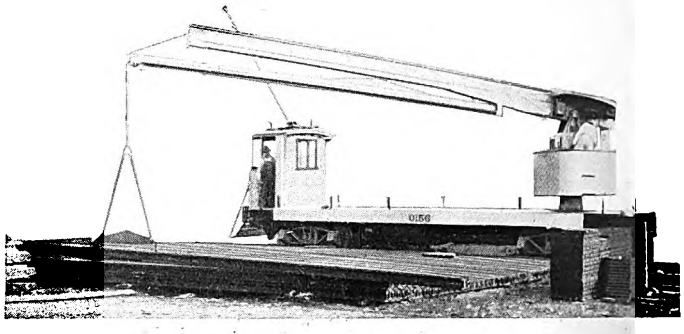


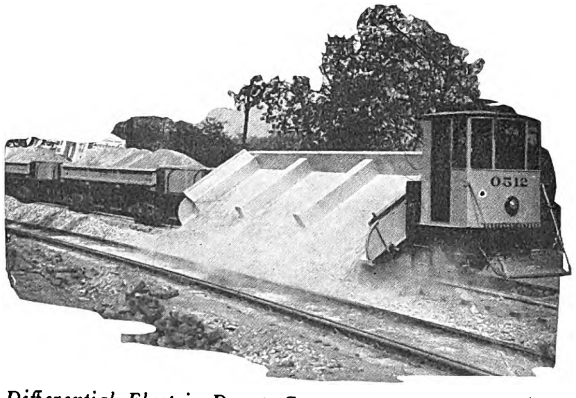


Better Equipment Means Better Track and Lower Costs

Differential Electric Locomotive Crane Cars

IMPROVE TRACK LAYING METHODS
MAKE POSSIBLE BETTER TRACK CONSTRUCTION
REDUCE COSTS
SAVE TIME
REDUCE TRAFFIC INTERFERENCE

The Differential Electric Locomotive Crane Car combines the advantages of the pillar type and the lift-boom type of crane. It can work under trolley wires with boom horizontal or can boom up allowing 26 feet headroom under the end of the boom. The crane has a capacity of five tons for radii up to 26 feet and two tons for radii up to 44 feet. Safe, reliable, speedy, and operates with one man. Useful in handling rail, ties, track work, bridge timbers, poles, and structural steel.



Differential Electric Dump Cars are standard work car equipment on nearly seventy Railways. They have played an important part in modernizing track-laying methods.

THE DIFFERENTIAL STEEL CAR CO.

FINDLAY, OHIO

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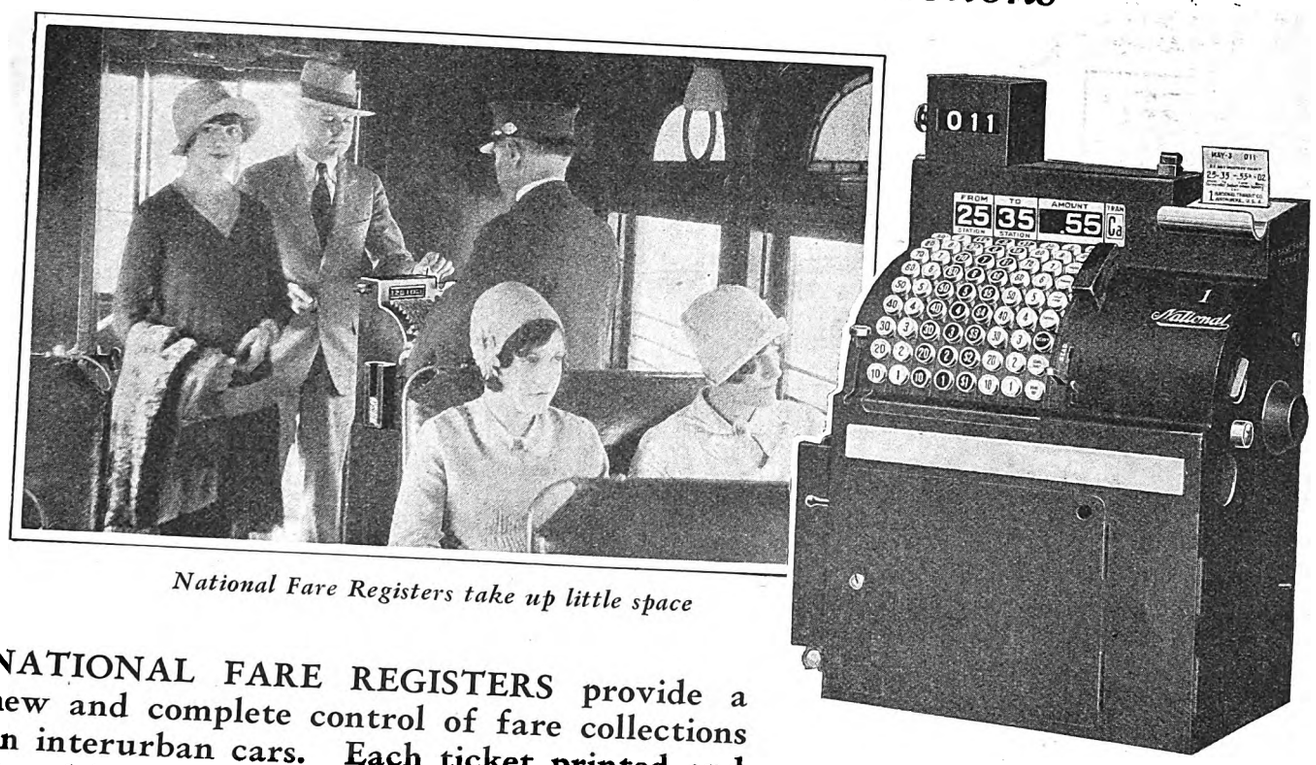
The National Fare Register

gives a new and complete control over interurban fare collections



National Fare Registers take up little space

NATIONAL FARE REGISTERS provide a new and complete control of fare collections on interurban cars. Each ticket printed and issued by the register must be a true record of the fare because the passenger would not accept a ticket for an amount less than paid.

Once the record is made, the money must be accounted for, because the amount is added on a total and printed on the trip sheet inside the register. These safeguards give complete control over every fare collected.

Other advantages such as passenger indication, public indication of fares and fare points, easily operated keyboard, repeat key, together with speed in operation and economy in upkeep, make National Fare Registers the best system for interurban fare collections.

NOV-3 011

DO NOT DESTROY TICKET

25-35 -.55★ -02

From To Fare Oper.

Surrender ticket when leaving car.

1 National Transit Co.
Anywhere, U. S. A.

Actual size of ticket issued by National Fare Register

THE NATIONAL FARE REGISTER

Product of The National Cash Register Company

Dayton, Ohio

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The new proven method of lubricating car journals

With the progress that has been made in electric railway methods, equipment and rolling stock, it was inevitable that an improvement would appear in lubricating methods and lubricants.

Formerly all car oils were made in two grades—summer and winter. Sometime ago the Standard Oil Company began developing light bodied oils designed to meet the requirements of electric railway service for year 'round operation. The result was Superla Car Journal Oil.

Superla Car Journal Oil has set a new standard of car journal lubrication, casting into obsolescence the old theory that different grades of oil were necessary for winter and summer operation. It has proven successful in all seasons in high speed interurban and ordinary street car service. It has made possible marked savings in power and waste consumption, increased the life of bearings and reduced bearing temperatures.

This modern method of lubricating car journals offers such attractive economies and improved lubrication that you'll find it well worth investigating. One of our engineers will be glad to give you complete information.

An article written by one of our engineers discussing the use of light oils for car journal service contains much valuable information and shows many tests that have been made.

If you are interested in reducing lubrication costs you'll find this article well worth reading. We will be pleased to send a copy at your request.

STANDARD OIL COMPANY (*Indiana*)

General Offices: 910 S. Michigan Ave. CHICAGO, ILLINOIS

Chicago	Duluth	Grand Rapids	Joliet	Mason City	Peoria	South Bend
Davenport	Detroit	Green Bay	Kansas City	Milwaukee	Quincy	St. Louis
Decatur	Evansville	Huron	La Crosse	Minneapolis	Saginaw	St. Joseph
Des Moines	Fargo	Indianapolis	Mankato	Minot	Sioux City	Wichita

1320

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VIZABLEDG
PATENTED
SAFKAR
TRADE MARK REG.
SAFSTEP

The advantages of **Safkar** step equipment are definite and tangible—if safety and economy have definite and tangible value to you.

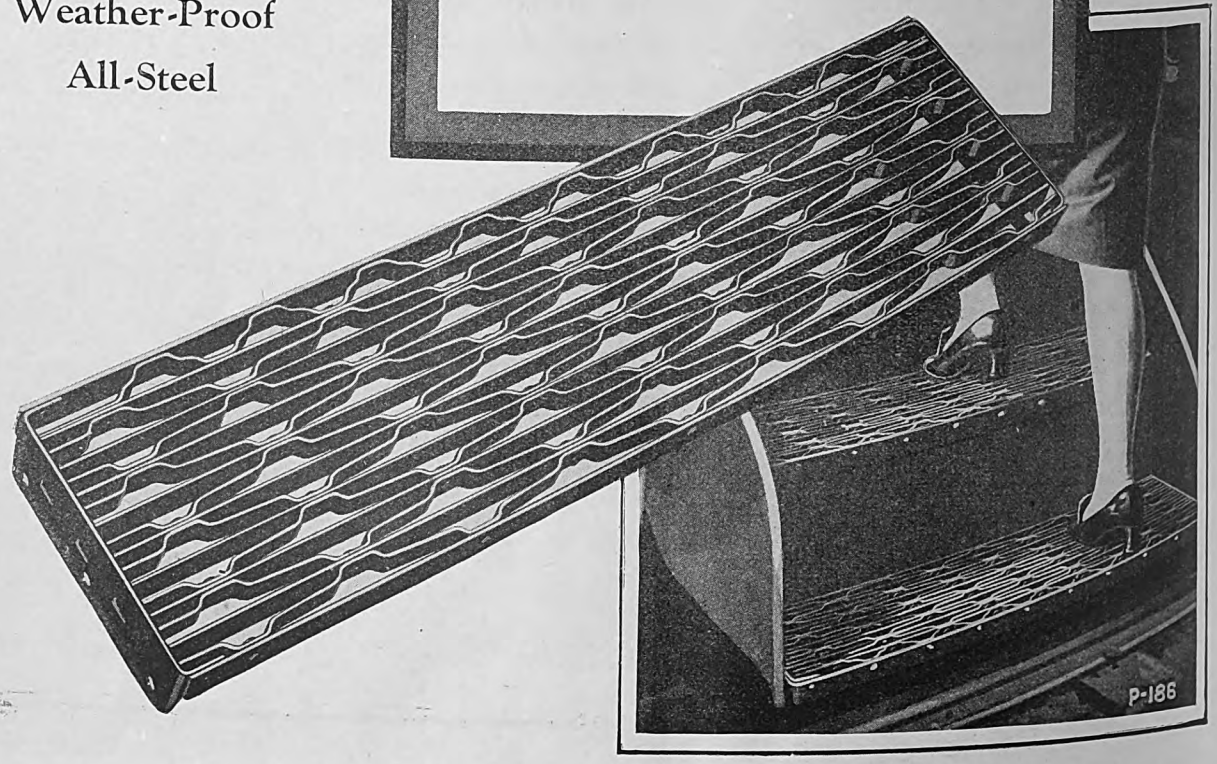
Safkar steps—by their slip-proof, miss-proof qualities—eliminate the accidents due to slippery carsteps which may prove so costly.

Safkar steps—because of their all-steel construction and inbuilt safety surface—eliminate the item of carstep maintenance. And their self-cleaning, foot-scraping feature lowers the cost of car cleaning.

Be informed—see Bulletin 2D28

IRVING IRON WORKS CO.
LONG ISLAND CITY. N.Y.. U.S.A.

Slip-Proof
Miss-Proof
Self-Cleaning
Time-Proof
Weather-Proof
All-Steel



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At Last...

the cost cutting facts you've needed most!

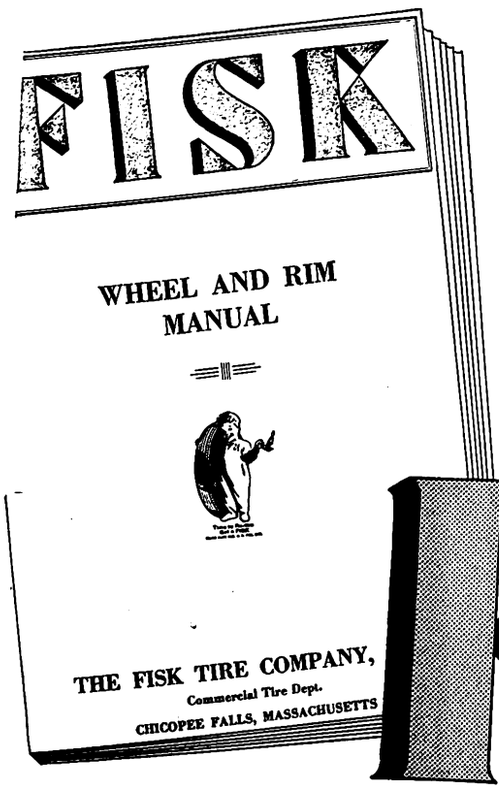
Time To Re-tire
GET A FISK!
TRADE MARK REG. U.S. PAT. OFF.

THE present day demand is for speedier haulage, speedier transportation. To meet this demand and keep operating costs at their lowest, you *must* have the up-to-date information that has now been gathered into one book, the new Fisk Wheel and Rim Manual.

This book is complete and detailed. It shows you in every case the most efficient, least expensive way to apply proper tire equipment in meeting modern day operating needs. We will send a copy of this expensive book without charge, to anyone in charge of truck or bus fleet operations who writes promptly on his own letterhead.

If you wish, our Engineering Department will make a thorough analysis of your particular equipment needs, without charge or obligation. Write, today, to

THE FISK TIRE COMPANY, Inc.
Commercial Tire Department
CHICOPEE FALLS MASSACHUSETTS



FISK

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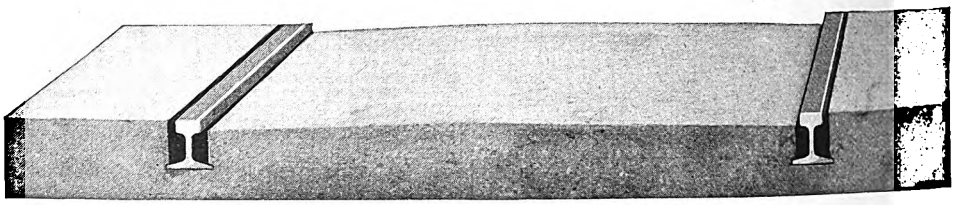
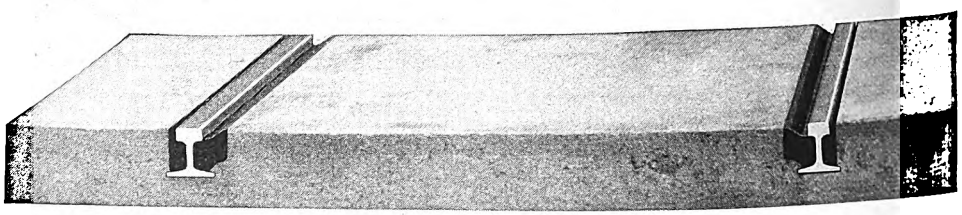
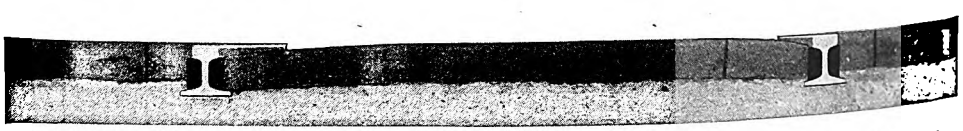
Which of these illustrates YOUR kind of ...showing the use of CAREY TRACK INSULATION with



A cross-section of monolithic concrete pavement, showing the T-rails fitted with Standard A and B Sections of Carey Elastite Rail Filler. Note that the roadway is crowned inward from the base of the rail heads.



Monolithic concrete paving construction with the standard T-rail. The Standard A Section of the Carey Elastite Rail Filler is on the outside of the rail—the Standard C Section forms the inside flangeway. The concrete is protected—the seal is water-tight.



Showing the use of brick pavement on a concrete base, with Standard B Sections of Carey Elastite Track Insulation on both sides of the rail. The brick pavement has a bituminous filler and the pavement is crowned between the T-rails.

A combination of brick pavement and sheet asphalt—brick between the rails and a sheet asphalt traffic surface. Standard A Rail Filler sections are used outside; Standard C Sections, inside, provide a preformed flangeway that eliminates expensive hand labor.

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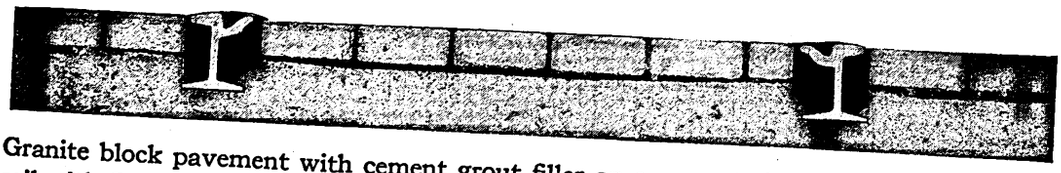
h of t cross-sections

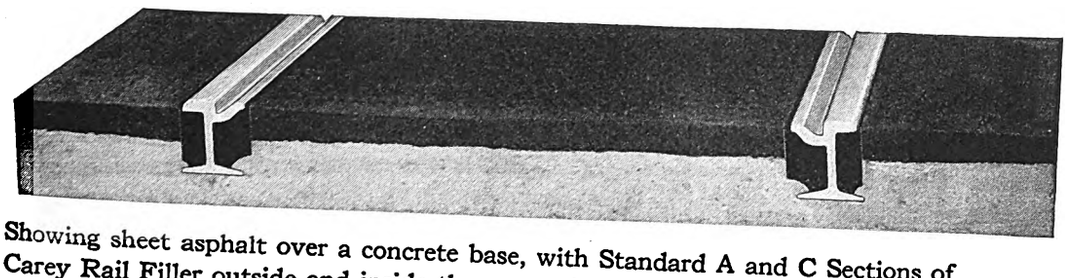
kind track construction work?

se of C ELASTITE SYSTEM OF

ATION *six different methods of paving*



Granite block pavement with cement grout filler on a concrete base. Grooved rail with Standard A and C Sections of Rail Filler. Here the rail is practically encased in sound-deadening, shock-absorbing material and the life of the pavement is materially lengthened.



Showing sheet asphalt over a concrete base, with Standard A and C Sections of Carey Rail Filler outside and inside the grooved rail. Here again the rail is almost completely surrounded with shock-absorbing material—the track is smoother-riding and quiet.

THE use of Carey Elastite System of Track Insulation is recommended by leading street railway officials in almost two hundred cities, large and small. Of course, *you* will want full information on this modern traction improvement.

THE PHILIP CAREY COMPANY, *Lockland*, CINCINNATI, OHIO

Carey Elastite

REG. U.S. PAT. OFF.

TRADE MARK REG'D. U.S. PATENT OFFICE

SYSTEM OF TRACK INSULATION

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Another Development by LORAIN

THE DIXON TONGUE SWITCH

Lorain

GIRDER RAILS
GIRDER GUARD RAILS
PLAIN GIRDER RAILS
RAIL JOINTS AND TRACK ACCESSORIES
EXPANSION JOINTS FOR ELECTRICALLY WELDED TRACK
SPECIAL TRACKWORK
SWITCHES, FROGS AND CROSSINGS
in
Solid Manganese Steel, Manganese Insert Construction, Chrome Nickel Steel Insert Construction and Built-up Construction of all heights and weights of rail.

DURING the past 40 years, the name LORAIN has been identified with many important developments in track equipment. The Dixon Tongue Switch—developed by LORAIN—is a solid casting of manganese steel. In addition to the Tadpole Heel feature, the Tongue is held in place by means of the Heel Plate which is provided with a raised floor to carry the car wheels on their flanges over the tongue heel. This eliminates the usual pounding of wheel tread on heel of tongue in the trailing position.

The Heel Plate is made of heat-treated cast chrome nickel steel, which facilitates the building up of floor by electro-deposit welding. The hold-down bolts and nuts are sealed with asphaltum to exclude moisture. *Write our nearest District Sales Office for quotation.*

THE LORAIN STEEL COMPANY
JOHNSTOWN, PA.
SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES:
AMERICAN BRIDGE COMPANY
AMERICAN SHEET AND TIN PLATE COMPANY
AMERICAN STEEL AND WIRE COMPANY
CARNEGIE STEEL COMPANY
CYCLONE FENCE COMPANY
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
THE LORAIN STEEL COMPANY
TENNESSEE COAL, IRON & R. R. COMPANY
UNIVERSAL PORTLAND CEMENT COMPANY

Pacific Coast Distributors—United States Steel Products Company, San Francisco, Los Angeles, Portland, Seattle, Honolulu. *Export Distributors*—United States Steel Products Company, New York City

Lorain Sales Offices—ATLANTA CHICAGO CLEVELAND DALLAS NEW YORK PHILADELPHIA PITTSBURGH

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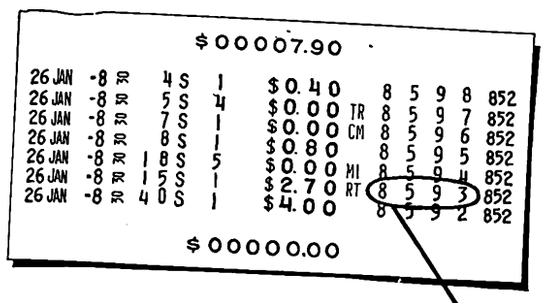
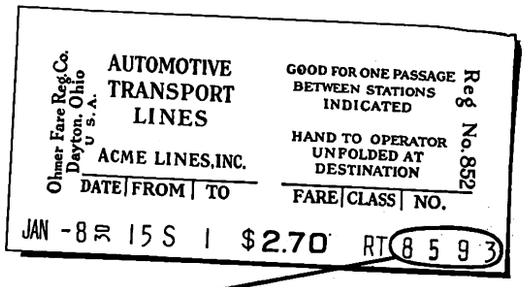


Here is a section of the detail strip from a Class 80 Register. Because of the wide detail strip (4¼ inches) a complete record with proper column spacing is made possible.



Tickets issued from OHMER Registers give exactly the same information as the detail strip. They are of the same shape and size, and have the same value to passengers as purchased railroad tickets.

8593

Consecutive Number on Detail Strip *and* Ticket

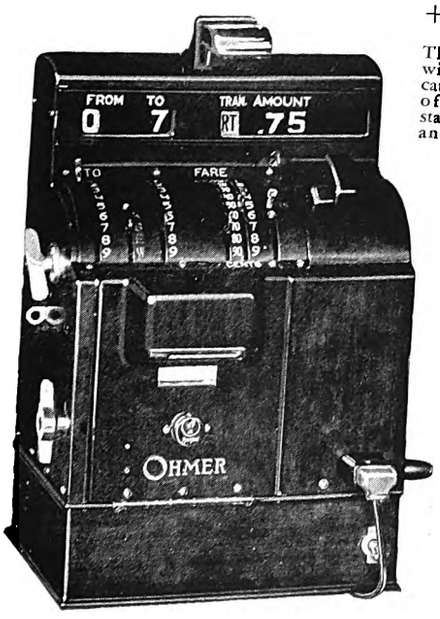
Only OHMER *gives you this added protection*

HERE'S a feature that you need on all your ticket-printing fare registers. It's a feature that was developed by transportation specialists to give you added protection through a complete check on every sale.

When the consecutive number appears on detail strip *and* ticket, you can positively identify each ticket with the corresponding sale on the detail strip. You can save time by auditing fares consecutively . . . a system impossible with any other register. You can make checking definite and simple.

And in addition, the detail strip carries the operator's number . . . another feature that makes the audit of sales even more positive and more accurate.

Other information appearing on the detail strip and ticket is the *Date,* the *From* and *To* stations, the *Division* traveled, and the *Amount* and *Class* of fare. No other fare register in the world gives so much information and so much protection.



+ + +

The Class 80 Register with large visual indicator shows the numbers of the From and To stations and the amount and class of fare. This register has the exclusive OHMER pre-indicating feature which makes it possible to detect mistakes before registration. Repeat tickets can be issued by pressing a single button. The register is electrically or manually operated.

Now . . . a more perfect "On and Off" Check

Our transportation specialists have devised a new "On and Off" check. It is simple, accurate and sure. We want you to see how it works. Send for your free copy of the folder in which it is completely described.

OHMER

REG. U.S. PAT. OFF. AND OTHER COUNTRIES

FARE REGISTER COMPANY

Dayton, Ohio, U.S.A.

9-39

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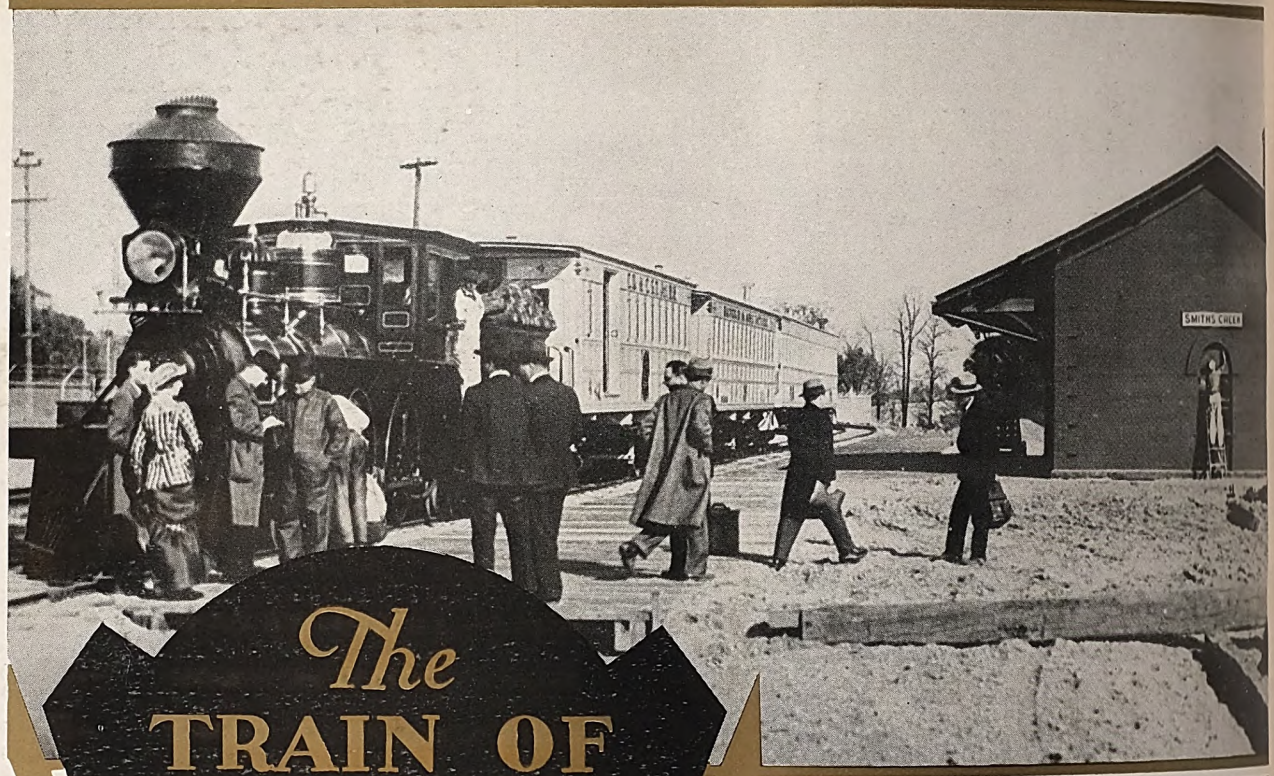

The TRAIN OF 1860 celebrates Light's GOLDEN JUBILEE

FOR half a mile, distinguished celebrants rode to "Menlo Park" in this quaint relic of the dear dead days—when lights were not electric and when cars were warmed by stoves. You can see the chimneys of these fine old inefficient, fatally dangerous "heaters".

For half a mile—then the guest of honor gayly said, "Well here we are, all safe and sound".

It was not until 1879, the birthday of electric lights, that Edward Gold presented the first of the famous Gold heating appliances.

Yes, 1929 is also *Gold's Golden Jubilee.*

GOLD CAR

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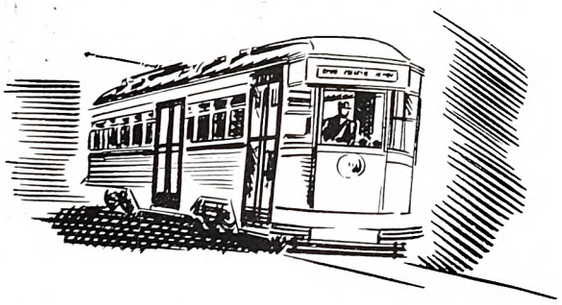
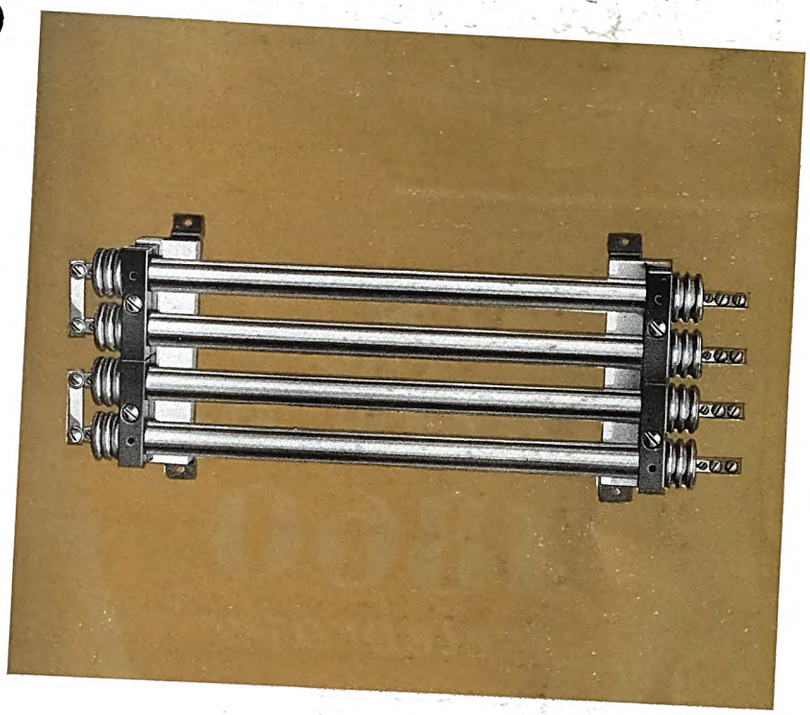
The Train of 1929 pays tribute to GOLD'S GOLDEN JUBILEE





High Voltage Heater for 3000 Volt Circuits

As used in heater shown above, resistance coil No. 19 B. & S. gauge Super-Nichrome wire No. 4, is the heaviest employed in any high voltage heater and is positively placed in center of lavite tube insulator.

This insulation has a compressive strength of 20,000 to 30,000 lbs. per square inch and a dielectric strength of 75 to 250 volts per thousandth of an inch in thickness.

Tubes are interlocked and have a ¾" maximum air gap.

After assembly, coils are embedded in a special cement, which substance is most inert at high temperatures. The specific resistance at a temperature of 800° C.-1472° F. is 30,800 ohms.

This construction guarantees a dielectric strength from coil to tube of 5,000 volts and with secondary insulation a dielectric strength from coil to heater case of 10,000 volts.

GOOD AS GOLD

NEW YORK

HEATING & LIGHTING COMPANY

Bush Terminal Building No. 2 — 220 36th Street, Brooklyn, N. Y.

In Canada: CANADIAN GOLD CAR HEATING & LIGHTING CO., *Limited,* — 728 St. James Street, Montreal

In the Orient: CHINESE ENGINEERING AND DEVELOPMENT CO., — 18 Ermanno Carlotto, Tientsin, China

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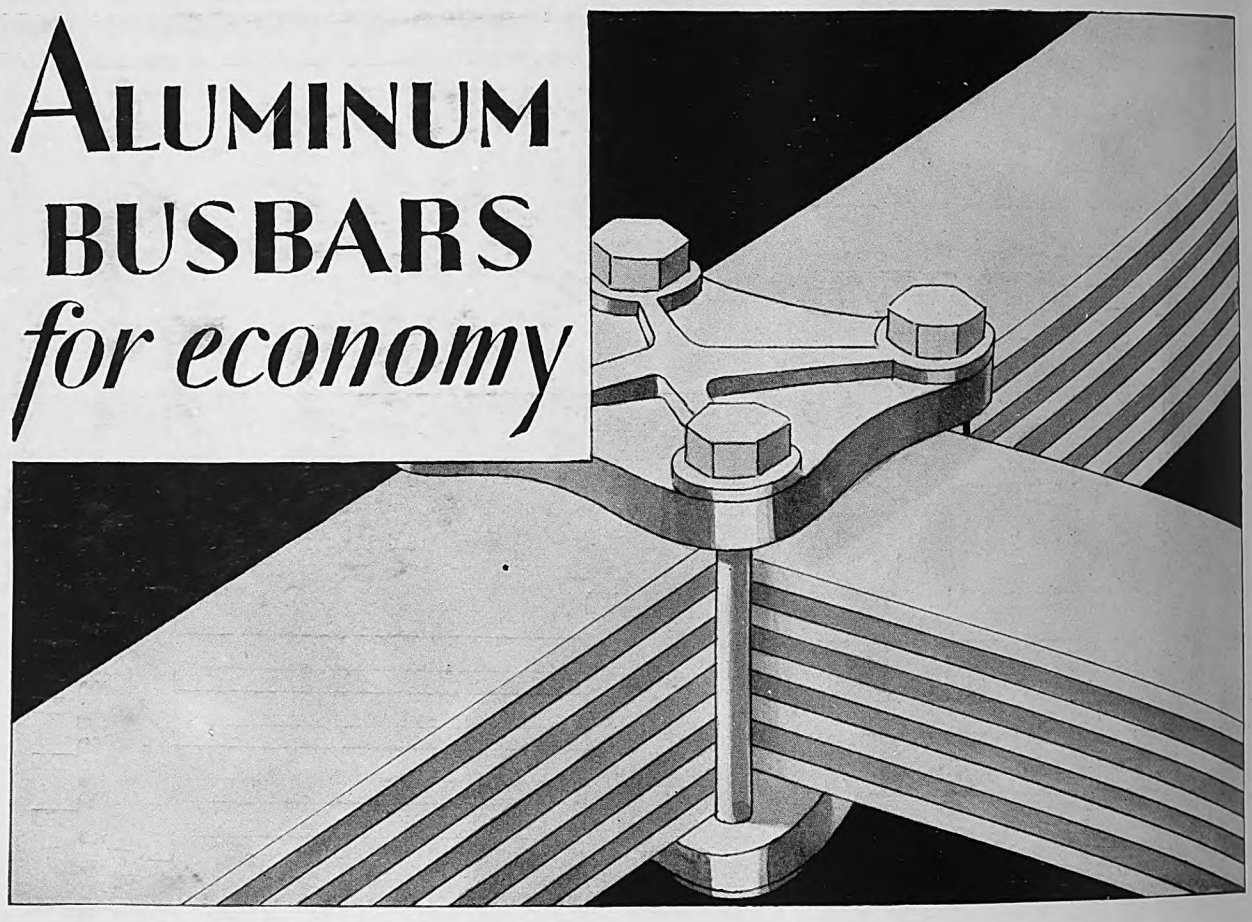
ALUMINUM BUSBARS *for economy*

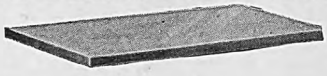


FOR years the most important nations of Europe have standardized on Aluminum Busbars as most economical and satisfactory for transmission purposes. In this country the steadily widening use of Aluminum Busbar clearly shows the way it is regarded by American engineers.

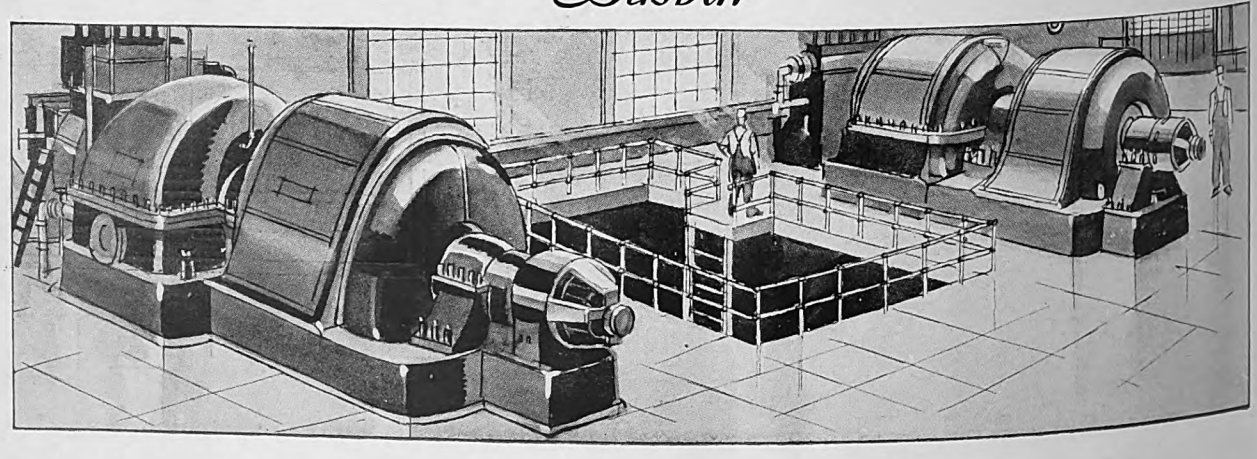
The booklet, "Aluminum Busbars," contains tables of weights, carrying capacities and physical properties, with installation photographs. Please send for your copy.

ALUMINUM COMPANY OF AMERICA
2463 Oliver Bldg., Pittsburgh, Pa.
Offices in 19 Principal American Cities

ALUMINUM



Busbar



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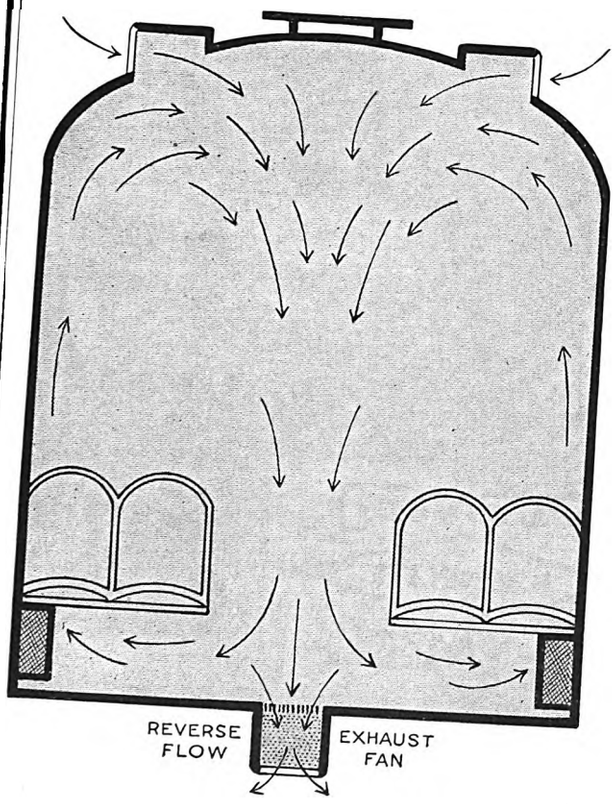
PETER SMITH
Reverse-Flow Ventilating System
(Patent Applied For)

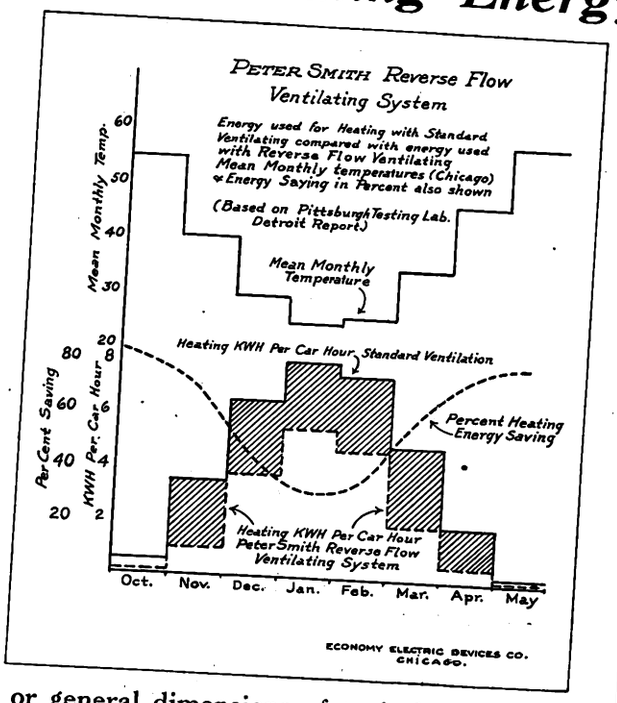


COMPLETE VENTILATION

Motor-driven specially designed exhaust fans mounted in the floor exhaust the cold, foul air from the bottom of the car, assuring positive forced ventilation. Rated so as to give a complete air change every four minutes. The heated air rises along the sides of the car and is mixed with incoming fresh air from roof intake ventilators. This method of ventilation assures vastly better air conditions at breathing line.

plus
25% to 50% Saving in Car Heating Energy

In addition to better ventilation, tests conducted by the Pittsburgh Testing Laboratories indicate a substantial saving in energy used for car heating. This saving is obtained by exhausting the coldest air from the floor line of the car. Present gravity exhaust systems discharge the hottest air at top of car. The curve indicates savings to be expected under normal weather conditions. The savings shown will pay for complete installation in two years.



Write for a copy of the Detroit test. Send plan or general dimensions of typical car for recommendation and quotation.

ECONOMY ELECTRIC DEVICES COMPANY
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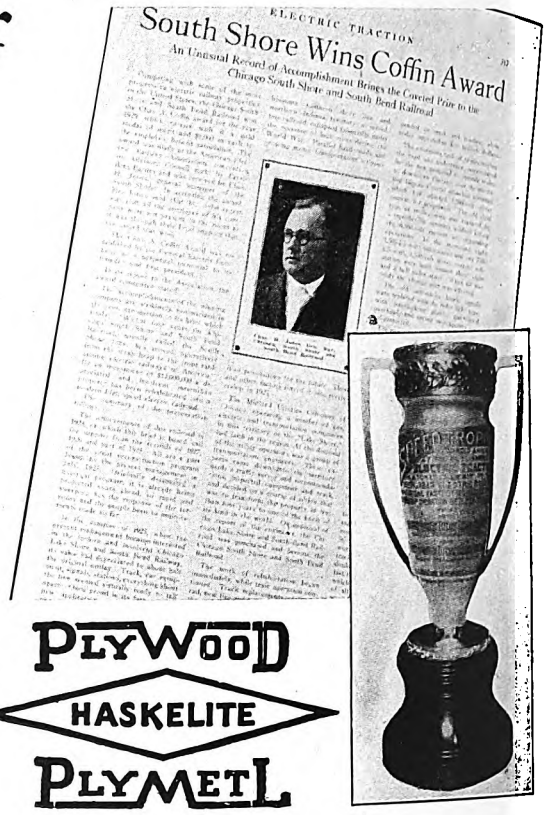

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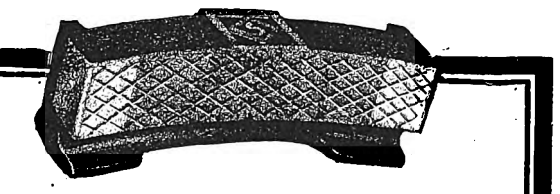

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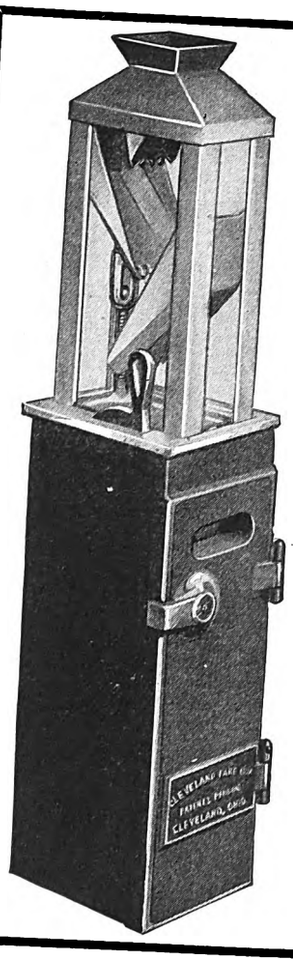

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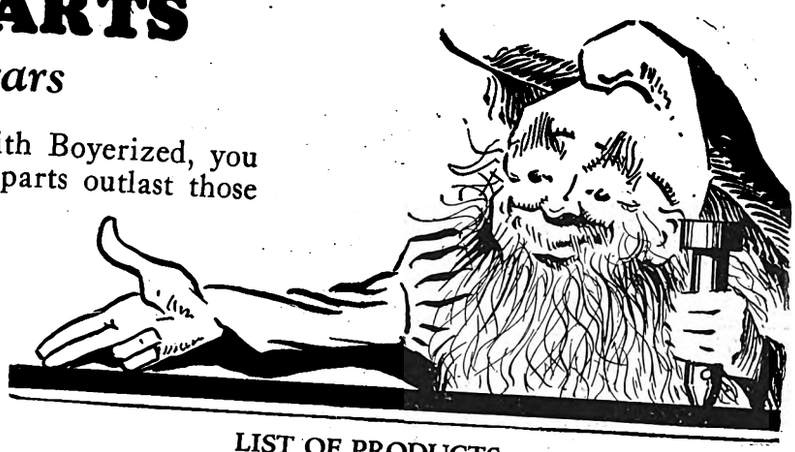

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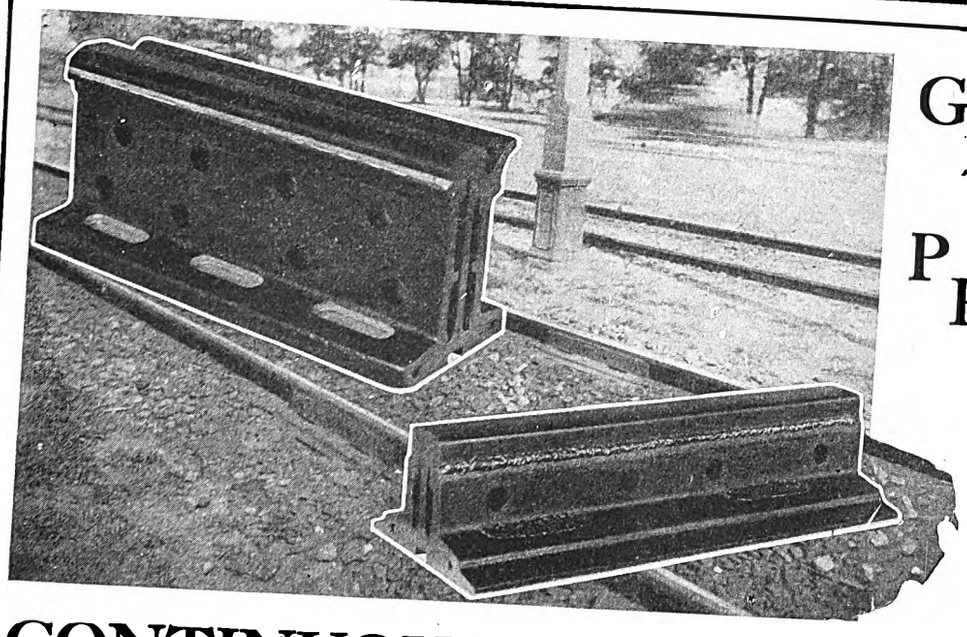

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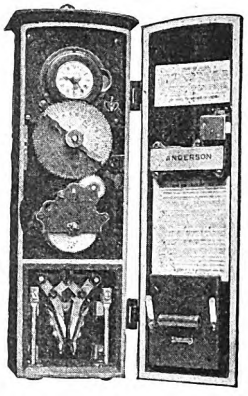

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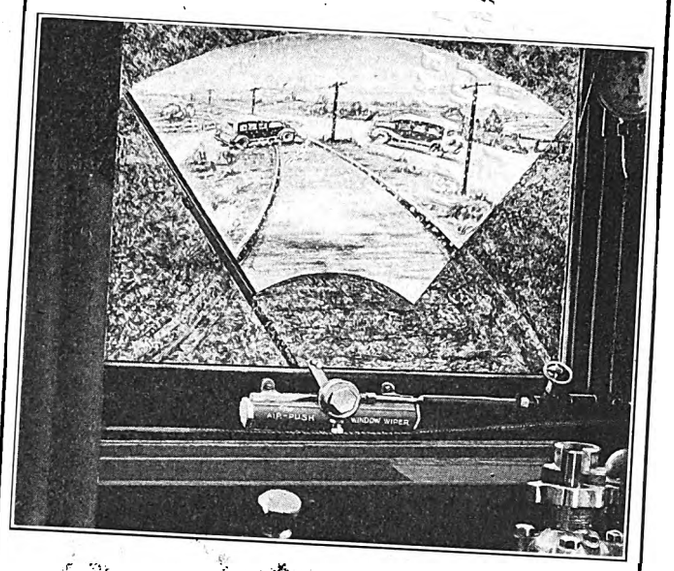

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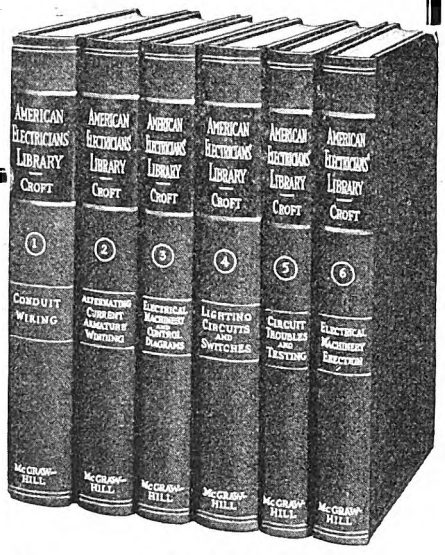

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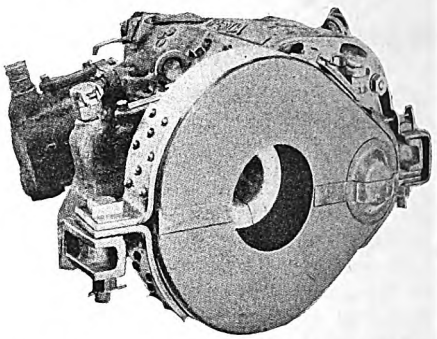

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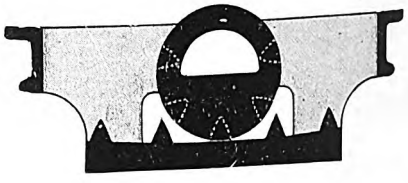

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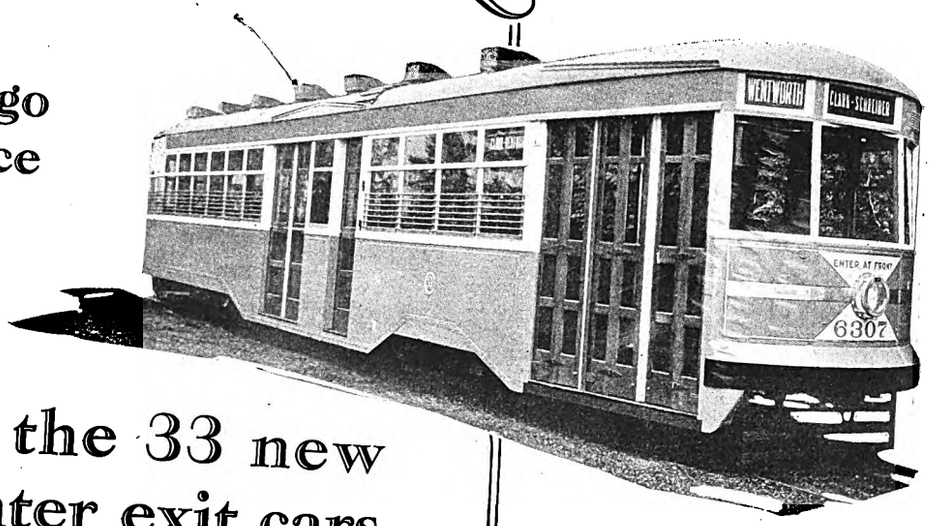

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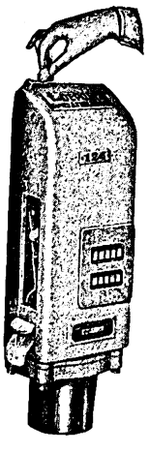

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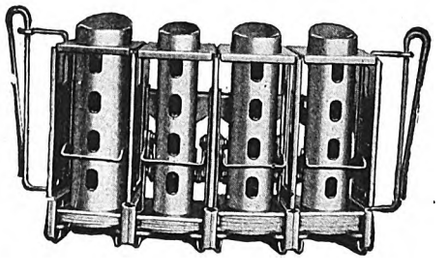

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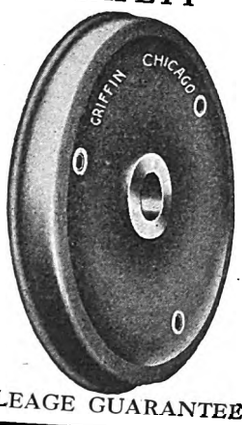

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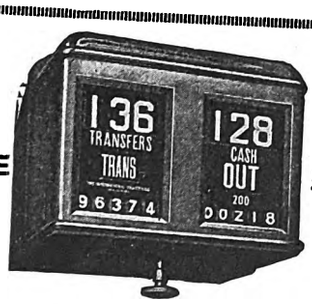

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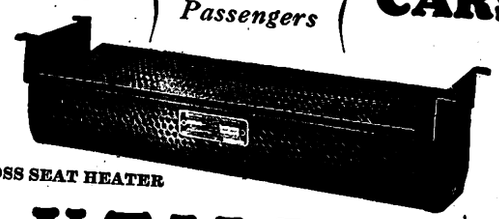

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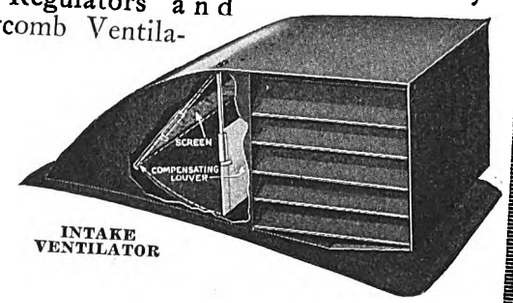

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Ramapo Automatic Return Switch Stands allow cars to trail through closed switches but return the points to the original setting. The target follows the points and indicates their exact position.

Installation of this equipment reduces maintenance work and speeds up schedules while promoting safety. Widely used by prominent electrical railways.

Behind Racor Service stand nine plants specializing in the manufacture and distribution of railroad track turnout and crossing equipment. Manganese work for heavy traffic.

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RACOR PACIFIC FROG & SWITCH CO. Los Angeles — Seattle

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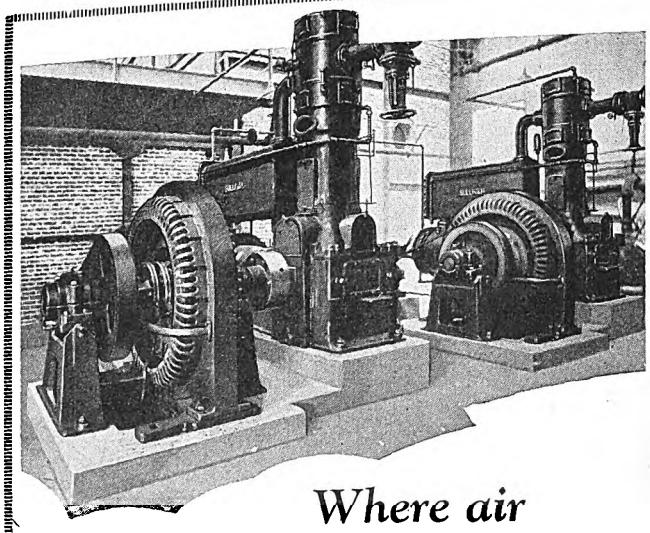
METROPOLITAN BANK BLDG, WASHINGTON
BUILDERS EXCHANGE BLDG, ST. PAUL

CANADIAN RAMAPO IRON WORKS LTD. Niagara Falls, Ontario

Nine Racor Works
Hillburn, New York. Niagara Falls, N.Y. Chicago, Illinois. East St. Louis, Ill. Superior, Wis. Pueblo, Col. Los Angeles, Cal. Seattle, Wash. Niagara Falls Ont.



Where air earns profits in 10 ways

Eighty miles of lumber in eight hours made in the Weyerhaeuser Clearwater Mill! A trifle saved per thousand board feet, means a worthy dividend.

So air power by Balanced Angle Compressors is doing ten tasks.

Air controls seventy dry kilns, preparing new lumber for shipment in ten days. It pumps water, opens and closes boiler dampers, changes band saws, runs pneumatic tools, controls 19,000 fire sprinklers and a fire alarm System.

BALANCED ANGLE COMPOUND SULLIVAN

For the Weyerhaeuser Lumber Company is clean, and flexible. Buys and applies air scientifically. And—like leaders in every industry — they use Balanced Angle Compressors. Send for *Booklet 83-J.*

Sullivan Machinery Company
809 Wrigley Building, Chicago, Ill.

PANTASOTE

TRADE MARK

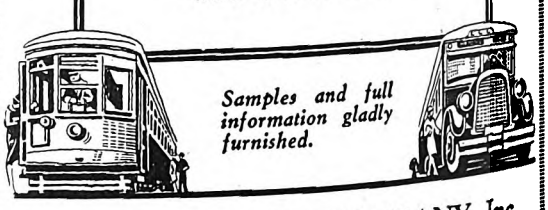
—the car curtain and upholstery material that pays back its cost by many added years of service. Since 1897 there has been no substitute for Pantasote.

AGASOTE

TRADE MARK

—the only panel board made in one piece. It is homogeneous and waterproof. Will not separate, warp or blister.

Standard for electric railway cars and motor buses



Samples and full information gladly furnished.

The PANTASOTE COMPANY, Inc.
250 Park Avenue NEW YORK

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EMPLOYMENT and BUSINESS OPPORTUNITIES—USED and SURPLUS NEW EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 5 cents a word, minimum $1.00 an insertion, payable in advance.

Positions Vacant and all other classifications, excepting Equipment, 10 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

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Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 inch $6.00
2 to 3 inches..... 5.75 an inch
4 to 7 inches..... 5.50 an inch

Other spaces and contract rates on request.

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

R.J.

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ACTIVE, ambitious young man wanted for position of street and interurban railway superintendent. Man of technical training and experience in operating responsibility desired. Must furnish references and complete statement of experience. An excellent executive opportunity with rapidly growing street and interurban railway system in the Middle West. P-192, Electric Railway Journal, 520 No. Michigan Ave., Chicago, Ill.

POSITIONS WANTED

ARMATURE and field winder desires change to where first-class work is wanted. Have wide experience and know other electrical work. Will go anywhere. Single, 35. PW-191, Electric Railway Journal, 883 Mission St., San Francisco, Calif.

When Writing Your Ad

Provide an indexing or subject word.

Write it as the first word of your ad.

If it is a Position Wanted or Position Vacant ad, make the first word the kind of position sought or offered.

This will assure proper classification in the column. The right is reserved to reject, revise or properly classify all Want Advertisements.

Proper Classification increases the possibility of Prompt Returns

New "SEARCHLIGHT" Advertisements

must be received by 3 P.M., the 15th of the month to appear in the issue out the 1st of the month.

Address copy to the Searchlight Department

Electric Railway Journal

Tenth Ave. at 36th St., New York City

POSITIONS WANTED

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MR. MANAGER—R. W. Bixby, Inc., offers for your consideration a man of unusual experience and qualifications for the position of Superintendent of Transportation or Assistant Manager. He has had a broad and long experience and possesses a record endorsed by executives of standing in the street railway industry. He has the faculty of gaining the confidence, good will and cooperation of employers, public officials and the public, and has had unusual success in both increasing revenue and decreasing operating costs. Conditions in his present position make him available on short notice. Should you be interested we will be pleased to send you complete details, and if you prefer all correspondence will be kept in strict confidence. Please address me personally, L. A. Bellinger, 268 Main St., Buffalo, N. Y.

FREE BULLETINS

MONTHLY Bargain Sheet—a practical handbook of available used electrical equipment, ranging through over 40 classifications from electric driven air compressors, generators and motors to welding sets, with prices and information as to purchase, rental and repair terms. Send for November Monthly Bargain Sheet of Gregory Electic Company, Lincoln and Sixteenth Sts., Chicago, Ill.

MIDGLEY Steel Products Corp., 8 North Front St., Philadelphia, Pa.—Bulletin reviews some of the 15,000 new and used pneumatic tools carried in stock, with sizes and prices. Company specializes in this class of equipment with repair parts for all makes of tools and testing and repair service.

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For Security Distribution

Corrected regularly—Sold with a guarantee

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IMMEDIATE SHIPMENT

FOUR BURNEY CARS

in good condition. Any reasonable offer accepted.

FS-195, Electric Railway Journal
Tenth Ave. at 36th St., New York City

FOR SALE

500 KW. MOTOR GENERATOR SET

1—500 kw. General Electric Compound Interpole Direct Current Generator, Type MPC, 600 v., 720 r.p.m., direct connected to 700 hp. General Electric synchronous motor, 3 ph., 60 cycle, 2300 volts.

Excellent condition.

The National Power Machinery Company
1922 Scranton Road, Cleveland, Ohio

THE PERRY, BUXTON, DOANE CO.

New and Relaying Rails

All Weights and Sections

We specialize in buying and dismantling entire Railroads, Street Railways, and all other industrial properties which have ceased operation. We furnish expert appraisals of all such properties.

May We Serve You?

THE PERRY, BUXTON, DOANE CO.

Rail Department, Philadelphia, Pa. General Department, Boston, Mass.

Pacific Sales Office—Failing Building, Portland, Oregon

WANTED

STREET RAILWAYS

We are in the market at all times to purchase and dismantle abandoned street railways. Highest prices paid.

M. K. FRANK
Park Row Bldg., New York

Controllers K-35-HH

Five wanted, second hand, in good operating condition.

W-194, Electric Railway Journal
520 No. Michigan Ave., Chicago, Ill.

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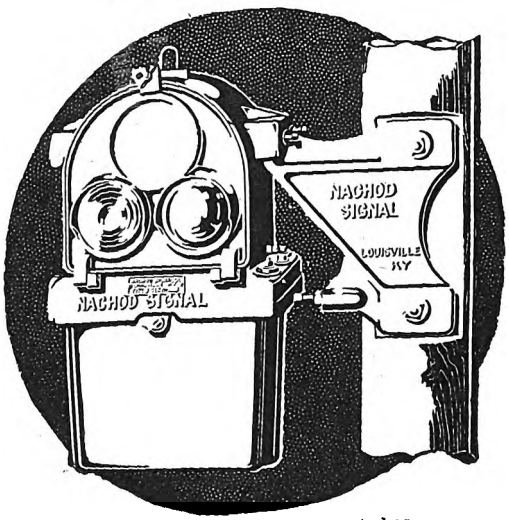
Do You Gamble?

...with Lives, Money and Equipment as stakes?



Type CD — the signal that has brought greater safety to hundreds of electric railways.

IT'S always a gamble when the human element must be depended upon without any automatic check for safe operation. And it's a gamble fraught with disaster—where the loss from a single crash might exceed by many dollars the cost of automatic control.

A forgotten order—a memory lapse—these are ever-present risks where only the conscious acts of employees are depended upon for safety.

Nachod Automatic Block Signals operate independently of the car crew—the movement of the car itself operates them.

The Type CD Signal for single track shows when the block is clear or, if occupied, which way the car is moving. On a clear block it tells the motorman when he has set the stop signal at the other end, shows the car following into the block that it is already occupied, and gives each motorman an indication that he is protected in entering. The system is Permissive, allowing several cars to follow into the same block under full protection.

NACHOD SPELLS SAFETY

The times demand fast schedules. **Nachod Automatic Block Signals assure safe operation at high speeds.**

Write for details.

NACHOD & UNITED STATES SIGNAL CO., Inc.

Louisville, Ky.

We Also Manufacture

Turn-right Signals, Signals for Single and Double Track, Stub End Signals, Annunciator Signals, Highway Crossing Signals, Headway Recorders.

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